CNT4007-HW2

February 29, 2024

Annaly Rocha

Z23695925

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HW2

0.1 Q. 1

NRZ represents 1 as 5 V and 0 as 0V, Manchester encodes 1 with a high to low transition and 0 with a low to high transition, NRZI uses transitions to encode 1 and stays at the current position for 0. Making changes midway through 1 is important for maintaining clock synchronization between SN and RS.

0.2 Q.5

Original "1101011111010111111010111111110"

bit-stuffing is marked by '0' following five consecutive '1' bits.

"11010 11111 01011 11110 10111 11110" The stuffed bits are marked by spaces, but the spaces represent '0' bits added after five consecutive '1' bits.

0.3 Q.6

Original "11010 11111 01011 11110 01011 11110"

look for sequences of five consecutive '1' bits followed by a '0' bit

Removed bits "110101111110111110101111110"

There should be no error as the '1' bits are not consecutive bits of 6.

0.4 Q.20

a.

delay $=\frac{Distance of Link}{Speed of Signal}$

$=\frac{20x10^3 m}{20x10^8 m/s}$ = 100 µs

b.

Ttimeout=2×RTT

Ttimeout=2×0.2ms

Ttimeout=0.4ms c.

Even with an appropriate timeout value, the ARQ algorithm may still experience timeouts and retransmissions due to network variability, jitter, and queuing delays.

0.5 Q. 38

delay $=\frac{Distance of Cable}{Speed of Propagation}$

$=\frac{1500m}{0.77c}$

$=\frac{1500m}{0.77c*3*10^8 m/s}$ = 6.49 µs

delay $=\frac{Distance of Cable}{Speed of Propagation}$

$=\frac{1000m}{0.65c}$

$=\frac{1000m}{0.65c*3*10^8 m/s}$ = 5.13 µs

delay $=\frac{Distance of Cable}{Speed of Propagation}$

$=\frac{6*50m}{0.65c}$

$=\frac{6*50m}{0.65c*3*10^8 m/s}$ = 1.54 µs

Process Delay = Number of Process x time

=6*0.2 µs###### =1.2 µs

Process Delay = Number Process x time

=2*0.6 µs ###### =1.2 µs

(6.49+5.13+1.54+1.2+1.2=1.2)µs = 15.56 µs

RTT=2×(One-Way Delay)

RTT=2x15.56µs

RTT= 31.12µs

Then the worst-case round-trip propagation delay is 331 bits

0.6 Q. 40

a.

Packet size=464x10

= 4640 bits

Minimum Packet size=(4640 + 48) bits

=4688 bits

$=\frac{4688}{8}$ **bytes** 586 bytes

b.

This packet size is bigger than many other packet sizes at higher levels, resulting in extra padding in each packet at the link layer and wasting a lot of bandwidth.

c.

Compatibility ensures that the time to detect collisions stays the same. To achieve this, we need to shorten the maximum distance between two stations.