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Question: Note: Stop-and-go protocol = Alternate bit protocol = Stop-an...

Note: Stop-and-go protocol = Alternate bit protocol = Stop-and-wait protocol

a) Suppose the Stop-and-go protocol is used with 840-byte data frames and 40 byte ack frames on a link with a 8 ms propagation delay in each direction. In the absence of transmission errors, what are the throughput (in packets per second) and efficiency if the link data rate is 1 kbps? 100 kbps? 10 Mbps? 1 Gbps?

b) You must have found the above protocol to be very inefficient over links with very high data rates. Let's try replacing it by a sliding window protocol. At 1 Gbps, what would the throughput and efficiency be if the window size is 10 packets? 100? 1000? 10,000? What is the ideal window size?

Expert Answer



Anonymous answered this
28 answers

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DATA Packet size: 840bytes=6720bits

ACK packet size 40bytes=320bits

P = propagation delay = 8ms

C = link data rate

Imagine no transmission errors, negligible framing overhead, and negligible processing time p.

a) With the Stop-and-go protocol:

$T = d + 2P + a + p = d + 2P + a$ (p is the processing time, assumed negligible)

T: Time to send a data frame and receive the corresponding ACK

d: Time to transmit a data frame

P: Time for the frame to propagate from the sender to the receiver

a: Time for the receiver to transmit an ACK

Throughput = $1/T$ (packet/second)

Efficiency = d/T (no units)

C	d	a	P	T	Throughput	Efficiency
1kbps	6.72sec	320msec	8ms	7.056 sec	0.142pkts/s	95%
100kbps	67.2 msec	3.2 msec	8ms	86.4 msec	11.6 pkts/s	77.8%
10Mbps	0.672 msec	0.032msec	8ms	16.7 msec	59.9 pkts/s	4.0%
1Gbps	6.72 μ sec	0.3 μ sec	8ms	16 msec	62.5 pkts/s	0.042%

b) By a sliding window protocol following the similar opinions

Efficiency = $\min [(W.d/T), 1]$

(the throughput can not be greater than C (C and throughput should be in similar units).

C	Window size	T	Throughput	Efficiency
1Gbps	10	16 msec	625 pkts/s	0.42%
1Gbps	100	16 msec	6.25 kpkts/s	4.2%
1Gbps	1000	16 msec	62.5 kpkts/s	42%
1Gbps	10,000	16 msec	148.8 kpkts/s	100%

The ideal window is: $W_i = T/d = 2381$ frames

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rdt 3.0 in which sequence numbers alternate between 0 and 1): a. With the SR protocol, it is possible for the sender to receive an ACK for a packet that falls outside of its current window. b. With GBN, it is possible for the sender to receive an ACK for a...

A: [See answer](#) 100% (5 ratings)

Q: TCP congestion control – Consider sending a large file from one host to another over a TCP connection that has no loss. a) Suppose TCP uses AIMD for its congestion control without slow start. Assuming cwnd increases by 1 MSS every time a batch of ACKs is received, and assuming constant round-trip times, how long does it take for cwnd to increase from 1 MSS to 6 MSS? b) What is the...

A: [See answer](#)

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