

# OPPORTUNISTIC ROUTING ALGORITHMS IN DELAY TOLERANT NETWORKS

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## ABSTRACT

Delay Tolerant Networks (DTNs), also called as intermittently connected mobile networks, are wireless networks in which a fully connected path from source to destination is unlikely to exist. Therefore, in these networks, message delivery relies on opportunistic routing where nodes use store-carry-and-forward paradigm to route the messages. However, effective forwarding based on a limited knowledge of contact behavior of nodes is challenging.

In this thesis, we discuss several aspects of routing problem in DTNs and present four novel algorithms for different DTN environments: (i) multi-period multi-copy based Spray and Wait routing algorithm where the copies are distributed to the nodes in different periods, (ii) multi-period erasure coding based routing algorithm where the optimal erasure coding parameters for different periods are selected to minimize the cost, (iii) efficient single copy based routing algorithm where the correlation between the mobility of nodes are utilized, and (iv) social structure-aware routing algorithm where message exchanges between nodes are performed considering the social relations of nodes. In all of these algorithms, our common objective is to increase the message delivery ratio and decrease the average delivery delay while minimizing the routing cost (number of copies used per message or number of forwardings of a single message between the nodes) under given circumstances. We also present simulation results (based on both real and synthetic DTN traces) regarding the performance comparison of the proposed algorithms with the state-of-the-art routing algorithms in DTNs.