1. Networking Principles
    a) Application, Presentation, Session, Transportation, Network, Datalink, Physical
    b) 5 layers
    c) Decide what protocols should be applied, broadcast channels to transmit the data, (we won't encounter the situation that multiple devices share a single link, if it happens partitioning will be considered as we don't want miss any message).We also need to consider high probability of loss, for performance we should implement functionality lower down. And we probably don't need (inter)network layer neither since most of transmission happens within the network.
    d) We can redesign transport layer which provides end-to-end communication service between processes. We need a better protocol to handle corrupted packets and efficient ways to retransmit lost packets. On top of that, we can smooth the communication by improving congestion control and flow control.
2. End-to-end Argument
    a) 1:N, 2:(1-p)*N, 3:(1-p) *(1-p) *N
    b) Hop-by-Hop keeps sending packet until other nodes receive the packet. From node1 to node2, the probability of successfully sent a packet is 1-p = 0.05, thus for each packet the expected transmission is 1/0.05 = 20, for 100 packets the expected retransmissions = 20*100 = 2,000. It's also true for node2 to node3, thus the total number of retransmissions = 4,000.
    c) End-by-End keeps sending packet until other end-host receives packet. The probability of successfully sent a packet is 0.05*0.05 = 0.0025, thus for each packet the expected transmission is 1/0.0025 = 400, for 100 packets the total expected transmission = 400*100 = 40,000.
    d) We will have:2N/(1-p) = N/(1-p)^2, where p=0.5. Thus when p is higher than 0.5 we should use hop-by-hop and vice versa. When we are transmitting data via a huge unstable(p is high) network such as wireless routers, hop-by-hop would require less retransmission.