

Name ..... ID ..... Section ..... Seat No .....

# Sirindhorn International Institute of Technology Thammasat University

**Final Exam: Semester 1, 2014**

**Course Title:** ITS323 Introduction to Data Communications

**Instructor:** Steven Gordon

**Date/Time:** Monday 15 December 2014; 13:30–16:30

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## **Instructions:**

- This examination paper has 18 pages (including this page).
- Conditions of Examination: Closed book; No dictionary; Non-programmable calculator is allowed
- Students are not allowed to be out of the exam room during examination. Going to the restroom may result in score deduction.
- Turn off all communication devices (mobile phone etc.) and leave them at the front of the examination room.
- The examination paper is not allowed to be taken out of the examination room. A violation may result in score deduction.
- Write your name, student ID, section, and seat number clearly on the front page of the exam, and on any separate sheets (if they exist).
- Assume bits are ordered from left to right. For example, for the data 00001111, the first (1st) bit is 0 and the last (8th) bit is 1.
- Assume the speed of transmission is  $3 \times 10^8$  m/s
- Reference material included at the end of the exam may be used.

## Hints for ITS323 Final Exam

- 8 questions
- 100 marks in total
- Question 1: fill in the blanks
- Questions 2 to 8: general questions with multiple parts (e.g. calculations, descriptions, diagrams)
- Topics Covered:
  - PCM (from Signal Encoding Techniques - Analog Data, Digital signals) and subsequent topics
- What is NOT covered in exam:
  - Digital Data Communication Techniques, including parity check
  - Multiple Access (mentioned in Multiplexing topic as well as under “Medium Access Control” in LANs/WANs topic)
  - Example Network Technologies from LANs and WANs
- The following topics may have very small coverage in the exam (e.g. worth no more than 5 marks, part of fill in the blanks question or a short question)
  - Multiplexing
  - TCP and Transport Protocols
  - Internet Applications
  - Go-Back-N and Selective-Reject
- The exam will focus on the topics discussed most during lectures.
- Use quizzes and past exams for practice and as an indicator of types of questions
- Show calculations. Partial marks will often be awarded if you have the correct approach, but the wrong final answer.
- Mark your final answer clearly. If you write multiple different values and I cannot easily distinguish which one is your final answer, then it will be marked incorrect.
- Answers with missing or incorrect units will be marked incorrect.
- You must know the meanings of different units and prefixes (e.g. dB, mW, Gb/s, MB)
- No penalty for wrong answers – attempt all questions.
- You may use the Reference Material at the end of the exam (see next 2 pages)

## Reference Material

Selected well-known ports:

- FTP 20 and 21
- SSH 22
- Telnet 23
- SMTP 25
- DNS 53
- HTTP 80
- HTTPS 443

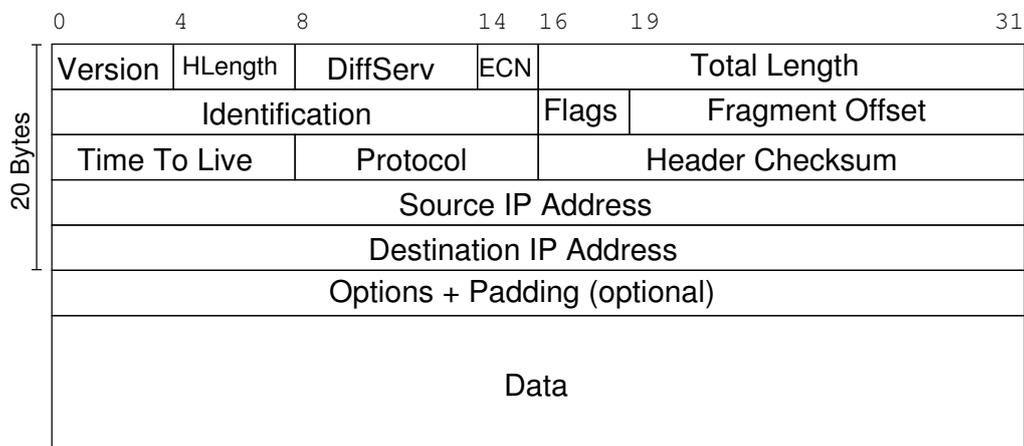


Figure 3: IP Datagram Format. Flags: Reserved, Don't Fragment, More Fragments

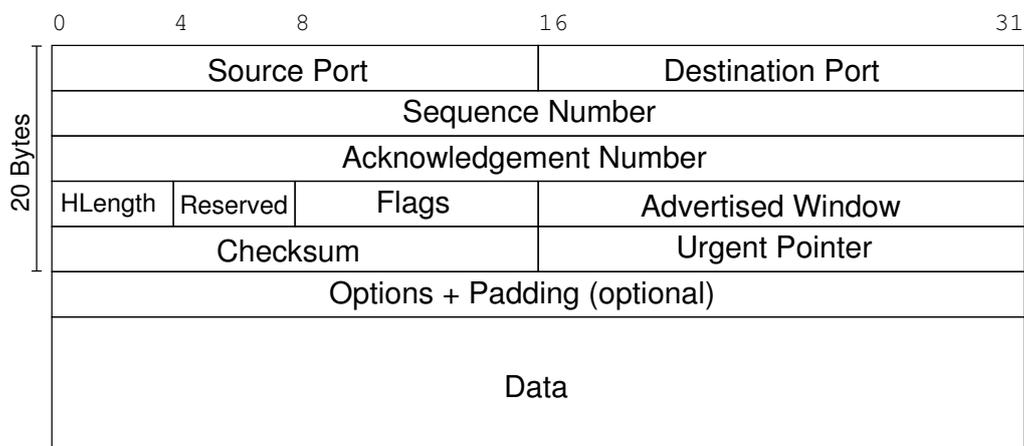


Figure 4: TCP Segment Format. Flags: CWR, ECE, URG, ACK, PSH, RST, SYN, FIN

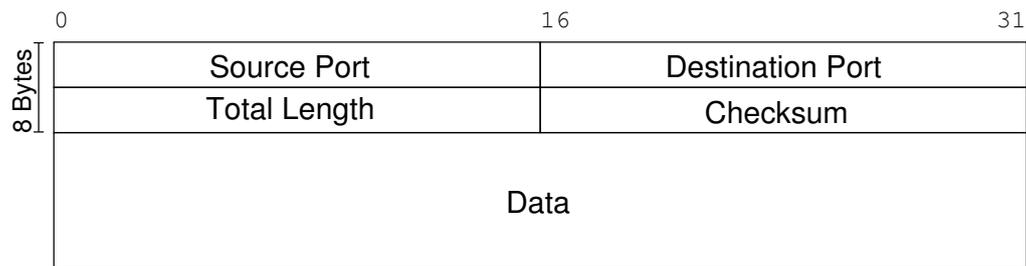


Figure 5: UDP Datagram Format

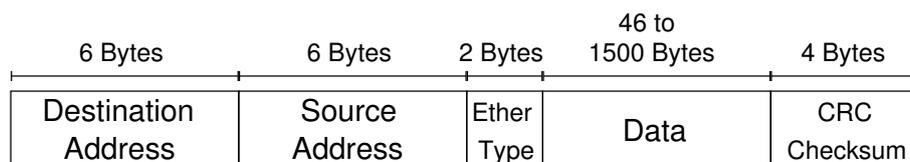


Figure 6: Ethernet Frame Format

Selected Protocol numbers:

- 1 ICMP
- 6 TCP
- 17 UDP