1999 Digital Electronics

p10q1
IML

~~to which B (assuming it received the requrest) responds with an ARP Reply sent to Aet:~~

~~ARP Reply~~
~~Aip~~
~~Aet~~
~~Bip~~
~~Bet~~

~~Other hosts which receive the ARP Request and which had store an address mapping for A will update the mapping. They can't for the reply sent by B since this was sent only to A.~~

~~Hosts will only remember mappings for a few minutes and then throw them away. This ensures that the state which is retained is always up to date. A host rebooting will, with its first ARP Request cause all hosts which have an interest in it to have their mappings up dated.~~

c) ~~Let the delay down the channel be d and the date rate be r. Simple ARQ means that we are only sending one packet at a time, so we can transmit a packet onto the channel in 1000/r and then start another in 2d (waiting for the packet to reach the end and for an acknowledgement to return) in the absence of errors. Lets assume that a corrupt packet is detected as such an a negative acknowledgement is sent immediately when this occurs.~~
~~If we assume with an error rate of 10^{-4} that one in ten packets will be corrupt and ignoring errors in acks, then very roughly we will transmit 11 packets for every 10 we want to send.~~
~~Applying the same approximations, with an error rate of 10^{-5} we will send 101 packets for every 100 we want to send. So we can just compare 110 transmissions with no coding with 101 transmissions with coding on.~~
~~Transmission time no coding 100 microseconds, with coding 200 microseconds, so (times in microseconds) for coding on to be better:~~

$$101\,(200 + 2d) < 110\,(100 + 2d)$$

~~from which d a little over 500 microseconds (have to divide 9200 by 18) makes coding on better.~~

p2q2
p11q12

~~Digital Electronics~~

~~Question 1~~

a) ~~Inputs: req1, req2, busy (optional)~~
~~Outputs: grant1, grant2~~
b) ~~Obvious policies are round robin and strict priority but the latter arguable requires no state about previous requests. So round robin and a hogging policy would be better~~
c) ~~Straightforward; eg round robin requires four states to remember who last had the resource and whether they currently have it or not.~~
d) ~~Follows from c)~~

Question 2

a) Inputs x0,x1,..., x7, control inputs a,b,c, output z.

z = abc x7 + ab NOT (c) x6 + ... + NOT (a) NOT(b) NOT (c) x0

b) Build a tree with 8 first stage 8:1 multiplexors producing the inputs to a second stage multiplexor. Use the first three control inputs on all of the first stage multiplexors, the second three control inputs on the second stage multiplexor.
c) Inputs a,b,c, outputs z0,z1,...,z7
Eg z2 = NOT(a) b NOT(c)
d) Read only memories have word lines for each location in the memory. A decoder on the address lines to a memory can be used to drive the word lines, ensuring that only the word addressed has its word line asserted.