CS & IT ENGINEERING

COMPUTER NETWORKS

Flow Control

Lecture No-9

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- Problem solving on GB-N

Problem Solving on GB-N Protocol

Q.1

In Go-back-N protocol, if the maximum window size is 512 what is the range of sequence number

A 0 to 513

B 1 to 513

C 0 to 512

D 1 to 512

In GB-N if sender window size = N

then minimum sequence No. required in GB-N

$= W_S + W_R = N + 1$ (0 – N)

Window sender size = 512

min. sequence No. required in GBN = 512 + 1 = 513 [0-512]

Q.2

A 20 Kbps satellite link has a propagation delay of 400 ms. The transmitter employs the "go back n ARQ" scheme with n set to 10. Assuming that each frame is 100 bytes long, what is the maximum data rate possible?

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A 5 Kbps

B 10 Kbps

C 15 Kbps

D 20 Kbps

$B = 20\,Kbps = 20 * 10^3$ bits/sec

$P_d = 400$ msec

$N = 10$

Frame size = 100 Byte
= 800 bits

$$T_d(F) = \frac{\text{Frame size}}{\text{Bandwidth}} = \frac{800 \text{ bits}}{20 * 10^3 \text{ bits/sec}} = 40 * 10^{-3} \text{ sec} = 40 \text{ msec}$$

Throughput $= \eta * B$

$= 0.4761 * 20\text{kbps}$

$= 9.52\ \text{kbps}$

$\cong 10\text{kbps}$

efficiency $= \dfrac{\text{useful time}}{\text{total time}}$

$= \dfrac{N * T_d(F)}{T_d(F) + 2 * P_d + \cancel{Q_d} + \cancel{P_{sd}} + \cancel{T_d(A)}}$

$= \dfrac{10 * 40\text{msec}}{40\text{msec} + 2 * 400\text{msec}}$

$= \dfrac{400\ \text{msec}}{840\ \text{msec}}$

$\eta = 0.4761 = 47.61\%$

Q.3

Assume we need to design Go-back-N sliding window protocol for a network in which bandwidth is 1 Mbps and average distance between sender and receiver is 5000 Km. Assume that average packet size is 5000 bits. Propagation speed in the media is 2×10^8 m/sec. In GB-10 If process delay is 0.5 Msec and queuing delay is 2msec then what is the efficiency.

$v = 2 * 10^8$ m/sec

$v = 2 * 10^5$ km/sec

$B = 1 Mbps = 10^6$ bits/sec

$d = 5000$ km

$N = 10$, $Pd = 0.5$ msec

$Qd = 2$ msec

Packet size or Frame size = 5000 bits

A 99%

B 57%

C 87%

D 67%

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

$$= \frac{N * T_d(F)}{T_d(F) + 2 * P_d + Q_d + P_{sd} + T_d(A)}$$

($T_d(A) \to 0$)

$$= \frac{10 * 5}{5 + 2 * 25 + 2 + 0.5}$$

$$= \frac{50}{57.5}$$

$$= 0.8695$$

$$\eta = 86.95\% \cong 87\%$$

$$T_d(F) = \frac{\text{Frame size}}{\text{Bandwidth}}$$

$$= \frac{5000 \text{ bits}}{10^5 \text{ bits/sec}}$$

$$= 5 * 10^{-3} \text{ sec} = 5 \text{ msec}$$

$$P_d = \frac{d}{v} = \frac{5000 \text{ km}}{2 * 10^5 \text{ km/sec}}$$

$$= 25 * 10^{-3} \text{ sec} = 25 \text{ msec}$$

Q.4

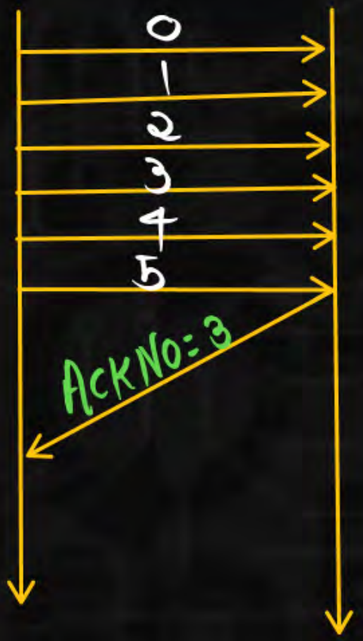
Assume a sender send 6 packet 0, 1, 2, 3, 4 and 5. The sender receivers an acknowledgement with AckNo = 3. what is the interpretation if the system in using GB-N

A. It means that packet 3 has been received uncorrupted

B. It means packet 0, 1, 2 have received uncorrupted and receiver is expected packet 3

C. Ack does not say anything about other packet

D. All the above



Q.5

In a sliding window ARQ scheme, the transmitter's window size is N and the receiver's window size is M. The minimum number of distinct sequence numbers required to ensure correct operation of the ARQ scheme is

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A. min (M, N)

B. max (M, N)

C. M + N ✓

D. MN

W_S	W_R	min. sequence No. required
N	M	N+M

Q.6

Consider packet size is 1000 bits and distance between two hosts is 5 km, 1 Mbps link with signal speed 2 ms/km (ms per km) is used, the efficiency in percentage if GB-N protocol is used and N is set to 7 **33.3**.

Packet size or Frame size = 1000 bits

$d = 5km$, $B = 1mbps = 10^6$ bits/sec

Propagation time for one km = 2msec

Propagation delay for 5km = 5*2msec = 10msec

$N = 7$

$T_d(F) = \frac{\text{Frame size}}{\text{Bandwidth}}$

$= \frac{1000 \text{ bits}}{10^6 \text{ bits/sec}}$

$= 10^{-3} \text{ sec} = 1 \text{ msec}$

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

$$= \frac{N * T_d(F)}{T_d(F) + 2 * P_d + 2d + P_{2d} + T_d(H)}$$

$$= \frac{7 * 1\,\text{msec}}{1\,\text{msec} + 2 * 10\,\text{msec}}$$

$$= \frac{7\,\text{msec}}{21\,\text{msec}}$$

$$= \frac{1}{3} = 0.333 = 33.3\,\%$$

Q.7

In GB-N Protocol the packet size is 1000 bytes transmission time for one packet is 1ms. If distance between hosts is 10km and signal speed is 5ms per km (5ms/km) and frame sequence number are 6 bit long in frame format then the throughput (in Mbps) is 4.99 .

Packet size or Frame size = 1000 Byte
= 8000 bits

$T_d(F) = 1msec = 10^{-3} sec$

d = 10km

Propagation time For 1km = 5msec

Propagation delay For 10km = 10 * 5msec = 50msec

Seq No = 6 bit

Throughput = $\eta * B$

$= \frac{63}{101} * 8\text{mbps}$

$= 4.99\text{ mbps}$

$\cong 5\text{ mbps}$

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

$\eta = \frac{N * T_d(F)}{T_d(F) + 2 * P_d + \cancel{Q_d} + \cancel{P_{xd}} + \cancel{T_d(ff)}}$ ($Q_d \to 0$, $P_{xd} \to 0$, $T_d(ff) \to 0$)

$\eta = \frac{63 * 1\text{msec}}{1\text{msec} + 2 * 50\text{msec}}$

$\eta = \frac{63\text{ msec}}{101\text{ msec}}$

$\eta = \frac{63}{101}$

GB-N

Seq No = K bit

W_S	W_R
$2^K - 1$	1

Seq No = 6 bit

W_S	W_R
$2^6 - 1$	1
63	1

N

$$T_{d(F)} = \frac{\text{Frame size}}{\text{Bandwidth}}$$

$$\frac{10^{-3}\,\text{sec}}{1} = \frac{8000\,\text{bits}}{B}$$

$$B = \frac{8000\,\text{bits}}{10^{-3}\,\text{sec}}$$

$$B = 8 * 10^3 * 10^3\ \text{bits/sec}$$

$$B = 8 * 10^6\ \text{bits/sec}$$

$$B = 8\,\text{Mbps}$$


THANK YOU
GW
SOLDIERS !