

WIRELESS COMMUNICATION AND NETWORKS

EC701

Contacts: 3L

Credits: 3

MODULE – I

Cellular Mobile Wireless Networks: Systems and Design Fundamentals:

Brief introduction to mobile wireless communication and systems, Description of cellular system, Cellular Structure, Frequency Reuse, Cell clustering, Capacity enhancement techniques for cellular networks, cell splitting, antenna sectoring, Co-channel and Adjacent channel interferences, Channel assignment schemes – Fixed channel, Dynamic channel and Hybrid channel, mobility management – location management and handoff management, handoff process, different types of handoff. [6L]

Characteristics of wireless channel and propagation path loss models:

Different Multi-path propagation mechanisms, Multi-path effects on mobile communication, Fading, different types of fading, small and large scale fading, slow and fast fading, narrowband and wideband fading, Inter symbol interference, fast fading model, Doppler effect due to velocity of mobiles, Rayleigh envelop, free space propagation model, two ray ground reflection model, log distance path loss model, log normal shadowing model, macro and micro cell propagation models, types of base stations and mobile station antennas. [6L]

MODULE – II

Modern Mobile Wireless Communication Systems

Evolution strategies – First Generation (1G) to Fourth Generation (4G), Personal Area Networks :PAN, Low Tier Wireless System: Cordless Telephone, Second Generation (CT2), Digital European Cordless Telecommunications (DECT), Public wide-area Wireless Networks: 1 G to 3G cellular networks [2L]

Multiple Access Technologies in cellular communication

Time division multiple access (TDMA), narrowband and wideband TDMA, synchronous and asynchronous TDMA, Frequency division multiple access (FDMA), Code Division Multiple Access (CDMA), Direct-sequence CDMA, spread spectrum technique, spectral efficiency of different wireless access technologies: Spectral Efficiency in FDMA system, Spectral Efficiency in TDMA system, Spectral Efficiency for DS-CDMA system [3L]

Cellular Communication Networks and Systems

Second generation (2G) Network: Global system for mobile communication (GSM): Architecture and Protocols Air Interface, GSM spectrum, GSM Multiple Access Scheme, GSM Channel Organization, Traffic Channel multi-frame, Control (Signaling) Channel Multi-frame, Frames, Multi-frames, Superframes and Hyper-frames, GSM Call Set up Procedure, Location Update Procedure, Routing of a call to a Mobile Subscriber [3L]

The concept of packet data services The 2.5 G General Packet Radio Services: GPRS Networks Architecture, GPRS Interfaces and Reference Points, GPRS Mobility Management Procedures, GPRS Attachment and Detachment Procedures, Session Management and PDP Context, Data Transfer through GPRS Network and Routing, The IP Internetworking Model [3L]

Overview of CDMA systems: IS-95 Networks and 3G – The Universal Mobile Telecommunication System (UMTS)

CDMA based IS-95 Systems, forward link and reverse link for IS-95, handoff process in CDMA based IS-95 network. UMTS Network Architecture –Release 99, UMTS Interfaces, UMTS Network Evolution UMTS Release 4 and 5, UMTS FDD and TDD, UMTS Channels, Logical Channels, UMTS Time Slots [3L]

MODULE – III

Wireless Local Area Networks (WLAN): IEEE 802.11 Standards and Protocols

IEEE 802.11 standards, WLAN family, WLAN transmission technology, WLAN system architecture, Collision Sense Multiple Access with Collision Detection (CSMA/CD) and CSMA collision avoidance (CSMA/CA), Frequency Hopping Spread Spectra, 802.11 PHY and MAC layers, IEEE 802.11 Distributed Coordination function (DCF) and Point coordination function (PCF), Back off algorithm, Virtual carrier sense, MAC frame format. Security and QoS issues, WLAN applications [4L]

Wireless Broadband Networks and Access

Evolution of broadband wireless, IEEE 802.16 standards : **WiMAX** , Spectrum Allocation, IEEE 802.16 Standard Architecture, Overview of WiMAX PHY, IEEE 802.16 MAC Layer, IEEE 802.16 Scheduling Services, Unsolicited Grant Service (UGS), Real-time Polling Service (rtPS), Non-realtime Polling Service (nrtPS), Best Effort (BE) Overview of 3G Long Term Evolution (3G LTE) for broadband wireless communication, Orthogonal Frequency Division Multiple Access (OFDMA) [3L]

MODULE – IV

Mobile Internet Protocol

Basic Mobile IP, Mobile IP Type-MIPv4 and MIPv6, Mobile IP: Concept, Four basic entities for MIPv4, Mobile IPv4 Operations, Registration, Tunneling, MIPv4 Reverse Tunneling, MIPv4 Triangular Routing, Configuring PDP Addresses on Mobile Station, Mobility Classification, Seamless Terminal Mobility Management, Limitations of current TCP/IP networks for mobility support, Mobility solution, Accessing External PDN through GPRS/UMTS PS Domain, Transparent Access, Use of Mobile IP for Non-transparent access, Dynamically accesses IP address from External Network. [3L]

TEXT BOOKS:

1. Wireless Networks: Applications and Protocols, T. S. Rappaport, Pearson Education
2. Wireless Communication and Networks : 3G and Beyond, I. Saha Misra, TMH Education.
3. Wireless Communications : Principles and Practice, T.S.Rappaport, PHI Learning.
4. Wireless Communications, A. Goldsmith, Cambridge University Press.

REFERENCE BOOKS:

1. Lee's Essentials of Wireless Communications, MH Prof. Med/Tech
2. Wireless Digital Communications: Modulations and Spread Spectrum Applications, K. Feher, Prentice Hall.
3. Wireless Communications and Networking, J.W.Mark and W. Zhuang, PHI.