Wireless Access Networks

Course Administration

Hung-Yun Hsieh
September 18, 2008

Course Information

- Registration
  - Title: Wireless Access Networks (無線接取網路)
  - Code: 942 U0370
  - Time: Thursday 2:20pm ~ 5:20pm
  - Place: Room 101, EE-II Building
- Instructor
  - Prof. Hung-Yun Hsieh
  - Office: Room 546, EE-II Building
  - Office hours: By appointment
  - Webpage: http://cc.ee.ntu.edu.tw/~hyhsieh

Wireless Internet Access

- Scope of this course
  - An investigation of existing and emerging wireless data networks for Internet access

① Packet data networks
  - This course does not consider circuit-switched cellular communication systems for mobile telephony (e.g. GSM)

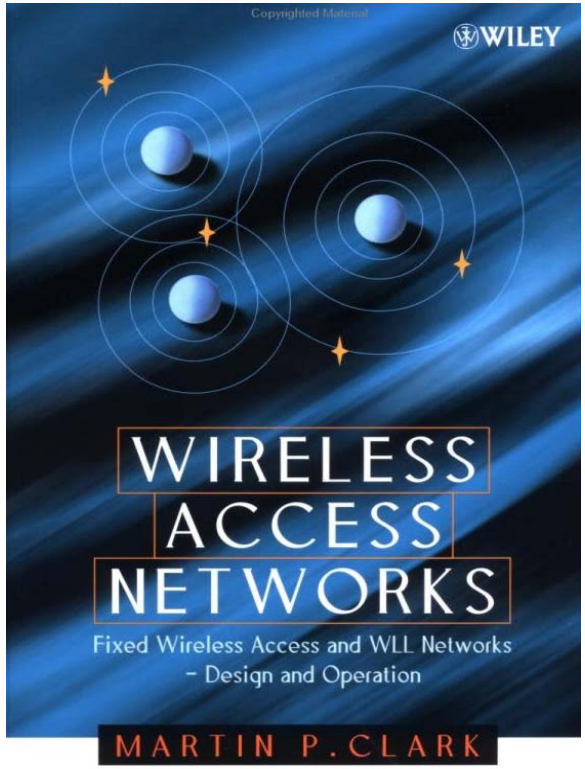
    → Personal Communication Services

② Internet access
  - This course does not cover mobile ad hoc and sensor networks (e.g. MANETs)

    → Wireless Ad Hoc Networks

Wireless Access Networks

- M. Clark, "Wireless Access Networks," John Wiley & Sons, 2000.
  - Design and operation of fixed wireless access and wireless local loop (WLL) networks
    - Design of radio systems and their basic functionality
    - Point-to-point (PTP) and point-to-multipoint (PMP) radio
    - Fixed wireless applications and their network integration
    - …



☞ Not exactly what we will cover in this course

IEEE 802 Wireless Networks

- Many wireless data networks are designed for providing users with wireless Internet access
  - Wireless personal area networks: Bluetooth
  - Wireless local area networks: WiFi
  - Wireless metropolitan networks: WiMax
  - Wireless wide area networks: IMT-2000
  - Airborne, satellite and interplanetary networks
- ☞ Focus of this course
  - Wireless data networks standardized by IEEE
    - IEEE 802.11, IEEE 802.15, and IEEE 802.16
    - ☞ PHY and MAC layer technologies
  - A course on wireless networking

Topics

Complementary course: "Protocol Design and Standardization for Medium Access Control"

- IEEE 802 (802.1, 802.2, and 802.3)
- IEEE 802.11
  - PHY, MAC, Management, 802.11a/b/g, 802.11e (QoS), 802.11h (power control), 802.11i (security), …
- IEEE 802.16
  - PHY, MAC (frame structure, bandwidth request, scheduling, network entry, ranging), 802.16e (mobility), 802.16j (relay), …
- IEEE 802.15
  - 802.15.1 (PHY, MAC, Link Management, L2CAP), …
- IEEE 802.21 and Interworking
- Other topics (time permitted)
  - IEEE 802.20 and 3GPP LTE, …

☞ Subtopics subject to change depending on progress

Course Materials

- Prerequisites
  - Introduction to computer networks,
  - Introduction to wireless and mobile networking, or
  - Computer communication networks
- No official textbooks
  - Materials primarily based on related IEEE standards
    - Available through the Get IEEE 802 program **http://standards.ieee.org/getieee802/**
  - Selected articles from IEEE and ACM journals, magazines, and conference proceedings
    - Available through IEEE Xplore, ACM digital library, ScienceDirect, or Google

References

- Books from the IEEE Press
  - T. Cooklev, "IEEE Wireless Communication Standards: A Study of 802.11, 802.15, and 802.16," IEEE Press, 2004
  - B. O'Hara and A. Petrick, "IEEE 802.11 handbook: A Designer's Companion," IEEE Press, 2005
  - C. Eklund, B. Marks, S. Ponnuswamy, K. Stanwood, and N. van Waes, "WirelessMAN: Inside the IEEE 802.16 Standard for Wireless Metropolitan Area Networks," IEEE Press, 2006

- Homepages of related working/task groups
  http://grouper.ieee.org/groups/802/dots.html

Grading

- Class participation (10%)
- Homework assignments (30%)
- Midterm exam (30%)
- Term project (30%)

☞ This is a research-oriented course
  - Homework and term project play an important part in this course

Class Participation

- Classroom participation
  - Questions and answers
  - ☞ Don’t just sit there, smile, and then doze off
- Student presentation
  - Topic chosen from papers that supplement the course materials
  - ☞ About 40-50 minutes in duration
- Language
  - Student presentations can be in Mandarin or English
  - ☞ All submissions (homework and project reports) must be in English

Homework Assignments

- Testbed experiments
  - Hands-on experiments for understanding real-life performance of 802.11, 802.15, and 802.16 networks
- Network simulations
  - Network simulations for understanding protocol operations of 802.11, 802.15, and 802.16 networks
  - ☞ Experience with the ns-2 network simulator is helpful although not mandatory

☞ Work as a group, but no collaboration outside the group!

Midterm Exam

- Source
  - Standards and paper readings
  - Student presentations
  - Lecture materials
  - Homework assignments
- Style
  - Multiple choices (or gap fills) and short essays
  - In class, closed books
  - ☞ Will cover 802.11 and 802.16
  - ☞ In late November

Term Project

- Topic
  - A selected set of topics will be given
  - ☞ Choice outside the given set should be approved
  - ☞ Don't reuse from other courses
- Proposal
  - Proposal presentation
  - Proposal report (schedule and deliverable)
- Demo and report
  - Project presentation and demo
  - Project report

☞ Details will be given as we go along

Course Administration

- Course portal
  `http://cc.ee.ntu.edu.tw/~hyhsieh/teaching/access08f`
  - Announcements
    - Course administration
  - Syllabus and course materials
    - Lecture slides
    - Reading lists
  - Homework assignments
- TA TBA
- Final note
  - No cheating