National University of Singapore
School of Computing

CS2105 **Tutorial 7** Semester 2 AY18/19

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1. **[KR, Chapter 6, R2]** If all the links in the Internet were to provide reliable delivery service, would the TCP reliable delivery service be redundant? Why or why not?

   IP datagrams in the same TCP connection can take different routes in the network, and therefore arrive at receiving host out of order. TCP is still needed to sort out received data in the correct order before passing them to application.
   Also, IP datagrams can be lost due to routing loops, equipment failures, etc. For example, what if a router holding a frame crashes?

2. **[KR, Chapter 6, P5/P6]** Consider a 4-bit generator G with value `1001`, what is the CRC checksum R if data D has the following value?

   a) `11000111010`

   110

   b) `01101010101`

   011

   c) `11111010101`

   011

   d) `10001100001`

   110

3. Consider the following two-dimensional parity matrix.

   0 1 0 1
   1 0 1 0
   0 1 0 1
   1 0 1 0

   a) Give an example of a 1-bit error that can be detected and corrected.

0	**1**	**1**	**1**
1	**0**	**1**	**0**
0	**1**	**0**	**1**
1	**0**	**1**	**0**

b) Give an example of a 2-bits error that can be detected but cannot be corrected.

0	**1**	**0**	**0**
1	**0**	**1**	**0**
0	**1**	**0**	**0**
1	**0**	**1**	**0**

c) Give an example of a 4-bits error that cannot be detected.

0	**1**	**0**	**1**
1	**0**	**1**	**0**
1	**1**	**0**	**0**
0	**0**	**1**	**1**

4. There are many nodes in a shared medium network and most nodes are likely to transmit frequently. Which of the following multiple access protocol(s) is (are) suitable? (1) TDMA; (2) CSMA; (3) Token passing.

TDMA and token passing are suitable because there is sufficient work to do to utilize the "fixed" resources allocated.
CSMA is not because many nodes competing for the shared channel can result in lots of collision. Utilization will be low.

5. Nodes A and B are accessing a shared medium using CSMA/CD protocol, with propagation delay of 245 bit times between them (i.e., propagation delay equals to the amount of time to transmit 245 bits onto the link). Minimum frame size is 64 bytes. Suppose node A begins transmitting a frame at $t = 0$ bit time. Before A finishes, node B begins transmitting a frame. Assume no other nodes are active.

Write down your answers to the following 2 questions in the unit of **bit time**.

a) When is the latest time, by which B can begin its transmission?

The latest time B can begin transmission is before the signal from A reaches B, which is when $t = 244$ bit time.

b) Suppose B begin its transmission at the time computed in a), can A detects that B has transmitted before it finishes transmission?

Suppose B begin transmission at $t = 244$ bit time. Signal propagates to A at $t = 244 + 245 = 489$ bit time. A is able to detect collision before it finishes transmission (at $t = 512$ bit time).