VELAMMAL INSTITUTE OF TECHNOLOGY
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
Focussed Question Bank –Part A with answers
EC6802 Wireless Netorks -R2013
UNIT 1
WIRELESS LAN

1.What is infrared transmission ?

Ans: Infrared light transmission is one of the important technology used in wireless LAN. It is based on the transmission of infrared light at 900nm wavelength.

2.What is the principle behind infrared technology

Ans: Infrared technology uses diffuse light reflected at walls, furniture etc.. or directed light when line of sight(LOS) exists between sender and receiver.

3.what are the advantages of infrared technology

Ans: a. Shielding is easy and no need for licence for infrared technology.
b. Electrical devices do not interfere with infrared transmission.

4.What are the disadvantages of infrared transmission

Ans: a. Low bandwidth
b. Cannot penetrate through walls or other obstacles.

5.Define spread spectrum

Ans: Spread spectrum involve spreading the bandwidth needed to transmit data. The main advantage of using spread spectrum is the resistance to narrow interference.

6.What are the spread spectrum techniques

Ans: There are two basic methods for spread spectrum transmissions.
   a.Direct Sequence Spread Spectrum (DSSS)
   b.Frequency Hopping Spread Spectrum(FHSS)

7.What is the principle behind FHSS

Ans: Frequency Hopping Spread Spectrum is evolved in order to avoid jamming. Here in this method, the transmitter shifts the center frequency of transmitted signal. The shifts in frequency or frequency hops, occur according to a random pattern is known only to the transmitter and receiver.

8.What is IEEE 802.11

Ans: The IEEE 802.11 is the first WLAN standard that has secured the market in large extent. The primary goal of the standard was the specification of a simple and robust that offers time bounded and asynchronous services.

9.Define SIFS

Ans: Short IFS is the shortest IFS used for the high priority frames like acknowledgement frames, CTS frames, poll response etc.

10. What is DIFS
Ans: DCF- IFS is used for transmitting data frames. It is equal to SIFS plus two time slots and is the longest inter frame gap.

11. What is the need for WATM
Ans: WATM systems had to be designed for transferring voice, classical data, video, multimedia etc.

12. What is HIPERLAN
Ans: The HIPERLAN stands for High Performance Radio LAN is an initiation of RES-10 group of the ETSI as a PAN European standard for high speed wireless local networks.

13.What is Bluetooth
Ans: Bluetooth is an inexpensive personal area adhoc network operating in unlicensed bands and owned by the user.

14. What is piconet and scatternet
Ans: Bluetooth specification defines a small cell called as piconet which has upto 8 devices grouped together. Two or more piconets grouped together known as scatternet.

15. What type of modulation is used in Bluetooth
Ans: Bluetooth uses Gaussian-shaped Frequency shift keying (GFSK) modulation with a nominal modulation index of K=0.3

16. What is the need for WIMAX
Ans: The main reason for the development of wimax(World Interoperability Microwave Access) is the demand of high data rates not only the faster downloading but also for the use of new applications like voip, video streaming multimedia conferencing and interactive gaming.

17. What is WIMAX
Ans: Wimax is the air interface for the actual radio interface network, where both fixed and mobile users can have access to the network. Its specification is IEEE 802.16

18. Explain the throughput feature in WIMAX
Ans: Wimax supports throughput upto 63Mbps on the downlink and 28 Mbps on the uplink, assuming a 10Mhz bandwidth channel with TDD frames and with 64 QAM 5/6 as modulation scheme.

19. What are the frequency bands in IEEE802.16
Ans: The 802.16 standard defines a number of air interfaces that can be divided into,
1. 10-66Ghz licensed bands
2. Below 11Ghz licensed bands
3. Below 11Ghz Unlicensed bands

PART B

1.Explain IEEE 802.16 with neat illustrations
2.What is Bluetooth.Explain its protocol model with applications
3.What is WLAN.Explain protocol model of IEEE802.11 with physical and MAC layer
4.What is WLAN.Explain with neat diagrams its general architecture
5.Discuss about HIPERLAN 1 and compare it with HIPERLAN 2

UNIT 2
MOBILE NETWORK LAYER
Part A

1.What is a mobile IP
Ans: Mobile IP is a protocol developed to allow internetwork mobility for wireless nodes without them having to change their IP addresses.

2.What are the benefits of Mobile IP
Ans: The major benefit of Mobile IP is that it frees the user from a fixed location. Mobile IP makes invisible the boundaries between attachment points, it is able to track and deliver information to mobile devices without needing to change the device's long-term Internet Protocol(IP) addresses.

3.What is care of Address (COA)
Ans: The Care of Address defines the current location of the MN from an IP point of view. All IP packets sent to the MN are delivered to the COA, not directly to the IP address of the MN.

4.What is agent advertisement
Ans: HA and FA advertise their presence periodically using Agent advertisement messages. These advertisement messages can be seen as a beacon broadcast into the subnet.

5.What is need for registration
Ans: The main purpose of the registration is to inform the HA of the current location for correct forwarding of packets.

6.Define encapsulation and decapsulation
Ans: Encapsulatin is the mechanism of taking a packet consisting of packet header and data a putting into the data part of a new packet. The revrese operation, taking a packet out of the data part of another packet, is called decapsulation.

7.What is route optimization
Ans: Route optimization permits the correspondent node(CN) to learn the current location of the MN and tunnel its own packets directly. The route can be optimized by informing the CN of the current location to the MN.

8.What is triangle routing
Ans: Tunneling in its simplest form has all packets to home network(HA) and then sent to MN via a tunnel. The inefficient behavior of a non-optimized mobile IP is called triangular routing.

9.What is DHCP

Ans: The Dynamic Host Configuration Protocol(DHCP) is based in the Bootstrap Protocol (BOOTP), which provides the framework for passing configuration information to hosts on a TCP/IP network. DHCP adds the capability to automatically allocate reusable network addresses and configuration options to Internet hosts.

10.What is SIP

Ans: The Session Initiation Protocol(SIP) is an application-layer(signaling) protocol for creating, modifying and terminating sessions with one or more participants. It is a IETF(Internet Standard) RFC 3261 protocol.

11.Define MANET

Ans: A mobile ad hoc network (MANET) is a continuously sef-configuting, infrastructure-less network of mobile devices connected without wires. Ad hoc is Latin and means "for this purpose".

12.What is DSDV

Ans: Distance-Vector Routing(DSDV) is a table-driven routing scheme for ad hoc mobile networks. The main contribution of the algorithm was to solve the routing loop problem.

PART B

1.Discuss briefly about agent discovery process in Mobile IP

2.Explain about registration process in mobile IP

3.Discuss in detail about IPV6

4.What are the solutions recommended for micromobility support ?

5.Discuss about DHCP in detail

6.Explain briefly about SIP

7.Explain with and example a.DSR, b.DSDV

UNIT 3
MOBILE TRANSPORT LAYER

1.Define traditional TCP?

Ans: The Transmission Control Protocol (**TCP**) is one of the core protocols of the Internet protocol suite, often simply referred to as **TCP**/IP. In the Internet protocol suite, **TCP** is the intermediate layer between the Internet layer and application layer.

2.What are the services of TCP ?

Ans : TCP provides connection oriented, reliable , byte stream service that is both flow and congestion control to the upper layers .

3.What are the algorithms used for congestion control in TCP

Ans: The congestion control functionality of TCP is provided by four main algorithms namely:
  ➢ Slow start
  ➢ Congestion avoidance

> ➤ Fast retransmit
> ➤ Fast recovery

4.What is slow start mechanism

 Ans:TCP slow start is an algorithm which balances the speed of a network connection. Slow start gradually increases the amount of data transmitted until it finds the network's maximum carrying capacity.

5.What is fast retransmit algorithm in TCP

Ans: In TCP/IP, fast retransmit and recovery (FRR) is a congestion control algorithm that makes it possible to quickly recover lost data packets. Without FRR, the TCP uses a timer that requires a retransmission timeout if a packet is lost. No new or duplicate packets can be sent during the timeout period. With FRR, if a receiver receives a data segment that is out of order, it immediately sends a duplicate acknowledgement to the sender.

6.What is congestion avoidance algorithm

Ans: In congestion avoidance algoritm a retransmission timer expiring or the reception of duplicate ACKs can implicitly signal the sender that a network congestion situation is going on.
The sender immediately sets its transmission winow to one half of the current window size, but to at least two segments

7.What are the techniques for classical TCP improvements
Some of the techniques for classical TCP improvements are ,
Indirect TCP
Mobile TCP
Snooping TCP

8.Explain Indirect TCP
> ➤ Indirect TCP or I-TCP segments the connection
>> ❑ no changes to the basic TCP protocol for hosts connected to the wired Internet, millions of computers use this protocol (or slight variants of it)
>> ❑ optimized TCP protocol for mobile hosts
>> ❑ splitting of the TCP connection at, e.g., the foreign agent into 2 TCP connections, no real end-to-end connection any longer
>> ❑ hosts in the fixed part of the net do not notice the characteristics of the wireless part

9.What are the advantages and disadvantages of I-TCP
> ➤ Advantages
>> ❑ no changes in the fixed network necessary, no changes for the hosts (TCP protocol) necessary, all current optimizations to TCP (Reno, Vegas, etc.) still work
>> ❑ transmission errors on the wireless link do not propagate into the fixed network
>> ❑ simple to control, mobile TCP is used only for one hop between, e.g., a foreign agent and mobile host

❑ therefore, very fast retransmission of packets is possible, the short delay on the mobile hop is known
➢ Disadvantages
❑ loss of end-to-end semantics, an acknowledgement to a sender does now not any longer mean that a receiver really got a packet, foreign agents might crash
❑ higher latency possible due to buffering of data within the foreign agent and forwarding to a new foreign agent

10. What are the advantages and disadvantages of Mobile TCP?
➢ Advantages
❑ maintains semantics, supports disconnection, no buffer forwarding
➢ Disadvantages
❑ loss on wireless link propagated into fixed network
❑ adapted TCP on wireless link

11. What is main function of snooping TCP?
The main function is to buffer data close to the mobile host to perform fast local retransmission in case of packet loss

12. What is time-out freezing?
The MAC layer informs the TCP layer about an upcoming loss of connection or that the current interruption is not caused by congestion. TCP then stops sending and freezes the current state of its congestion window and further timers.

13. What are the advantages and disadvantages of time-out freezing?
➢ Advantage
❑ scheme is independent of data
➢ Disadvantage
❑ TCP on mobile host has to be changed, mechanism depends on MAC layer

14. What is selective retransmission?
Selective retransmission (occasionally called "**selective repeat**") is an ARQ protocol, used to request **retransmission** of lost or corrupt packets in a communications network

15.Compare the different approaches for "mobile" TCP?

Approach	Mechanism	Advantages	Disadvantages
Indirect TCP	splits TCP connection into two connections	isolation of wireless link, simple	loss of TCP semantics, higher latency at handover
Snooping TCP	"snoops" data and acknowledgements, local retransmission	transparent for end-to-end connection, MAC integration possible	problematic with encryption, bad isolation of wireless link
M-TCP	splits TCP connection, chokes sender via window size	Maintains end-to-end semantics, handles long term and frequent disconnections	Bad isolation of wireless link, processing overhead due to bandwidth management
Fast retransmit/ fast recovery	avoids slow-start after roaming	simple and efficient	mixed layers, not transparent
Transmission/ time-out freezing	freezes TCP state at disconnect, resumes after reconnection	independent of content or encryption, works for longer interrupts	changes in TCP required, MAC dependant
Selective retransmission	retransmit only lost data	very efficient	slightly more complex receiver software, more buffer needed
Transaction oriented TCP	combine connection setup/release and data transmission	Efficient for certain applications	changes in TCP required, not transparent

PART-B

1. Explain briefly about various algorithms to control the congestion in TCP.
2. What are the various schemes to improve the performance of TCP.
3. Discuss about TCP over 3G wireless networks.
4. What are the parameters to adapt TCP to wireless environments.

UNIT – 4
WIRELESS WIDE AREA NETWORK
PART-A

1. What are the applications of 3G?
   Ans: Applications for a 3G wireless network range from simple voice-only communications to simultaneous video, data, voice and other multimedia applications.

2. What is UMTS?
   Ans: Universal Mobile telecommunications services(UMTS) is a new radio access network based on 5MHz WCDMA and optimized for efficient support of 3G services. UMTS can be used in both new and existing spectra.

3. What is Radio Resouce Control(RRC).
   Ans: The radio resource control(RRC) layer broadcasts system information, handles radio resources such as code allocation, handover, admission control, measurement/control report.

4. What is Transport Network Control Plane(TNCP)
   Ans: The transport network control plane(TNCP) carries information for the control of transport network used within UCN.

5. What is 3G-SGSN
   Ans: The 3G-SGSN(Serving GPRS Support Node) provides the appropriate signaling and data interface that includes connection to an IP-based network toward the 3G-GGSN, SS7 towards the HLR/EIR/AUC and TCP/IP or SS7 toward and UTRAN.

6. What is 3G-GGSN
   Ans: The GGSN(Gateway GPRS Support Node) is connected with SGSN via an IP-based network. It provides interworking with the external PS network.

7. What is SMS-GMSC
   Ans: The SMS-GMSC(Gateway MSC) is a MSC can receive a terminated short message fom a service center, interrogates with an HLR for routing information and SMS information, and deliver the short message to the SGSN of the recipient UE.

8. What is firewall
Ans: To protect the service providers backbone data networks from attack firewall is used. By applying packet filtering mechanisms based on access control lists the security of the backbone data network can be assured.

9. What is DHCP?
   Ans: A dynamic host configuration protocol server is used to handle the allocation of IP configuration information by assigning IP addresses to systems configured to use SHCP automatically.

10. What is the objective of High-Speed Downlink Packet Access(HSDPA)
    Ans: The principal objective behind HSDPA is to provide a cost-effective, high bandwidth, low-delay, packet-oriented service within UMTS.

11. What is LTE?
    Ans: Long Term Evolution(LTE) has been designed to support only packet-switched services. It aims to provide seamless Internet Protocol(IP) connectivity between user equipment(UE) and the packet data network(PDN), without any disruption to the end users applications during mobility.

12. What is SCTP?

Ans: The SCTP protocol is well known for its advanced features inherited from TCP that ensure the required reliable delivery of the signaling messages. In addition it makes it possible to benefit from improved features such as the handling of multi-streams to implement transport network redundancy easily and avoid head-of-line blocking or multi-homing.

PART-B

1. Explain about services of UMTS.
2. Describe in detail about logical interfaces of UTRAN.
3. Explain about LTE architecture and its protocol model.
4. Describe about UMTS core network architecture with neat illustrations.
5. With neat illustrations explain about UMTS terrestrial radio access network.

UNIT – 5
4G NETWORKS
PART A

1.What are the main functions of cognitive radio

Ans: The main functions of cognitive radio are spectrum sensing, dynamic spectrum management and adaptive communications.

2.Define cognitive radio

Ans: "A radio that can change its transmitter parameters based on interaction with the environmentin which it operates".

3.What is time slot scheduler

Ans:The time slot scheduler shares the spectrum efficiently between users by satisfying the QoS requirements. When the channel quality for each radio link can be predicted for a short duration into the future and accessible by the link layer,then ARQ together with an adaptive modulation and coding system can be selected for each user to satisfy the biterror rate requirement and offer high throughput.

4.What is MIMO

Ans:MIMO represents multiple individual,parallel data streams that are carried on the air interface.

5.What are the challenges of 4G

Ans: The main challenges are:
  ➢ Multimode User Terminals
  ➢ Wireless System discovery and selection
  ➢ Terminal Mobility
  ➢ Network Infrastructure and QoS support

6.What are the main issues in terminal mobility of 4g

Ans: There are two main issues in terminal mobility :
  ➢ Location management

> ➢ Handoff management

7.Define 4G
Ans:4G can be defined as MAGIC
> ➢ Mobile Multimedia
> ➢ Anytime Anywhere
> ➢ Global Mobility Support
> ➢ Customized Personal services

8.What are the goals of 4G
Ans: The ambitious goal of 4G is to allow everyone t access the internet anytime and everywhere. The provided connection to internet will allow users to access all type of services including text.databases, and multimedia.

9.What are the features of 4G Wireless systems
Ans: The following are some possible features of the 4G systems :
> ➢ Support interactive multimedia,voice,video,wireless internet and other broadband services
> ➢ High Speed,high capacity and low cost per bit

10.Discuss about security challenge in 4G
Ans: The security challenge with IP networks is one of the most significant facros that slows down the further adoption of network technologies . An end to end system approach to security is required in next generation wireless networks.

11.What are the approaches to overcome security and privacy issues in 4G
Ans: To overcome the security and privacy issues, 2 approached can be followed:
To modify he existing and security and privacy methods so they will be applicable to heterogeneous 4G networks.

12.How 4G can be applied in education field
Ans: Distance education is a viable option nowadays for many students .4G will provide them with real time classroom experience .This will prove beneficial in coming days as it can be instrumental in reducing infrastructure demands of universities and colleges to accommodate the rising number of students .

13.Discuss briefly about single input single output
Ans: In SISO, there is one input and one output in the radio channel. If the channel bandwidth is B, the transmitter power is P_t , then signal at the receiver has an average signal to noise ratio of SNR_0,
Here the Shannon limit on channel capacity C is
$C= B \log_2(1+SNR_o)$

14.What are the benefits of 4G systems
Ans: The 4G systems serve both next generation obileservices and fixed wireless networks. 4G technology is designed to provide a wide variety of new wireless channels .

PART B

1.Compare the key parameters of 3G with 4G

2.Discuss about 4g vision,features and challenges of 4G with applications

3.Discuss about various technologies used in 4G

4.What is cognitive radio- Explain.