Branch : CSE & IT Batch : Hinglish

WEEKLY TEST – 05
Subject : Computer Networks

Maximum Marks 15

Q.1 to 5 Carry ONE Mark Each

[MSQ]

1. Which of the following statement(s) is/are true.

S_1: The maximum window size for data transmission using Go-Back-N-ARQ protocol with n bit frame sequence number is 2^n-1.

S_2: The maximum window size for data transmission using selective repeat protocol with n bit frame sequence number is 2^n-1.

S_3: The maximum window size for data transmission using selective repeat protocol with n bit frame sequence is 2^{n-1}.

(a) S_1 (b) S_2
(c) S_3 (d) None of these

[MCQ]

2. A transmission channel has a bit rate of 8kbps and round trip time 40 msec is given. The cannel uses stop & wait protocol. Consider the transmission time of acknowledgement frame as negligible. What will be the frame size if channel efficiency is 75% (in bytes)?

(a) 240 (b) 30
(c) 120 (d) 160

[NAT]

3. Stop and wait protocol is used to transfer data across the link. On this wireless link the probability of a packet being corrupted is 0.1. What will be the average number of transmission attempts required to transfer 1800 packets.

[MCQ]

4. A host X uses 64 bytes packets to transmit message to host B using sliding window protocol. The one-way propagation delay is 40 msec. and the bottleneck bandwidth on the path between X and Y is 512 kbps. Calculate the optional window size that should be used by host X.

(a) 51 (b) 41
(c) 81 (d) 80

[NAT]

5. In selective repeat protocol if 6 bit sequence number is used then consider the following two statements.

S_1: The maximum sender window size will be 63.
S_2: The maximum sender window size will be 32.
S_3: The maximum window size will be 1.
S_4: The maximum receiver window size will be 32.

The number of true statements are ____.

Q.5 to 10 Carry TWO Mark Each

[NAT]

6. From an earth station a 1000 bytes packet is being transmitted to satellite. The distance between satellite and earth station is 2400 km. and the link has a bandwidth of 100 Mbps. The signal propagates at a speed of 3×10^8 m/sec. Then calculate the link utilization by using stop and wait protocol (in percentage up to two decimal places).

[MCQ]

7. Consider two system wants to establish connection between themselves. The distance between these two stations is 900 km. The bandwidth of the network is 400 Mbps and the signal is propagating at a speed of 3×10^8 m/sec. Suppose host X wants to send a 10^5 bits packet to another host Y. If network is using its full capacity, then calculate the minimum size of the sequence number in bits if selective repeat protocol is used.

(a) 5 (b) 6
(c) 4 (d) None of the above

[MSQ]

8. Which of the following statement(s) is/are true regarding stop and wait and sliding window protocols in terms of the buffer size?

(a) The buffer size in stop wait protocol is N+1.
(b) The buffer size Go-Back-N-ARQ protocol is N+1.
(c) The buffer size in selective repeat protocol is N+N.
(d) The buffer size in stop and wait protocol is 1+1.

[MSQ]

9. Select the true statements that apply to the continuous ARQ method's use of error retransmission.

(a) Go-Back-N-ARQ has better line utilization.
(b) Selective repeat has better line utilization.
(c) Selective repeat involves complex login than Go-Bank-N-ARQ
(d) Go-Back-N method required more storage at receiving site.

[MCQ]

10. In selective repeat ARQ protocol if the maximum sender window size is w, then what will be the number of sequence bit?

(a) $\log_2 (w+1)$ (b) $\log_2 (w)$
(c) $\log_2 (2w)$ (d) $\log_2\left(\frac{w+1}{2}\right)$

Answer Key

1. **(a,c)**
2. **(b)**
3. **(Range 2000 to 2000)**
4. **(c)**
5. **(2)**
6. **(Range 0.48 to 0.50)**
7. **(b)**
8. **(b,c,d)**
9. **(b,c)**
10. **(c)**

Hints and Solutions

1. (a,c)

The maximum window size for data transmission using Go-Back-N-ARQ and selective repeat protocol with n bit frame sequence number are 2^n-1 and 2^{n-1} respectively.

2. (b)

$$\eta = \frac{\text{useful time}}{\text{total time}}$$

$$\frac{3}{4} = \frac{t_d}{RTT}$$

$$4 \times t_d = 3 \times RTT$$

$$t_d = \frac{3 \times RTT}{4}$$

$$\frac{l}{B} = \frac{3 \times RTT}{4}$$

$$l = \frac{3 \times RTT \times B}{4}$$

$$l = \frac{3 \times 40 \times 10^{-3}\,\text{sec} \times 8 \times 10^3\,\text{bits/sec.}}{4}$$

$$l = \frac{3 \times 40 \times 8}{4}$$

$$l = 240 \text{ bits}$$

$$l = \frac{240}{8} = 30 \text{ Bytes}$$

3. (Range 2000 to 2000)

If probability of a packet being lost = 0.1

Then expectation number to transmits one packet = $\frac{1}{1-0.1} = \frac{1}{0.9}$

To transmits 1800 packets = $1800 \times \frac{10}{0.9}$

= 2000 attempts are needed.

4. (c)

$$t_t \text{ (packet)} = \frac{64 \text{ bytes}}{512 \text{ kbps}} = \frac{64 \times 8 \text{ bits}}{512 \text{ kbps}}$$

$$= \frac{512}{512} \times 10^{-3} = 1\text{msec.}$$

Bottleneck bandwidth $\Rightarrow$ 100% utilization

$t_p = 40$ msec.

$$\eta = \frac{w \times t_t}{t_t + 2 \times t_p}$$

$$1 = \frac{w \times 1}{1 + 2 \times 40}$$

$$\boxed{w = 81}$$

5. (2)

In selective repeat is sequence number is N then

S.W.S. $= 2^{n-1}$
$= 2^{6-1}$
$= 2^5$
$= 32$

R.W.S. $= 2^{n-1}$
$= 2^{6-1}$
$= 2^5$
$= 32$

Hence, Statement S2 & S4 are true.

6. (Range 0.48 to 0.50)

Given

Packet size = 1000 byte
l = 2400 km
Bandwidth = 1000 Mbps
v = 3×100 m/sec.

Propagation delay (t_p) = $\frac{l}{v}$

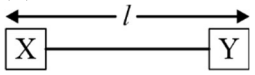
$$= \frac{2400 \times 10^3 \text{ m}}{3 \times 10^8 \text{ m/sec}}$$

$= 8 \times 10^{-3}$ sec.
= 8 msec.

$$\text{Transmission time } (t_t) = \frac{\text{Packet size}}{\text{Bandwidth}}$$
$$= \frac{1000 \text{ bytes}}{100\times10^6 \text{ bits/sec.}}$$
$$= \frac{1000 \times 8 \text{ bits}}{100\times10^6 \text{ bits/sec.}}$$
$$= 80\times10^{-6} \text{ sec.}$$
$$= 0.08 \text{ msec.}$$

$$\text{Efficiency (link utilization)} = \frac{t_t}{t_t + 2tp}$$
$$= \frac{0.08}{0.08 + 2 \times 8}$$
$$= \frac{1}{1+2\times\frac{800}{0.08}}$$
$$= \frac{1}{1+200} = \frac{1}{201}$$
$$= 0.00497 = 0.49\%$$

7. (b)



l = 900 km
Bandiwdth = 400 mbps
Packets size = 10^5 bits
Full capacity $\Rightarrow$ 100% link utilization
$v = 3\times10^8$ m/sec.

$$\text{Transmission time } (t_t) = \frac{\text{Packet size}}{\text{Bandwidth}}$$
$$= \frac{10^5 \text{bits}}{400\times10^6 \text{bits/sec.}}$$
$$= 0.25 \text{ m/sec.}$$

$$\text{Propagation time } (t_p) = \frac{l}{v}$$
$$= \frac{900\times10^3 \text{m}}{3\times10^8 \text{m/sec.}}$$
$$= 3\times10^{-3} \text{ sec.} = 3\text{msec.}$$

$$\eta = \frac{w \times t_t}{t_t + 2\times t_p}$$
$$100\% = \frac{w \times 0.25}{0.25 + 2\times3}$$
$$0.25 + 6 = w\times 0.25$$
$$w = \frac{6.25}{0.25} = 25$$

We know that window size in selective repeat is
$w = 2^{n-1}$
$2^{n-1} = 25$
$2^n = 50$
$2^n \approx 2^6$
$\boxed{n \simeq 6}$ bits

8. (b.c,d)

	Stop and wait	GBN	SR
Buffer	1+1	N+1	N+N

9. (b, c)

Selective repeat has better line utilization as compare to Go-Back-N-ARQ and selective repeat involves complex login than Go-Back-N-ARQ.

10. (c)

In selective repeat protocol:
Sender window size = w
$2^{n-1} = w$
$2^n = 2w$
$\boxed{n = \log_2(2w)}$