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COMPUTER NETWORKS

Uses of Computer Networks

- **Business Application**
  - Resource sharing
  - High reliability
  - Saving money
  - Powerful communication medium
- **Home Applications**
  - Access to remote resources
  - Person-to-person communication
  - Interactive entertainment
  - Electronic commerce

Uses of Computer Networks

- Mobile Users
  - PDA
  - Notebook
  - WAP
  - m-commerce (mobile commerce)
- Social Issues
  - Newsgroups
  - Bulletin boards

Uses of Computer Networks

Distributed Processing

- A task is divided among multiple computers with various advantages:
  - Security/encapsulation
  - Distributed databases
  - Faster problem solving
  - Security through redundancy
  - Collaboration processing

Objectives

- We will learn
  - Layer-architecture of Computer Networks (OSI) models
    - Communication protocols in different layers
    - Mapping to TCP/IP protocol suite at the appropriate parts
    - Linux networking is used for the labs/demonstrations
  - Major is on both networking knowledge and practical experience
- This course is appropriate for
  - Technically oriented people with little or no networking experience

Contents: week-by-week topics

- Course Program consists of:

- **10 LECTURES:**
- Week 1: Introduction [chapter 01]
- Week 2: Network Layer [chapter 04, addressing/subnet]
- Week 3: Exercises on IP addressing/subneting
- Week 4: Network Layer [chapter 04, IP routing algorithms, IP routing protocols, Internet network protocols]
- Week 5: Exercises on IP routing algorithms and protocolss
- ***Week 6: Mid-Term***
- Week 7: Transport Layer [chapter 03, RDT protocols]
- Week 8: Transport Layer [chapter 03, TCP pure operations, TCP congestion control]
- Week 9: Exercises on TCP
- Week 10: Application Layer [chapter 02] & MAC Layer [chapter 05, multiple access protocols, Ethernet: CSMA/CD, ARP]
- ***Final-Exam***

References

- Lecture Notes
- Text Books
  - Jim Kurose and Keith Ross, "**Computer Networking: A Top Down Approach Featuring the Internet,**" 3 rd edition, 2004, Addison-Wesley.
- Reference Books
  - *Computer Networks*, 4th Edition, Andrew S. Tenenbaum, Prentice Hall, 2003
  - *Data Communications and Networking*, 2nd Edition, Behrouz A. Forouzan, Mc Graw Hill, 2000

Grading policy

- Following UIT policy, update later!
  - Labs: 25% {Thực hành}
  - Study in_progress: 25% {Quá trình}
  - Final Exam: 50% {Cuối kỳ}

Communication

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Wireless Self-Organized Networks

802.11.x, 802.15.x, 802.16.x

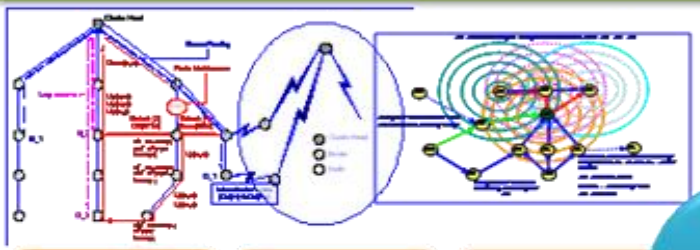
(mobile, ad-hoc, sensor-actuator, mesh)

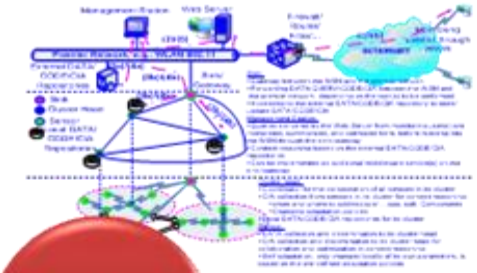


Routing, Addressing, Internetworking

Traffic Management, Congestion Control, Load-Balancing

Mobility Management, Application Developments





Wireless Networking

Linux Networking

Internet

Embedded Systems

Networking:

Linux-based Wireless Embedded Internet

TCP/IP protocol suite

Device drivers

Kernel: packet transmission, forwarding, receiving, and routing updates




Core Internet architectures: MPLS, G-MPLS, IPv4/IPv6, ATM, SONET/SDH

Routing & Internetworking: RIP, OSPF, BGP

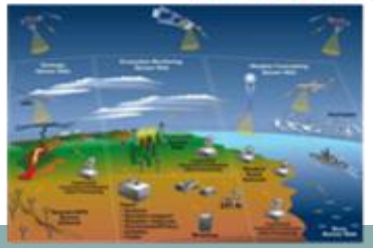
Traffic management & Congestion Control

Network management

Mobility Management: MIPv4/v6, HMIPv4/6, FMIPv4/6, FHMIPv4/6, PMIPv4/6, NEMO, 802.21

Internet





Device drivers

- Sensors, RFIDs, smart phones
- Wireless cards


Tiny operating systems

- TinyOS, Contiki, Linux
- Code distribution, re-programming
- Re-configuration, adaptation

TinyOS

Applications

- Monitoring (building, environment)
- Automation control
- Smart house, smart building, smart city