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ScienceDirect

Procedia Computer Science 48 (2015) 401 – 407

Procedia Computer Science

International Conference on Intelligent Computing, Communication & Convergence

(ICCC-2015)

Conference Organized by Interscience Institute of Management and Technology,

Bhubaneswar, Odisha, India

Delay Tolerance in Wireless Networks through Optimal Path Routing Algorithm

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Abstract

A Delay Tolerant Network (DTN) is a mesh network designed to operate effectively over great distances. DTNs have not custom to vindicate complete track from source to destination most of the time during communication. Existing data routing approaches used in DTNs were based on multi-copy routing. However, these existing methods incur overhead due to exorbitant transmissions and increases seer side processing. Hence there is a necessity to propose an optimal path routing algorithm to overcome the above issues. The optimal path routing reduces the proposition of message dropping and wax the throughput. The design approximate also uses random path generation that can reveal the path that affirms active connection for a longer duration to achieve a desired routing delay. In addition, this system has an effective buffer management mechanism to increase throughput and decrease routing delay. The analysis and as well as the simulation results clearly shows that the optimal path routing algorithm, provides high throughput and low routing delay compared to existing routing approaches.

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Peer-review under responsibility of scientific committee of International Conference on Computer, Communication and Convergence (ICCC 2015)
doi:10.1016/j.procs.2015.04.113

Keywords: Delay Tolerant networks; Social networks; Utility-based routing; Probabilistic routing; Epidemic routing.

1. Introduction

A wireless network is a computer network that does not require wired connection for data transmission. Wireless networking is a tactic by which homes, telecommunications networks and venture (business) installations avoid the costly process of introducing cables into the building or as a connection between different locations. Wireless is generally implemented and administered using radio communication. The implementation of proposed system is carried out at the physical layer of the OSI model network structure.

This research work focuses on Delay Tolerant Networks for nodes that are at a distance between 100 and 300m, which are known as intermittently connected networks. The intermittent connection may result from [10] network dynamism, [3] power management of mobile nodes and [7] node scarcity. Routing methods specifically meant for DTNs have been widely studied in recent years. One of the major works is grouping of routing methods that uses multi-copy routing scheme named SEDUM with Optimal Tree Replication algorithm was introduced by Ze Li et al. that enable messages to meet its destination node with high probability but does not reduce the problem of message dropping. This paper focuses on introducing Optimal Path Routing Algorithm for DTNs which provides high throughput as well as reduces the problem of message dropping compared to existing routing approaches. In this estimated approach, initially it uses use random based routing technique through which it finds the Optimal Path, that are considered to be the path to maintain active connection for longer duration. By implementing the optimal path routing algorithm, the problem of message dropping is reduced using Path Trace Algorithm. In addition, this approach maintains effective buffer management in which the time duration for each transaction is updated.

1.1. Literature Survey

Costa et al. [1] proposed a Social Cast. It is a routing framework for publish-subscribe model, which exploit the predictions based on metrics of social interaction (e.g. patterns of movements among communities) to identify the best information carriers. The principles underlying in this protocol, its operation illustration and performance evaluation using a mobility model is based on a social network that has been validated with real human traces of mobility. The evaluation clearly shows the prediction of co location and node mobility leads to maintain a very high and steady delivery of event with low latency and overhead, despite the variation in number of replicas per message.

In [2], Ze Li et al. introduced intermittently connected mobile networks. Recent approaches which were used for transmission in such networks were primarily based on multi-copy scheme for flooding and single-copy scheme for flooding. However, they incur either high overheads due to excessive transmissions or long delay due to possible incorrect choices while message forwarding. In this paper, a utility based distributed routing algorithm with multi copies was proposed, where a packet was replicated to a certain number of its nodes that are neighbor, which packets are forwarded sequentially to the destination node based on a probabilistic routing scheme. Some methods for buffer management are also proposed to further improve its performance. In [3], Henri Dubois-Ferriere et al. introduced Fresher Encounter Search for efficient route detection in mobile ad-hoc networks. Here the source searches for intermediate node and the intermediate node then searches for the node that encountered the destination more recently and the procedure iterates until the end communicating partner is reached. Therefore, the single network wider search is replaced by FRESH into the succession of smaller searches resulting in cheaper route discovery. In [5], Levine B N et al. presented an intentional DTN routing protocol that can optimize a specific routing metric such as the worst-case delivery delay or the fraction of packets that are delivered within a border. The key imminent is to treat DTN routing as a resource allocation problem that translates the routing metric into per-packet utilities which determine how packets should be replicated in the system.

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