

## CS2402 MOBILE AND PERVASIVE COMPUTING

YEAR & SEM : IV & VII CSE

### UNIT I MOBILE NETWORKS

Cellular Wireless Networks – GSM – Architecture – Protocols – Connection Establishment – Frequency Allocation – Routing – Mobility Management – Security – GPRS.

### UNIT II WIRELESS NETWORKS

Wireless LANs and PANs – IEEE 802.11 Standard – Architecture – Services – Network – HyperLAN – Blue Tooth- Wi-Fi – WiMAX

### UNIT III ROUTING

Mobile IP – DHCP – AdHoc– Proactive and Reactive Routing Protocols – Multicast Routing.

### UNIT IV TRANSPORT AND APPLICATION LAYERS

Mobile TCP– WAP – Architecture – WWW Programming Model– WDP – WTLS – WTP – WSP – WAE – WTA Architecture – WML – WMLScripts.

### UNIT V PERVASIVE COMPUTING

Pervasive computing infrastructure-applications- Device Technology - Hardware, Human-machine Interfaces, Biometrics, and Operating systems– Device Connectivity – Protocols, Security, and Device Management- Pervasive Web Application architecture- Access from PCs and PDAs - Access via WAP

#### TEXT BOOKS:

1. Jochen Schiller, “Mobile Communications”, PHI, Second Edition, 2003.
2. Jochen Burkhardt, Pervasive Computing: Technology and Architecture of Mobile Internet Applications, Addison-Wesley Professional; 3rd edition, 2007

#### REFERENCES:

1. Frank Adelstein, Sandeep KS Gupta, Golden Richard, Fundamentals of Mobile and Pervasive Computing, McGraw-Hill 2005
2. Debashis Saha, Networking Infrastructure for Pervasive Computing: Enabling Technologies, Kluwer Academic Publisher, Springer; First edition, 2002
3. Introduction to Wireless and Mobile Systems by Agrawal and Zeng, Brooks/ Cole (Thomson Learning), First edition, 2002
4. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, Principles of Mobile Computing, Springer, New York, 2003

**CS2402 - MOBILE AND PERVASIVE COMPUTING**  
**2 MARKS QUESTION AND ANSWER**

**Unit-I**

**1. How are guard spaces realized between users in CDMA?**

**Ans:** The guard space between a pair of users in CDMA systems is the orthogonality between their spreading codes. The lower the correlation between any pair of spreading codes is, the better is the user separation.

**2. List out the advantage of cellular system.**

**Ans:** Advantages:

- . Higher capacity, higher number of users
- . Less transmission power needed
- . More robust, decentralized
- . Base station deals with interference, transmission area etc. locally

**3. What limits the number of simultaneous users in a TDM/FDM system compared to a CDM system?**

**Ans: limits of users in a TDM/FDM**

FDM: No dynamic coordination necessary

TDM: Only one carrier in the medium at any time

**4. If 8 speech channels are supported on a single radio channel, and if no guard band is assumed, what is the number of simultaneous users that can be accommodated in GSM?**

**Ans:** 1000 users

**5. How to improve signal reception by counteracting the negative effects of multi path propagation?**

**Improve signal reception by counteracting the negative effects of multi path propagation:**

- Smart antennas are used to improve the signal reception in multi path propagation
- The dual purpose of a smart antenna system is to augment the signal quality of the radio-based system through more focused transmission of radio signals while enhancing capacity through increased frequency reuse.

**6. Discuss about the frequency division duplex scheme.**

**Frequency Division Duplex Scheme:**

- Two partners typically establish a duplex channel, i.e., a channel that allows for simultaneous transmission in both directions.
- The two directions, mobile station to base station and vice versa are now separated using different frequencies.

**7. List the three different categories of services of GSM.**

**Three Different Categories of Service of GSM:**

- Bearer Service
- Tele Service
- Supplementary Service

8. Why are electromagnetic waves with very low frequency not used for data transmission in computer networks?

**Electromagnetic waves with very low frequency not used for data transmission in computer networks:**

- Lower frequencies also mean lower data rates according to Nyquist / Shannon as the available bandwidth is less
- Lower frequencies also require large antennas for efficient transmission and reception
- Lower frequencies penetrate materials more easily. There SDM is more difficult . Cell size would increase dramatically and frequency reuse would be almost impossible.

9. What are the main benefits of spread spectrum?

**Main benefits of spread spectrum:**

- Very robust against interference
- Inherent security (If the spreading code is unknown it is very difficult to tap the transmission)
- Basic for CDMA technologies
- Can be used in the .background. of existing system if the signal level is low enough.

10. What are the reasons for delays in GSM for packet data traffic?

**Reasons for delays in GSM for packet data traffic:**

- CS: Common Setup (some second)  
FEC Coding / decoding and interleaving (about 100ms) propagation delay (some ms)
- PS: Channel access (depending on the current load)  
FEC Coding / decoding and interleaving (about 100ms) propagation delay (some ms)
- Experiments show that packets in GPRS may experience heavy delays due to channel access delays: 200 . 500 ms for 128 byte packets, several seconds for 1 . 4 byte packet.

11. Differentiate hard and soft hand . off.

**Hard Hand - Off**

Occurs in GSM  
Available in FDD / TDD modes  
Inter frequency handover, Inter system handover

**Soft Hand - Off**

Occurs in UMTS  
Available only in FDD mode  
Macro diversity

12. Differentiate analog modulation and digital modulation.

**Analog Modulation**

- i) AM is able to continuously change the amplitude, frequency, or phase of the carrier.
- ii) Is to send computer information over transmission channels that require analog signals, like a fiber optic networks, computer modems, cellular phone networks, and satellite systems.

**Digital Modulation**

- i) There are only discrete values of these attributes that correspond to digital codes.
- ii) A digital signal can be transmitted over a dedicated connection between two or more users.

13. How are guard spaces realized between users in CDMA?

**Guard Spaces:**

The guard space between users in CDMA systems is the orthogonality between the spreading codes. The lower the correlation is, the better is the user separation.

14. What are the disadvantages of small cells?

**Disadvantages of Small cells:**

- Infrastructure needed
- Handover needed
- Frequency planning

15. What are the handover types in the satellite?

**Types of Handover in the satellite: (6)**

- Intra-satellite handover
- Inter satellite handover
- Gateway handover
- Inter system handover

16. Which elements of the network perform the data transfer

**Ans:** Physical medium

## Unit –II

### 1. Is IEEE 802.11 and Wi Fi same/ State the purpose of WiFi.

**Ans:** No

It is wireless internet. Your laptop has an internal wireless card so you can connect to wireless routers. If you goto a hotel that advertises free wireless internet, you should be able to connect to it. You don't have to have an ethernet cable to connect to the web at home either.

### 2. Why Bluetooth specification comprises so many protocols and components?

**Ans:** The Bluetooth protocol stack, in common with all such standards, is specified as several separate layers

### 3. Compare the different types of transmission errors that can occur in wireless and wired networks.

**Ans: Types of Error:**

Data loss

Noise

Low power

### 4. What are the two different basic transmission technologies used to set up WLANs?

**Two Different Basic Transmission Technologies used to set up WLANs:**

- Infra red light
- Radio transmission

### 5. List the different user scenarios for wireless piconets.

**Different user scenarios for wireless piconets:**

- Connection of peripheral device
- Support of ad-hoc networking
- Bridging of networks

### 6. Why is the physical layer in IEEE 802.11 subdivided?

**Physical layer in IEEE 802.11 subdivided:**

- Depending on transmission technology, bandwidth, etc, different physical layers exist.
- They all share a common MAC.
- In order to adapt the different lower parts of the physical layer a sub layer offers common function required by MAC, eg. Carrier sensing.

### 7. How is mobility restricted using WLANs?

**Mobility restricted using WLANs:**

Mobility is restricted in WLANs to the coverage of a single access point. In order to support roaming additional inter access point protocols are needed.

### 8. What is HIPERLAN?

**HIPERLAN: (2)**

HIPERLAN stands for High Performance Local Area Network. The key

feature is to provide time . sensitive data transfer services.

There are,

- HIPERLAN 2
- HIPERACCESS
- HIPERLINK

9. How are mobility restricted using WLANs?

**Mobility restricted using WLANs:**

Mobility is restricted in WLANs to the coverage of a single access point.

In order to support roaming additional inter access point protocols are needed.

10. What are the three types of spacing,

- i) Short inter . frame spacing (SIFS)
- ii). PCF inter . frame spacing (PIFS)
- iii) DCF inter . frame spacing (DIFS)

11. What are the three methods followed in WLAN

Basic DFWMAC . DCF using CSMA / CA

- DFWMAC . DCF with RTS / CTS extension
- DFWMAC . DCF with Polling

12. What are the different phases in HYPERLAN?

**Different phases in HIPERLAN:**

- i. Prioritization
- ii. Contention
- iii. Transmission

13. What is a Scatternet?

**Scatternet:**

A scatternet is a number of interconnected piconets that supports communication between more than 8 devices. Scatternets can be formed when a member of one piconet (either the master or one of the slaves) elects to participate as a slave in a second, separate piconet.

14. What are the three types of logical channels provided by L2CAP?

**Three types of logical channels provided by L2CAP:**

- Connectionless
- Connection . oriented
- Signaling

15.) How do IEEE 802.11, HIPERLAN 2 and Bluetooth respectively, solve the hidden terminal problem?

**IEEE 802.11 solve hidden terminal problem:**

- Problem occurs is one station can receive two others, but those stations cannot receive each other

➤ Two stations may sense the channel is idle, send a frame and cause a collision at the receiver in the middle.

**16 .In the Distributed Coordination Function DCF protocol of IEEE 802.11, why does a Node wait only SIFS time units (after the last data packet reception) before sending an ACK, while waiting DIFS time units before attempting a data transmission?**

**Ans:** When the station receives a packet meant only for itself(not multicast or broadcast), it respond with an ACK after waiting only for SIFS gap. There are 2 effects:

- i. Because collision detection is not used, possibility of collision is greater
- ii. SIFS can be used to provide efficient delivery of an LLC protocol data unit that requires multiple MAC frames.

**17. What are the advantages and problems of forwarding mechanisms in Bluetooth networks regarding security and power saving?**

**Ans: Advantage:** Bluetooth network enables setting up of the network without much preparation. It sets itself automatically.

**Problems:** Security and power are major constraints. Security may be compromised and power may be spent on traffic not meant for a particular device.

**18. Why the PHY layer of IEEE 802.11 is subdivided? What about HiperLAN2 and Bluetooth?**

**Ans:**

PLCP Physical Layer Convergence Protocol

clear channel assessment

signal (carrier sense)

PMD Physical Medium Dependent

modulation, coding

PHY Management

channel selection, MIB

Station Management

coordination of all management

functions

**19 What is the functionality of L2CAP? List the different types of logical channels it provides.**

**Ans:** L2CAP takes data from higher protocol layers and applications and sends it over the lower layers. L2CAP passes packets either to HCI or in a host-less system, directly to LM. L2CAP utilities ACL connections. A separate control function is required to set up and close down these connections. L2CAP transfers data, not audio (voice or IP regard as data).

## Unit – III

### 1. What are the difference between AODV and the standard distance vector algorithm?

**Ans:** AODV is capable of both unicast and multicast routing. It is a reactive routing protocol, meaning that it establishes a route to a destination only on demand. Routers use distance vector-based routing protocols to periodically advertise the routes in their routing tables. Routing information exchanged between typical distance vector-based routers is unsynchronized and unacknowledged.

### 2. How can DHCP be used for mobility and support of mobile IP?

**Ans:** A protocol that enables an 802 mobile host to obtain a .home IP address,. and other configuration parameters via DHCP or BOOTP, while attached to either its home subnet or a foreign subnet.

### 3. What are the problems related to the use of DHCP?

#### **Problems related to the use of DHCP:**

➤ Without authentication, the mobile node cannot trust a DHCP Server, and the DHCP server cannot trust the mobile node.

### 4. Discuss some of the routing to be considered in a mobile network layer.

#### **Routing in a mobile network layer:**

- Destination sequence distance vector
- Dynamic source routing
- Least interference routing

### 5. Why is routing in multi . hop adhoc networks complicated?

#### **Routing in multi . hop adhoc networks complicated:**

Routing is complicated because of frequent topology changes, different capabilities of the nodes, varying propagation characteristics. Further, no control instance can support routing.

### 6. What is the basic purpose of DHCP?

#### **Basic purpose of DHCP:**

- DHCP is mainly used to simplify the installation and maintenance of networked computer
- DHCP is a mechanism for configuring nodes, parameters acquired via DHCP are eg., IP address, default gateway, DNS server, subnet mask, etc.

### 7. What could be quick solutions and why don.t they work?

#### **Quick Solution: (1)**

Quick solutions could be the permanent adaptation of the current IP address of a mobile node depending on the current location.

#### **Problem: (1)**

But then no correspondent node can find the mobile node (or a lot of signaling this current IP address would be necessary). Alternatively, all routers could change routing table to reflect the current location of the mobile node. This

5 obviously does neither scale nor it is secure . changing routing entries destabilizes the whole network.

8. What advantages does the use of IPV6 offer for mobility?

**Advantages of IPV6 in providing mobility: (2)**

Many mobility supporting function are already integrated in IPV6. An explicit FA is not needed any more; all routers are capable of agent advertisements, tunneling, forwarding of data, setting up security associations. Authentication is built . in as well as optimization functions.

9. What DSDV adds two component to the distance vector algorithm?

- i. Sequence Number
- ii. Damping

10. What DSR adds two component to the distance vector algorithm?

- Route Discovery
- Route Maintenance

**11. Tunneling and Encapsulation:**

- Encapsulation: is the mechanism of taking a packet consisting of packet header and data and putting it into the data part of a new packet.
- Tunnel: establishes a virtual pipe for data packet between a tunnel entry and a tunnel endpoint.

12. What are the three types of encapsulation.

- IP . in . IP Encapsulation (4)
- Minimal Encapsulation (5)
- Generic Routing Encapsulation

13. What is the need for encapsulation?

**Need for encapsulation:**

- To hide the original header information
- To provide data independence

14. Write about the requirements of Mobile IP.

**Requirements of Mobile IP: (6)**

- Compatibility
- Transparency
- Scalability and efficiency
- Security

15. How does the MN discover the foreign agent that it has moved?

**MN discovers the foreign agent that it has moved:**

- CN want to send the IP packet to FN
- The HA now intercepts the packet, knowing that MN is currently not in the home network

- The packet is not forwarded into the subnet as usual. But encapsulated and tunneled to COA.

16. Explain the Generic routing encapsulation.

**Generic Routing Encapsulation:**

- Generic routing encapsulation (GRE) allows the encapsulation of packets of one protocol suite into the payload portion of a packet of another protocol suite.

**17. How does registration on layer 3 of a mobile node work?**

**Ans** In the real system, a mobile node can connect to the network by using multiple interfaces with different access technologies such as WiFi, CDMA. At the same time it can perform multiple connections for multiple services such as video, voice, or just chatting.

**18. Specify the DHCP state transition diagram for acquiring the IP address.**

**Ans:** The client sends via a MAC broadcast a request to the DHCP server (Might be via a DHCP relay)

IP addresses have to be requested periodically, simplified protocol

**19. Specify the field of minimal encapsulation method in mobile network layer.**

**Ans: Minimal encapsulation**

- avoids repetition of identical fields
- e.g. TTL, IHL, version, TOS
- only applicable for unfragmented packets, no space left for  
o fragment identification

## Unit – IV

1. Why the TCP protocols used in wired networks cannot be as such used in wireless networks?

**TCP protocols used in wired networks cannot be as such used in wireless networks:**

- Any packet loss is considered to be the result of congestion and the congestion window size is reduced dramatically as a precaution
- Wireless links are known to experience sporadic and usually temporary losses due to fading, shadowing, hand off, and other radio effects, that cannot be considered congestion

2. How does I - TCP isolate problems on the wireless link?

**I . TCP isolate problems on the wireless link:**

- I . TCP splits the connection into two parts . a wired / fixed and a wireless / mobile part.
- I - TCP isolate problems on the wireless link from the fixed networks.

3. Write advantages and disadvantages of mobile TCP.

**Advantages of Mobile TCP: (1)**

1. It maintains the TCP end . to . end semantics. The SH does not sent any ACK itself but forwards the ACKs from the MH.
2. If the MH is disconnected, it avoids useless retransmissions, slow starts or breaking connections by simply shrinking the sender.s window to 0.
3. Since it does not buffer data in the SH as I-TCP does, it is not necessary to forward buffers to a new SH. Lost packets will be automatically retransmitted to the new SH.

**Disadvantages of Mobile TCP: (1)**

1. As the SH does not act as proxy as in I-TCP, packet loss on the wireless link due to bit errors is propagated to the sender. M-TCP assumes low bit error rates, which is not always a valid assumption.
2. A modified TCP on the wireless link not only requires modification to the MH protocol software but also now new network elements like the bandwidth manager.

4. Define fast retransmit.

**Fast Retransmit: (2)**

The gap in the packet stream is not due to severe congestion, but a simple packet loss due to a transmission error. The sender can now retransmit the missing packet before the timer expires. This behavior is called fast retransmit.

**5. WAP (Wireless Application Protocol):**

- WAP is a standard for mobile Internet applications. Its primary objective is to provide an open standard for optimized access via a mobile device to the

Internet or intranet.

6. Explain the concept of about traditional TCP.

**Traditional TCP:**

- Congestion Control (4)
- Slow Start (4)
- Fast Retransmit / Fast Recovery (4)
- Implication on Mobility

7. Write the goal of M . TCP.

**Goal of M . TCP:**

The goal of M . TCP is to prevent the sender window from shrinking if bit errors or disconnection but not congestion cause current problems. It wants,

- i. To provide overall throughput
- ii. To lower the delay
- iii. To maintain end . to . end semantics of TCP
- iv. To provide a more efficient handover

8. Explain the difference between wired network and ad-hoc wireless network related to routing.

**Difference between wired network and ad-hoc wireless network related to routing:**

Factor	Wired Network	Wireless Network
Asymmetric links	Routing algorithm asymmetric	Routing algorithm symmetric
Redundant links	Less number of redundant links.	More number of redundant link
Interference	Links exist only where a wire exist	Links come and go depending transmission characteristics.

9. How and why does I-TCP isolate problems on the wireless links?

**I-TCP isolate problems on the wireless links: (4)**

- I-TCP splits the connection into two parts . a wired/fixed and a wireless/mobile part.
- This isolates problems on the wireless link from the fixed network.
- However, this also requires that intermediate systems are able to look into IP packets to split the connection.

10. Which WTP class reflects the typical web access best?

**WTP class reflects the typical web access best:**

- WSP/B together with a class 2 transaction would be a good choice for standard web request/response schemes.
- The web expects a reliable protocol (that is why typically TCP is used) and works with transactions.

11. What are the enhancements of WAE to the classic client / server model of the web? What are the functions of this enhancement?

**Enhancements of WAE to the classic client / server model of the web:**

- Besides languages and content formats the WAE defines gateways between

clients and servers.

➤ As mobile devices can often not use the standard formats and protocols of servers (TCP, HTTP, SSL etc.), gateways translate between the classical fixed and the new mobile and wireless world.

**12. Can the problems using TCP for mobile communication be solved by replacing TCP with snooping TCP? Justify your answer.**

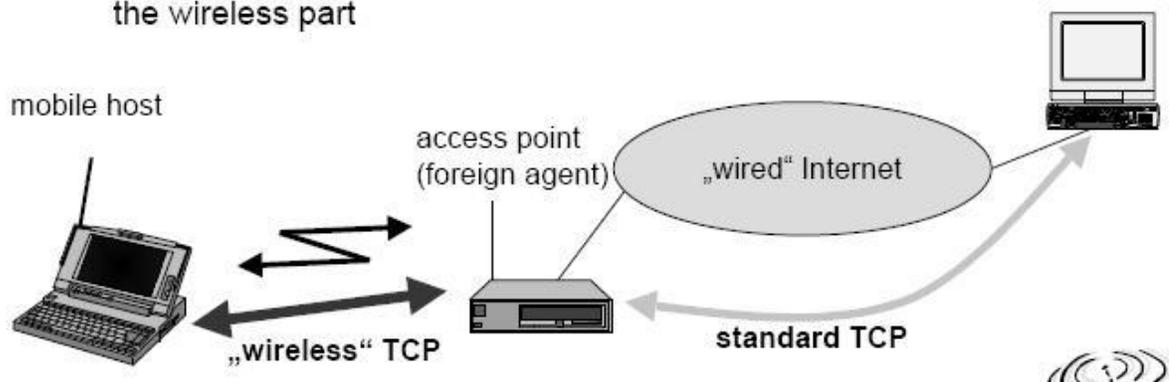
**Ans: yes**

- buffering of packets sent to the mobile host lost packets on the wireless link (both directions!) will be
- retransmitted immediately by the mobile host or foreign agent, respectively (so called .local. retransmission)
- the foreign agent therefore .snoops. the packet flow and recognizes acknowledgements in both directions, it also filters ACKs
- changes of TCP only within the foreign agent

**13. Compare and contrast I-TCP, Snooping TCP, and Mobile TCP.**

Indirect TCP or I-TCP segments the connection

- ❑ no changes to the TCP protocol for hosts connected to the wired Internet, millions of computers use (variants of) this protocol
- ❑ 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



**14 . What is the reaction of standard TCP in case of packet loss? In what situation does this reaction make sense and why it is quite problematic in the case of wireless networks and mobility?**

Change of foreign agent often results in packet loss

- ❑ TCP reacts with slow-start although there is no congestion

Forced fast retransmit

- ❑ as soon as the mobile host has registered with a new foreign agent, the MH sends duplicated acknowledgements on purpose
- ❑ this forces the fast retransmit mode at the communication partners
- ❑ additionally, the TCP on the MH is forced to continue sending with the actual window size and not to go into slow-start after registration

Advantage

- ❑ simple changes result in significant higher performance

Disadvantage

- ❑ further mix of IP and TCP, no transparent approach

15. Explain WAP Application Environment?

**WAP Application Environment** . Nominally viewed as the 'WAP Browser', the WAP 2.0 Application

Environment has evolved to embrace developing standards for Internet browser markup language. This has led

to the definition of the XHTML Mobile Profile (XHTMLMP). XHTMLMP is based on the modularity

framework of the eXtensible HyperText Markup Language (XHTML) developed by the W3C to replace and

enhance the currently used HTML language common today. The use of Internet technologies is not new for

WML, as WML1 is a fully conformant XML language in its own right.

## Unit – V

1. What is pervasive computing?  
Pervasive computing also called as ubiquitous computing is the trend toward embedding micro processors in everyday objects so that they can communicate information.
  
2. Discuss the problems of a file system in mobile environment.  
Problems of a file system in mobile environment:
  - Limited resources on portable devices
  - Low bandwidth of the wireless access
  - Cannot rely on large caches in the end . system or perform many updates via the wireless link.
  
3. What are the three technologies involved in pervasive computing?
  - i) Micro electronic technology.
  - ii) Digital communication technology
  - iii) The international standardization.
  
4. What are the Key characteristics of pervasive computing?
  - i) Multiple devices are integrated in the system.
  - ii) Devices are used for multipurpose
  - iii) A large no.of different interfaces are used to build an optimized user interface.
  - iv) Security elements are integrated to prevent unauthorized access.
  
5. What are application of pervasive devices?
  - i) Retail
  - ii) Airlines check in and booking
  - iii) Health care
  - iv) car information system
  - v) Tracking
  
6. What are the h/w device involved in pervasive computing?  
Batteries:
  - Nickel cadmium cell.
  - Nickel metal hybride(NiMH)
  - Lithium ion battery(Lion battery)

# CS 2402 MOBILE AND PERVASIVE COMPUTING QUESTION BANK

## 16 marks questions for five units

### UNIT-1

- 1) Discuss the advantage and disadvantage of cellular system with small cells
- 2) Explain FDMA in detail.
- 3) Discuss SDMA in detail.
- 4) Explain the various applications of mobile computing.
- 5) Why do MAC scheme in wired network fail in wireless networks and how does the multiple access with collision avoidance (MACA) scheme work.
- 6) Explain the architecture of GSM with a neat diagram.
- 7) How is routing carried out in GSM networks?
- 8) Explain in detail about
  - a. Mobile Terminated Call
  - b. Mobile Originated Call

With suitable diagrams

- 9) List the various handovers carried out in GSM and explain any one of them in detail.
- 10) How is Mobility Management done in GSM ?
- 11) Explain in detail about the General Packet Radio Service (GPRS)

### UNIT II

1. Explain in detail the three phases of EY-NMPA in Hiperlan.
2. List the various information bases in Hiperlan and explain the same.
3. Discuss the architecture of Bluetooth in detail.
4. Explain the architecture of WI FI in detail.
5. Explain the architecture of WIMAX in detail.
6. Describe Hiperlan architecture with suitable diagrams.
7. List out the various MAC management services and explain any 2 of them in detail.
8. Draw the MAC frame format and explain its various fields in detail.
9. Explain DFWMAC-DCF using CSMA /CA.
10. Explain DFWMAC-DCF with RTS/CTS extension.
11. Explain DFWMAC-DCF with polling.

### UNIT III

1. Explain how
  - a. End to End packet delivery is done in mobile IP
  - b. Agent advertisement is done in mobile IP
2. Explain how registration of a Mobile Node is carried out with appropriate request and reply packet formats.
3. Explain in detail about the IP in IP and minimal encapsulations.
4. Explain in detail about GRE encapsulation with the appropriate packet format.
5. Describe the process of optimization in Mobile IP with a suitable timeline diagram.
6. Explain in detail about DHCP.
7. Discuss DSDV routing in detail.
8. Discuss DSR routing in detail.
9. Why is conventional routing in wired networks not suitable for wireless networks? Substantiate your answers with suitable examples.
10. How is multicast routing carried out in ad-hoc networks?

### UNIT 1V

1. Explain in detail about WAP architecture.

2. Write notes on WDP and WTLS.
3. Write notes on wireless sessions protocol
4. Discuss about WAE.
5. Discuss about WTP and its classes.
6. Explain the following: Snooping TCP and Indirect TCP.
7. Explain about WML and WML script with the help of an example.
8. Explain classical TCP improvements and snooping TCP.
9. Discuss about the WWW programming model in detail.
10. Explain about the architecture of WTA.
- 1x. Aim for High dot blogspot dot com

#### UNIT V

1. Discuss in detail about any two Pervasive Applications of your choice in detail.
2. Explain about the various hardware components involved in Pervasive Computing Devices.
3. Write brief notes on the following.
  - a. Speech Recognition
  - b. Handwriting recognition
  - c. Haptic Interfaces
  - d. QWERTY and FITALY keyboards
4. Explain in detail about Bio-Metrics. List out its merits and demerits.
5. How is synchronization carried out in a Pervasive Environment? Write brief notes on the syncML tool.
6. What are the various issues related to device management and how are they dealt with?
7. Explain how a Pervasive Web Application can be secured using an 'Authentication Proxy'.
8. How security is achieved in MVC and JSP based applications?
9. Discuss in detail about the access from PCs.
10. How is access carried out in case of a PDA?
11. Explain in detail about access via WAP