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| **KING SAUD UNIVERSITY**  **COLLEGE OF COMPUTER AND INFORMATION SCIENCES**  **COMPUTER SCIENCE DEPARTMENT** | | | |
| **CSC 329: Computer Network** | **Tutorial 7** | | **1st Semester 1437-1438** |
| **Name:** | | **Student ID:** | |
| **Serial Number:** | | **Section Number:** | |

**Part1: Multiple-Choice Questions**

1. In \_\_\_\_\_\_\_\_ ARQ, if a NAK is received, only the specific damaged or lost frame is retransmitted.
2. Stop-and-Wait
3. Go-Back-N
4. Selective Repeat
5. (a) and (b)
6. In Selective Repeat ARQ, if 5 is the number of bits for the sequence number, then the maximum size of the receive window must be \_\_\_\_\_
   1. 15
   2. 16
   3. 31
   4. 1

3. HDLC is an acronym for \_\_\_\_\_\_\_.

* 1. High-duplex line communication
  2. High-level data link control
  3. Half-duplex digital link combination
  4. Host double-level circuit

4. Frame type that refers to High-level Data Link Control error detection field is

1. Frame Check Sequence field
2. Control field
3. flag field
4. information field

5. In control field, first bit defines the

1. sequence number
2. acknowledgement number
3. type
4. information

6. Each frame in HDLC may contain up to

1. three fields
2. four fields
3. five fields
4. six fields

7. In High-level Data Link Control (HDLC), frame that is used only to transport control information is called

1. frame
2. S-frame
3. V-frame
4. Piggybacking

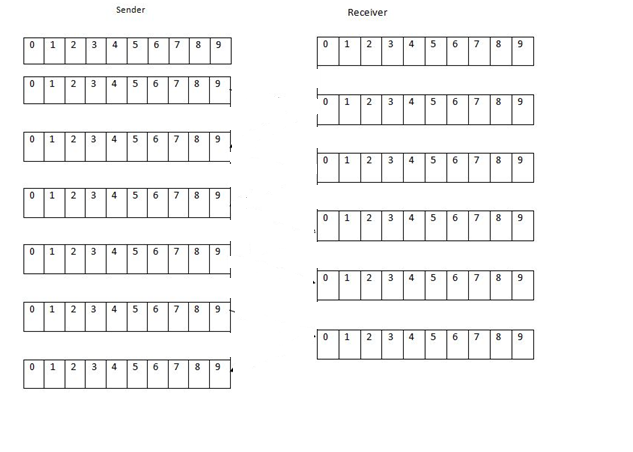
**Part2: Exercises**

1) A computer is using **4 bits** to represent the sequence numbers. Draw the sender and receiver windows for a system using Selective Repeat ARQ.

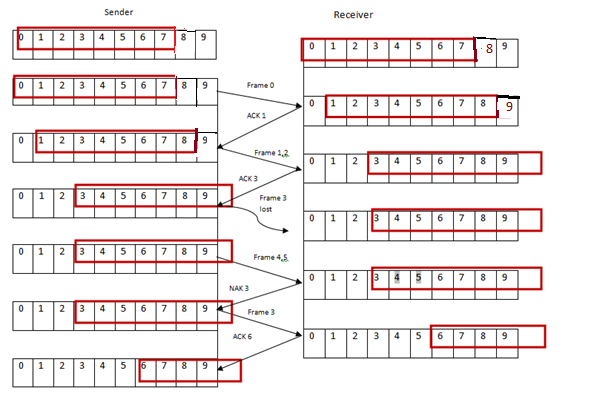
Given the following actions:

1. Frame 0 is sent; frame 0 is acknowledged.
2. Frames 1 and 2 are sent; frames 1 and 2 are acknowledged.
3. Frames 3 is sent and lost.
4. Frames 4 and 5 are sent.
5. frames 3 through 5 are acknowledged.

**Show the value of both sliding windows each time and complete the graph**



window size = 24 / 2=8



2) What does the number on an ACK frame mean for Selective Repeat ARQ?

The number of the next frame expected

3) A Selective Repeat ARQ uses a window of size 16. How many bits are needed to define one sequence number?

16 = 2m  / 2 , 2m =32, m = 5 bits

4) Computer A uses Selective-Repeat ARQ to send packets to computer B. If the distance between A and B is 40000 km, the packet size is 5000 bytes and the bandwidth is 10Mbps. Assume that the propagation speed is 2.4x108m/s. The window size of 32.

1. Round trip delay.
2. Calculate bandwidth Delay Product.
3. Calculate utilization of link.

a) Round trip delay = 2 \* propagation time

= 2 \* distance / speed

= 2 \* 40000 \* 103 / 2.4 \* 108

= 0. 33 s

b) BDP (bits) = bandwidth \* round trip delay (sec)

= 10000000 \*0.33

= 3300000 bits

c) Utilization % = 32 \* 8 \* 5000 / 3300000 \* 100 = 38.79%

5) Bit-stuff the data in the below figure.

