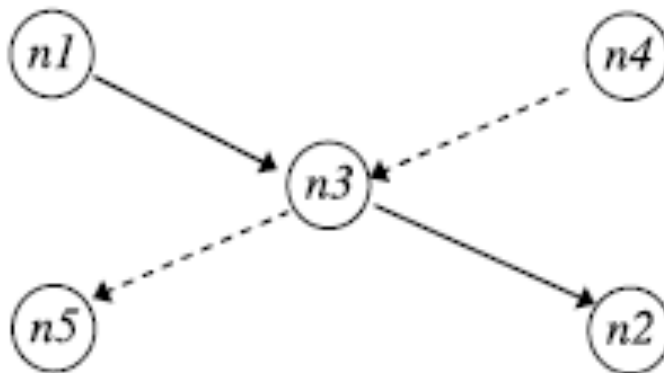


9 Principles of Communications (JAC)

- (a) Network Coding can be added to the routing and forwarding layer in a wireless mesh network to improve the capacity. The gains come from reduced transmissions, and from the associated reduction in contention for the radio channel. Show with examples how the coding scheme that combines packets in the simplest topology illustrated below can increase capacity by $1/3$. If we increase the number of flows traversing the central node, how does the capacity improve? In the limit, for a star network, how good can the improvement be?



[15 marks]

- (b) The standard version of the Transmission Control Protocol recovers from lost packets by using positive acknowledgements coupled with timeout or duplicate acknowledgements to trigger retransmissions. Describe briefly how network coding can be applied across multiple data packets instead, explaining how the acknowledgement scheme must be modified to accommodate coded packets.

[5 marks]