COMPSCI 314 S1 C Assignment 4

Department of Computer Science

The University of Auckland

Due Wednesday 1 June 05, 11:59 pm

This assignment will contribute 40/am300 = 13.33% to your coursework mark, and 4% to your overall course mark.

Submit your assignment via the DropBox, either in PDF (preferred), or in MS Word format.

1. **Digital Encoding Schemes** [12 marks]

   (a) Explain how the binary sequence 010110001001 would be encoded for transmission on a wire using *NRZ Encoding*. [3 marks]

   (b) If the sender and receiver clocks are not precisely synchronised, what effect will that have on a received NRZ signal? [3 marks]

   (c) Explain how the problem in (b) can be solved using a *differential* encoding scheme. [3 marks]

   (d) Give an example of a differential encoding scheme, and show how the binary sequence from (a) above would be encoded using it. [3 marks]

2. **Internet Protocol** [13 marks]

   (a) What is meant by *Classless* IP addressing? What problem(s) does it solve compared with *Class-based* addressing? [4 marks]

   (b) Explain briefly how an IP host discovers the Ethernet address of a destination IP host. [3 marks]

   (c) What are the *Time To Live (TTL)* and *Protocol* fields in the IPv4 header? How are they used? [3 marks]

   (d) What are the IPv6 equivalents of the two fields in (c) above? Comment on any differences in the way IPv6 uses them, compared with IPv4. [3 marks]

3. **UDP and TCP** [15 marks]

   (a) Give brief descriptions of the service provided by UDP and TCP. Your answer should cover the kinds of data each protocol carries, and the way in which that data is moved from one host to another. [4 marks]

   (b) Which of these two protocols would be more suitable for each of the following applications? Explain (briefly) your answers.

   - Domain Name lookup
   - Remote Login
   - File transfer
   - Streamed Audio (e.g. from an Internet ‘radio station’

   [4 marks]

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(c) What are *ports* in UDP and TCP? How are they used in carrying data from one application to another? [3 marks]

(d) How are ports identified in IP headers? What ports does FTP (the File Transfer Protocol) normally use? Could FTP use other ports? If so, how? [4 marks]