COMP 3331/9331:
Computer Networks and Applications

Recap

Term 2, 2024

Shape our Future

Complete your myExperience and shape the future of education at UNSW.

Click the myExperience link in Moodle

or login to myExperience.unsw.edu.au

(use z1234567@ad.unsw.edu.au to login)

The survey is confidential, your identity will never be released

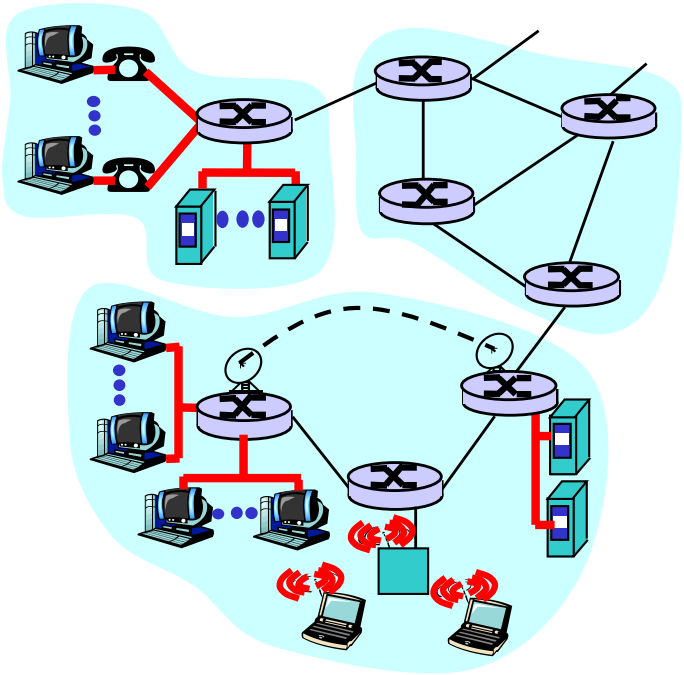
Survey results are not released to teaching staff until after your results are published

UNSW SYDNEY

High-level Course Recap

Covered networking using a **top-adown** approach: from the *applications* to *transport* to *networking* to *data link layer*

- end-system applications, end-end transport
- network core: routing, hooking nets together
- link-level protocols, both wired (Ethernet) and wireless (WiFi)



What you have accomplished

- Comprehensive overview of the entire protocol stack with a particular focus on the Internet
- Key principles
  - Layering, scale, hierarchy, etc.
- Key design issues
  - Application architectures, reliability, congestion control, routing, medium access, etc.
- Hands-on practical laboratory experiments using several diagnostic tools, e.g., Wireshark
- Developed a “real-world” networking application

Key topics in Week-1: Network Introduction

Textbook Chapter: Chap 1: 1.1-1.5

- Internet as a network of networks
- The protocol stack and layering principle
- Edge vs. Core
- Loss, delay and throughput
- Packet switching vs. Circuit switching

Key topics in Weeks 2-3: Application Layer

Textbook Chapter: Chap2: 2.1, 2.2,2.4,2.5,2.6,2.7

- HTTP
- Email
- DNS
- P2P
- Video Streaming
- CDN
- Socket Programming Overview

Key topics in Weeks 4-5: Transport Layer

Textbook Chapter: Chap 3: 3.1 - 3.7

- Multiplexing and demultiplexing
- Reliable data transfer
- Flow control
- Congestion control
- TCP
- UDP

Key topics in **Weeks 7-8**: Network Layer

Textbook Chapters: Chap 4: 4.1, 4.3 | Chap 5: 5.1, 5.2, 5.6

- Forwarding vs. Routing
- IP addressing, subnets, CIDR, longest prefix matching
- IP packet structure (header fields)
- Checksum
- IP fragmentation and reassembly
- DHCP overview
- NAT
- Routing: Link state, distance vector
- ICMP overview

Key topics in **Week-9**: Data Link Layer (Wired)

Textbook Chapter: Chap 6: 6.1 – 6.4, 6.7

- Error detection and correction using Parity, CRC
- The concept of *multiple access* and *medium access control* (MAC)
- MAC addressing
- MAC protocols: TDMA, FDMA, ALOHA (Slotted vs. Pure), CSMA, Polling, Token Passing
- CSMA for **wired** networks (Ethernet) using **Collision Detection and Random Backoff**
- Switching

Key topics in **Week-10**: Wireless Networks

Textbook Chapter: Chap 7: 7.1 – 7.3

- Hidden nodes (a.k.a. hidden terminals)
- Exposed nodes (a.k.a. exposed terminals)
- RTS and CTS (to address hidden node problem)
- CSMA/CA
- Data rate adaptation with dynamic coding and modulation (interplay between BER, SNR, Data Rate)
- WiFi frame addressing
- WiFi asssociation: passive scanning vs, active scanning

What's next?

- Advanced courses with COMP3331/9331 as perquisite
  - COMP 4336/9336: Wireless/Mobile Networks
  - COMP6337: IoT Experimental Design Studio
  - COMP 9334: System Capacity and Planning
  - COMP 6441/9441, COMP4337/9337: Security Engineering & Cybersecurity, Wireless Network Security
- Undergraduate/Postgraduate Project and Thesis
- Research degrees: MPhil (1.5-2 yrs), PhD (3-3.5 yrs)