



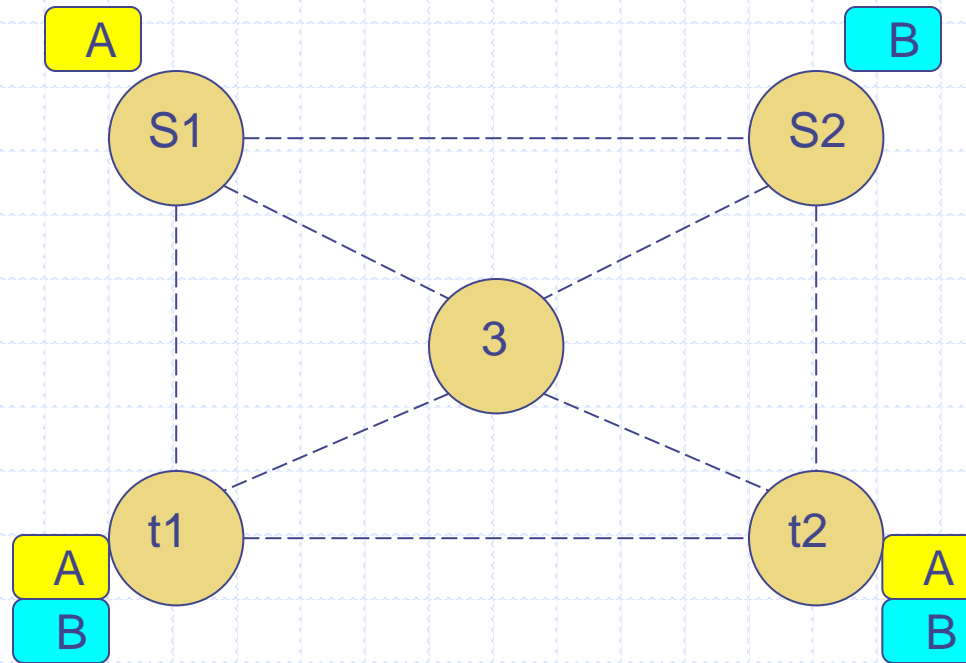
1.0 Introduction

- Wireless Network
 - Easy to deploy
 - Mobility
 - Insufficient throughput
 - Software and hardware to increase throughput
- Network Coding (software):
 - Increase throughput
 - Combine packet
 - Destination can decode the receive combine packet



1.0 Introduction

Multicast

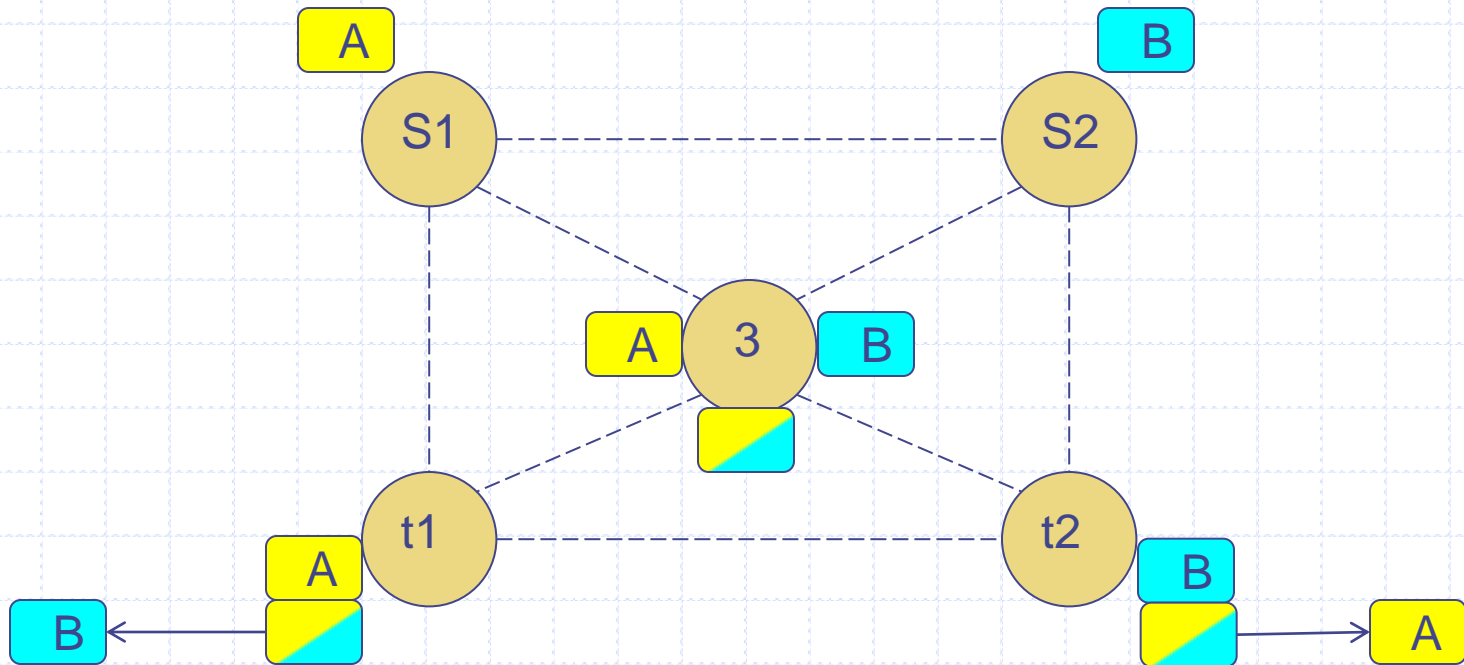


- 4 Transmission Time Slot



1.0 Introduction

Multicast With Network Coding



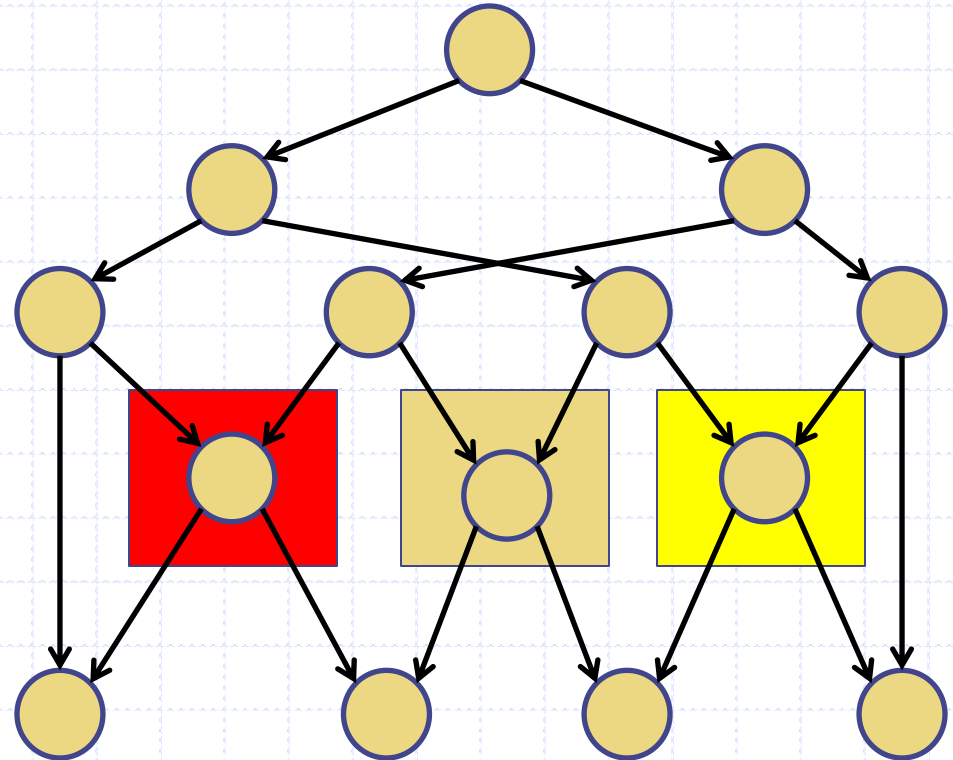
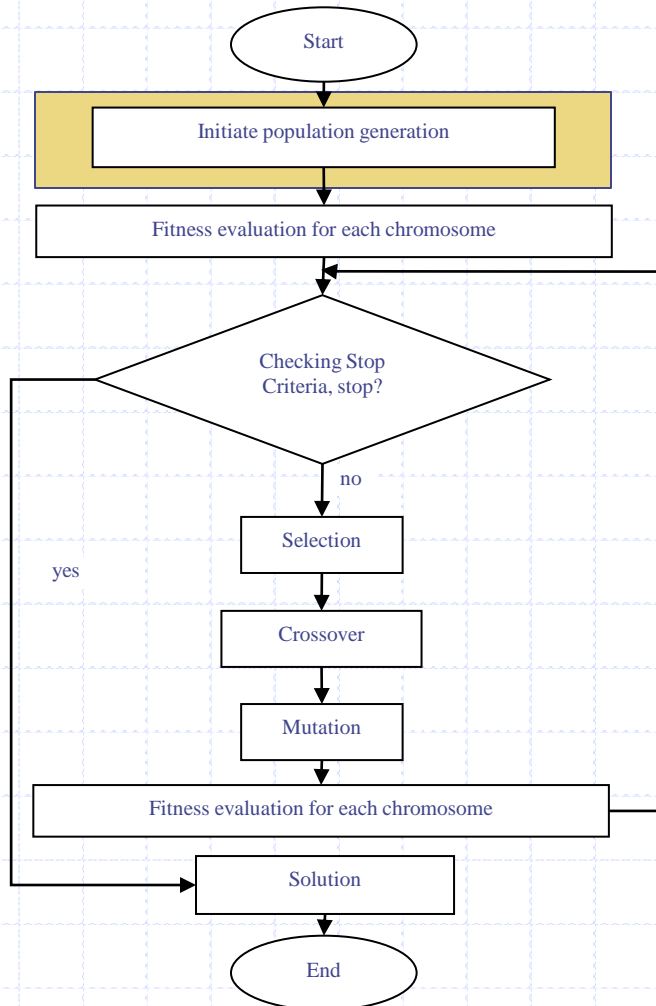
- 3 Transmission Time Slot



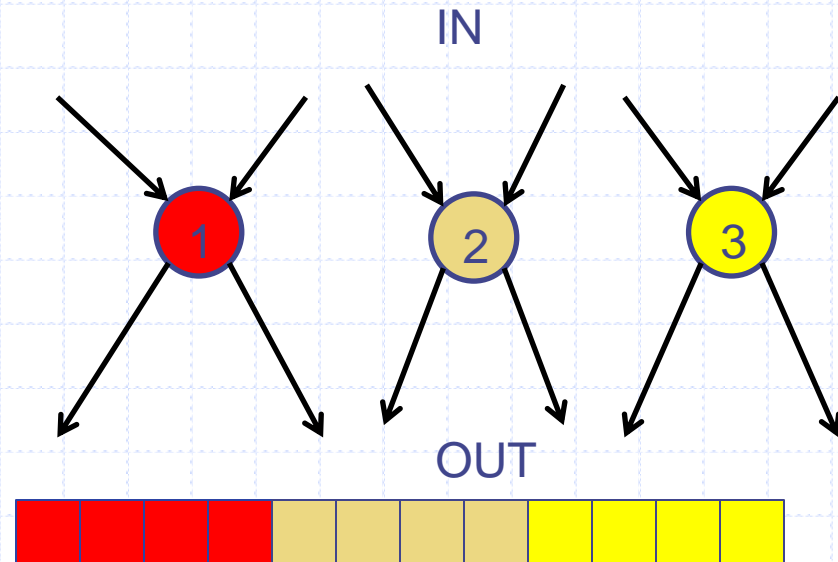
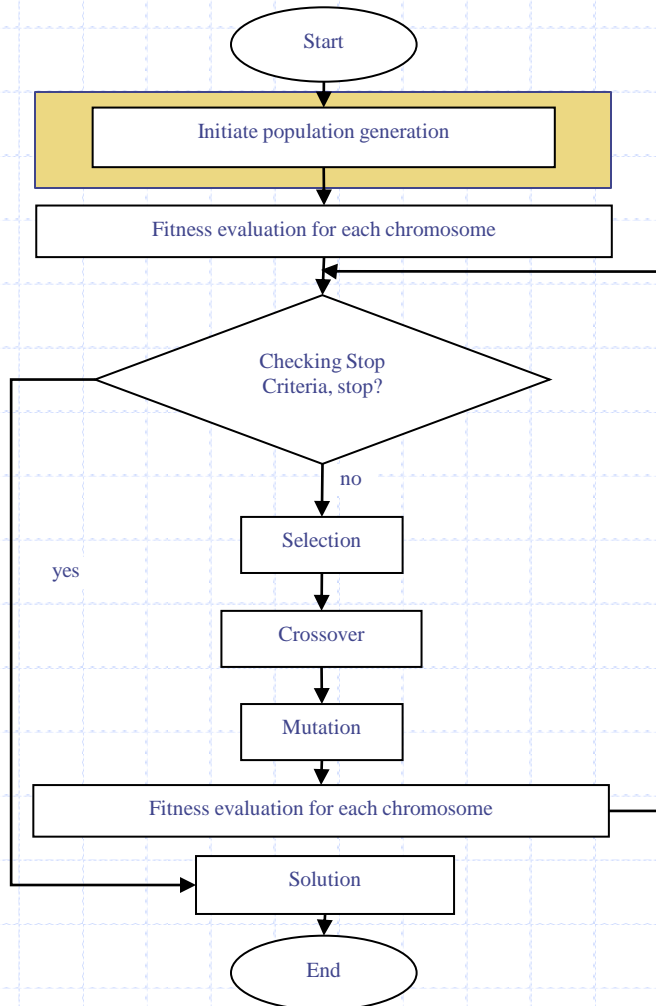
2.0 Objective

- The purpose of this paper is to minimize the usage of the link and coding resources in a network.

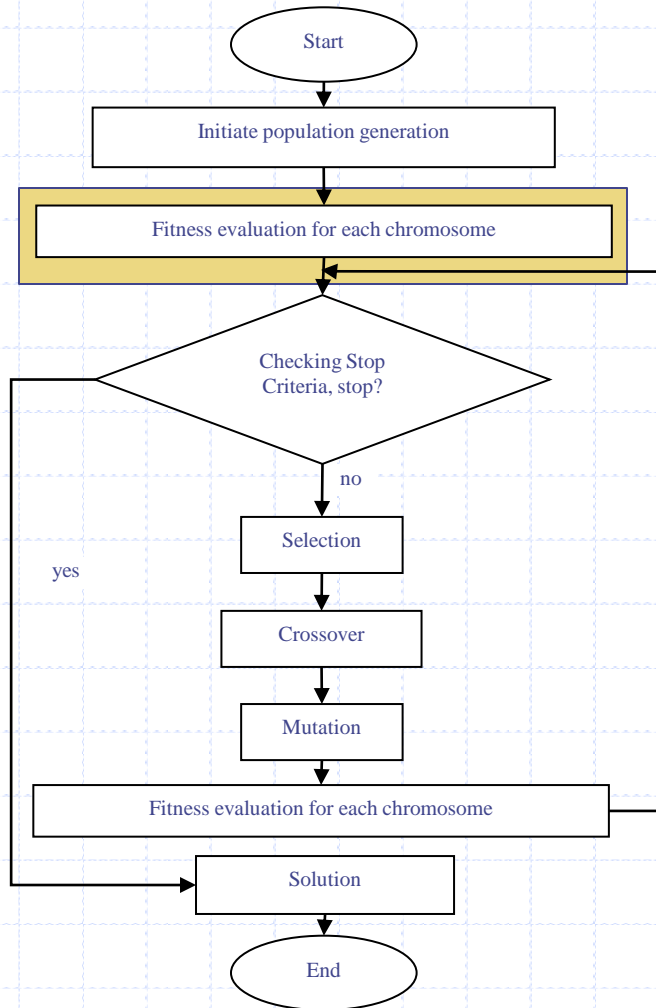
3.0 Methodology (Genetic Algorithm)



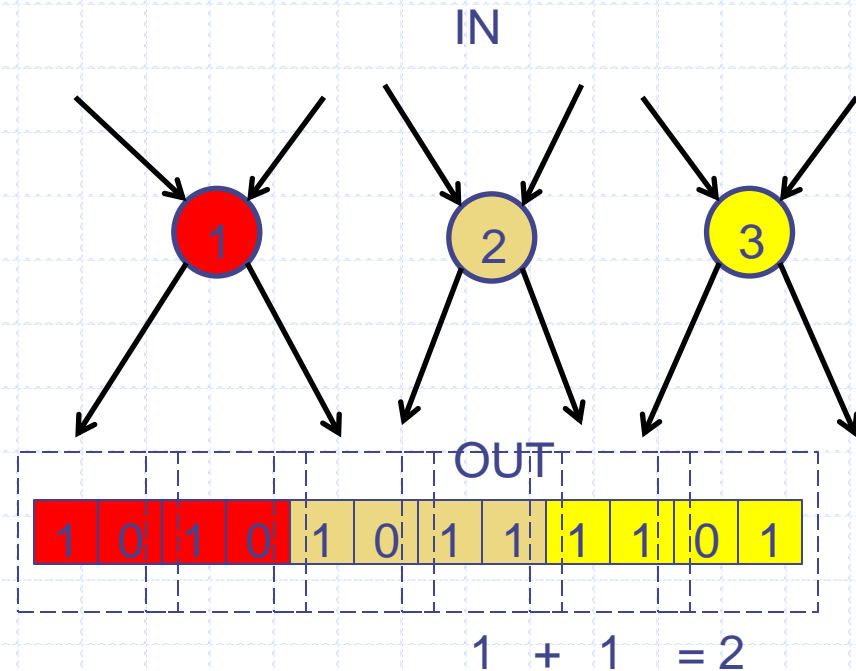
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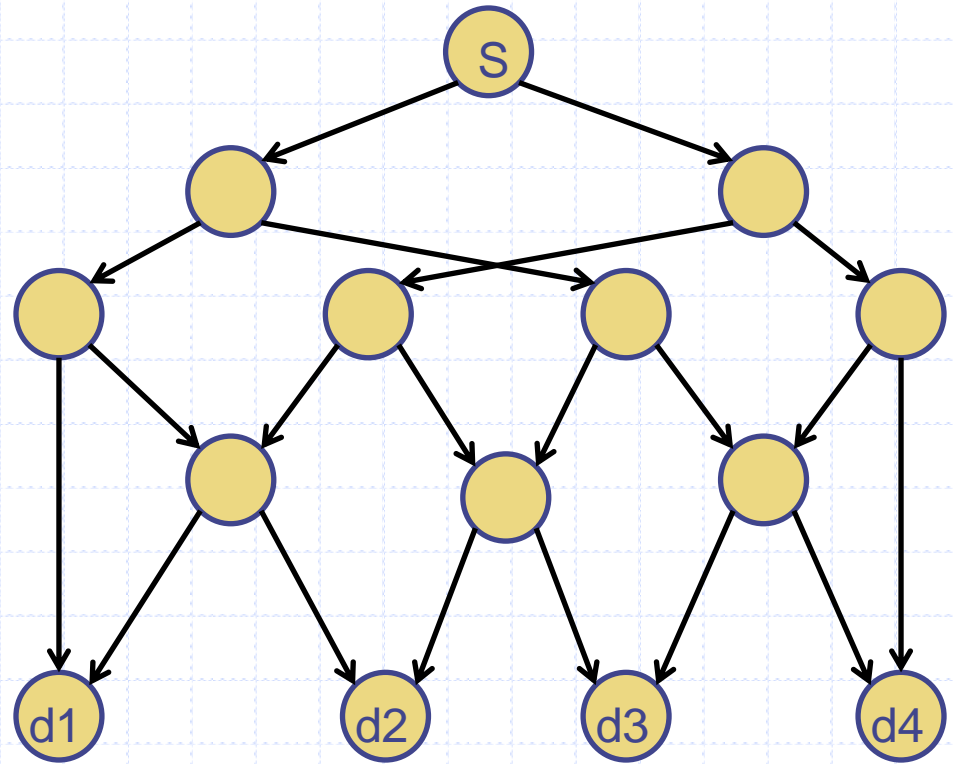
$$F(R) = \begin{cases} n_{node}, & \text{feasible} = 1 \\ n_{max} + 1, & \text{feasible} = 0 \end{cases}$$





4.0 Simulations (Setup)

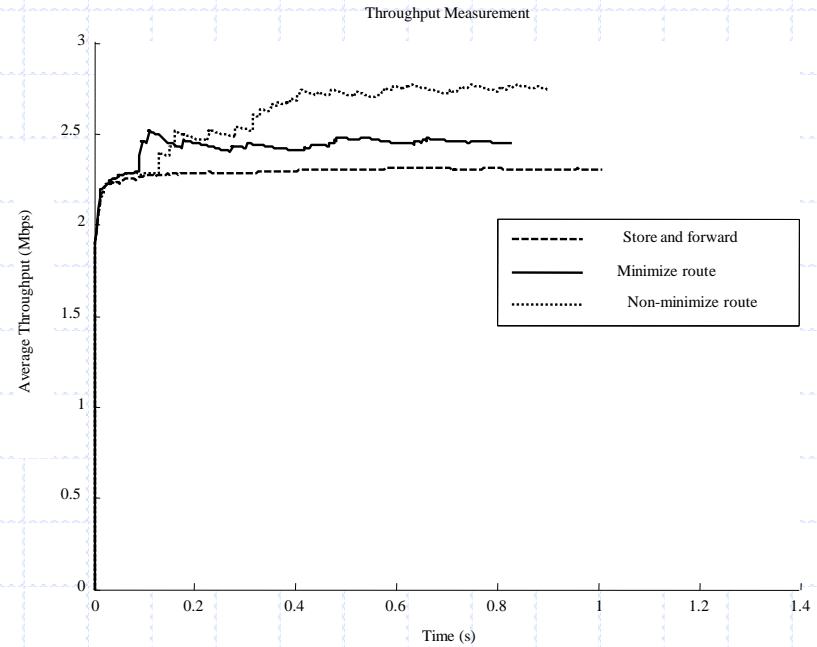
- Simulation
- Setup topology
 - 14 nodes
- Packet send from source s to destination $t1$, $t2$, $t3$, and $t4$.
- Packet is split into 100 piece of 5kb packets, send to 4 destination.





5.0 Results and Discussions

Mutation rate	Minimal coding node	Average result	Average Generation needs
0	1	1.8	22.8
0.05	1	1.4	30.4
0.1	1	1.5	47.9
[0 0.1]	1	1.2	30.7





6.0 Conclusions

- Genetic algorithm is used to minimize the usage of the coding nodes in the network in order to reduce the deficit of network coding while increasing the throughput.
- For future work,
 - multiple sources to multiple sinks.
 - Improve Chromosome representation.
 - Unicast?
 - Complicated feasible equation, take time.
 - Genetic Algorithm to solve coding-aware problem.