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Simulation for proposed DTN algorithm & Analysis

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ABSTRACT : There are different simulation tools available for simulating the algorithms of mobile ad-hoc networks, and these tools are user friendly, means easy to work upon. In case of DTN algorithm implementation, these tool cannot work properly because of the frequent disconnection environment of nodes in DTN. We have used The ONE simulator [33] for implementing our proposed DTN algorithm.

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I. Introduction to the Simulator: The ONE

ONE stands for Opportunistic Network Environment, and it is a java based simulator used for DTN specific environment. In this simulator, the source code of some famous DTN algorithms such as PRoPHET, Spray and Wait etc. are given and different types of movements models are also embedded. There are some .txt files are provided with ONE [33] in which two files are of main concern. One is README.txt and other is default settings.txt. Every time when the simulation runs it reads the default settings.txt file to get the values of the variables defined in the java files of the classes used from routing and movement packages. The README.txt file introduces the user with the working of ONE and how to use it.

By default, the epidemic router is used with the Shortest Path Map Based movement model. So after running the default settings we get this result, for the 43200 seconds simulation time it gives the average of 0.2522 delivery probability with a total of 126 nodes. In the following figure A, we are showing the run window of the ONE simulator.

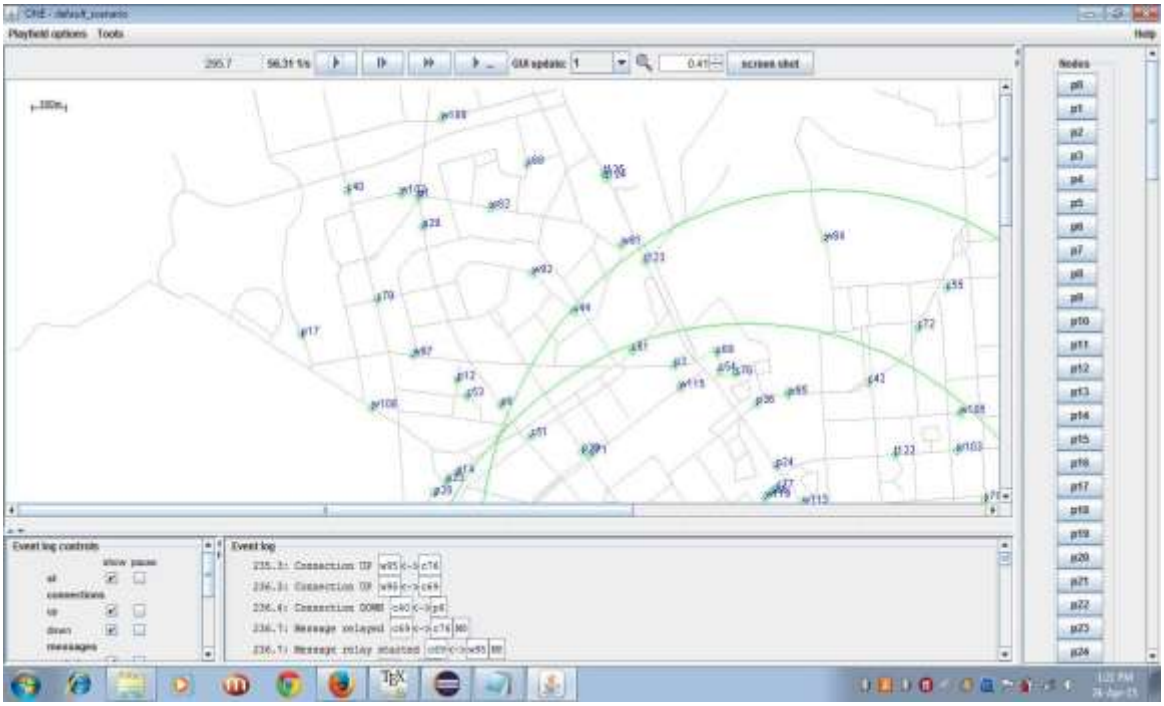

Figure A: Run window of ONE simulator

In the figure B, the nodes are deployed in the region given by the helsinki underlay map in which the nodes are shown at their intended paths defined for different group of nodes in the default settings file.

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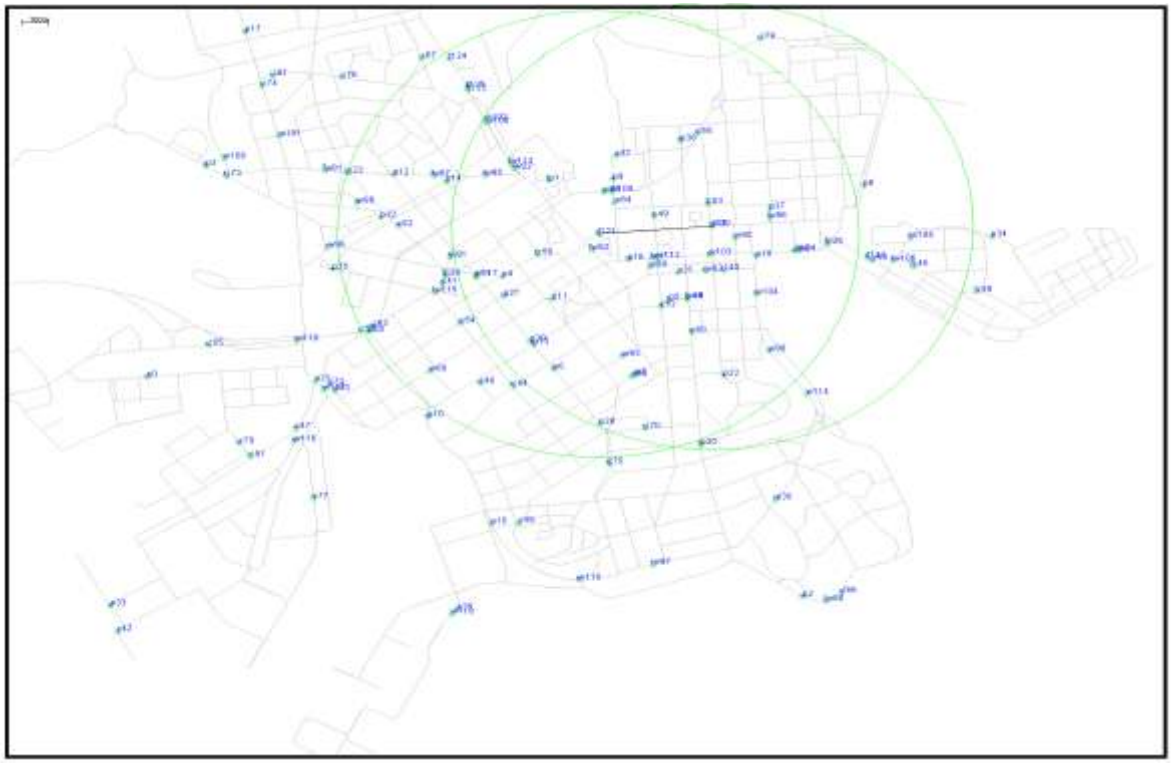

Figure B: The position of nodes in the helsinki underlay map

A test scenario

In this section, we are considering a scenario with 5 nodes in a region 400, 300 meters size of height and width. In the figure C, the green circle around the nodes are showing

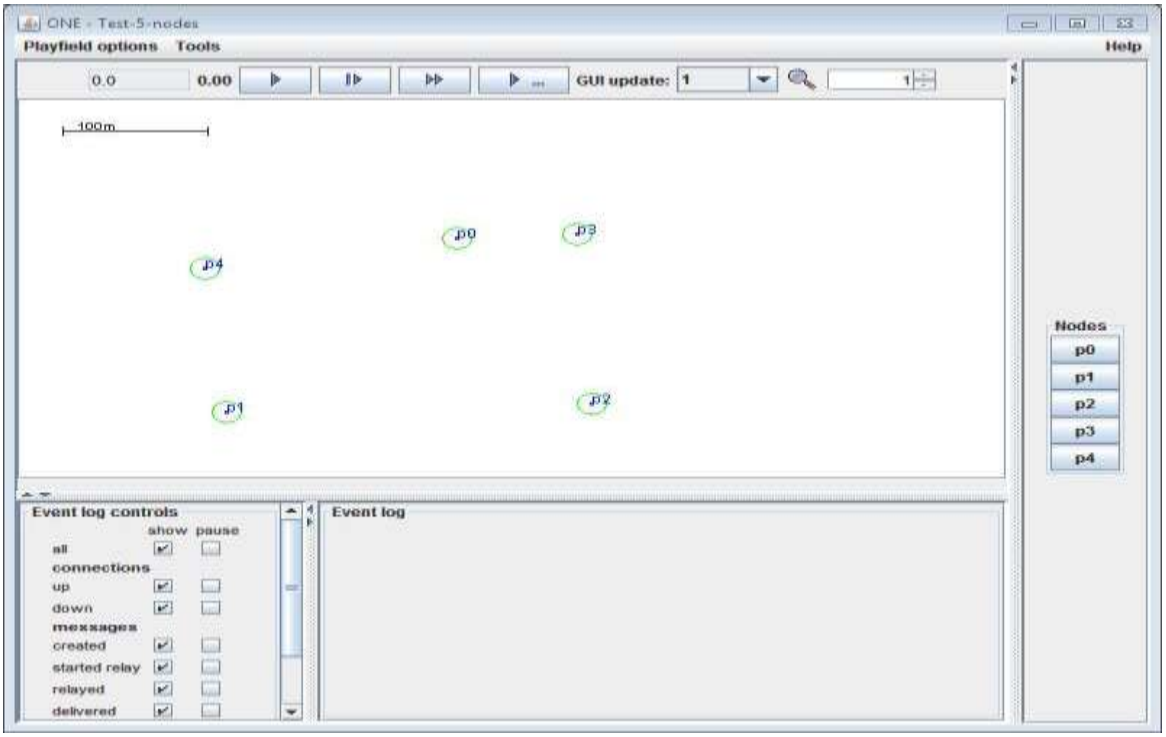

Figure C: Test scenario with 6 nodes

the range of the node. When we click on the play button(provided on the top of the window), nodes start the movement and generation of messages. When two or morenodes come in communication range of each other, exchange messages. The exchange the messages depend upon the message destined for which node and if the

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available node is good relay node for that destination.

In the figure D, the event log window (at bottom) showing the events hap-
pened during the simulation run such as, at which point of time the connection goes up, the message get relayed, the connection goes down and when the message get aborted.

In the node window(at right side of the window), one may click on any particular node to view its information about how many messages it received and how many messages it forwarded.

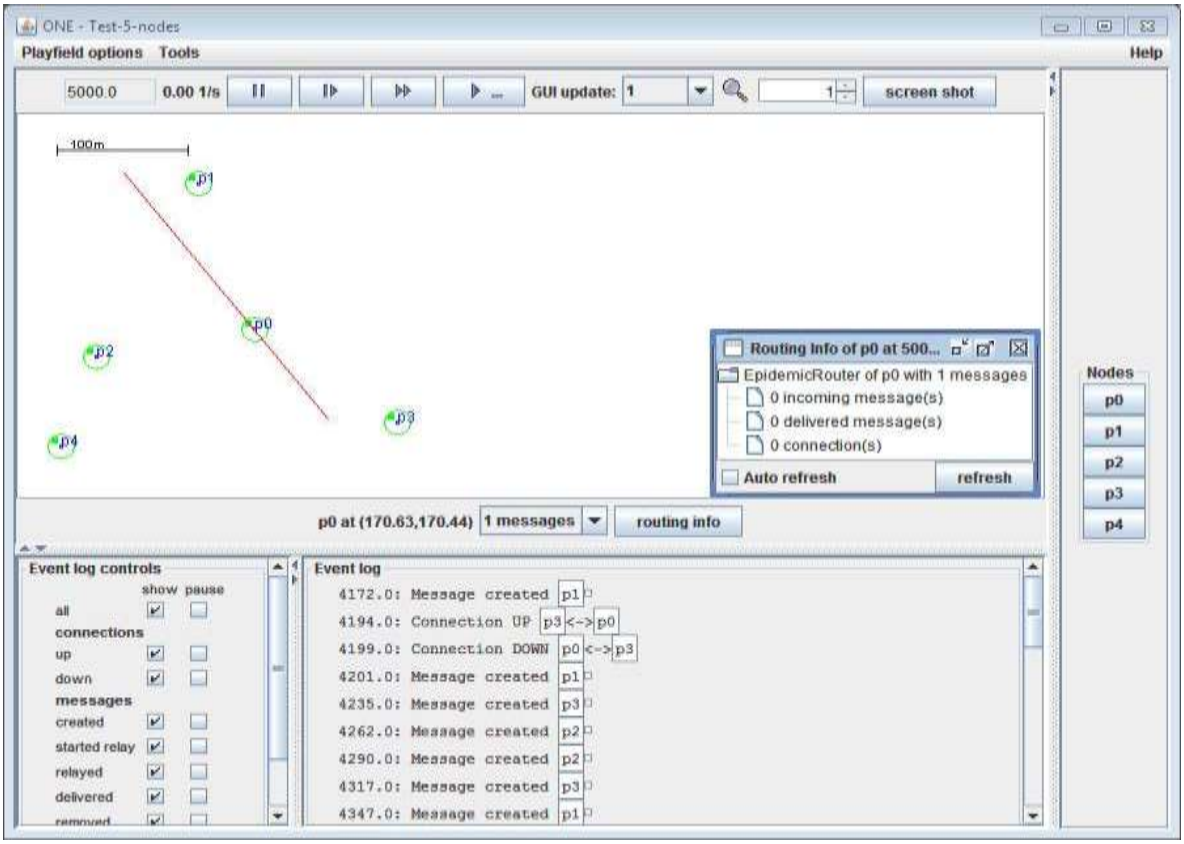

Figure D: The node movement and message transfer

Algorithm simulation

The simulation of our proposed algorithms needs to be implemented in the ONE
simulator. In ONE, for any algorithm implementation, it needs two minimum settings: First is to setup a simulation environment and second is the Router logic. The Router logic we have already explained in the proposed algorithm section. Here we are pre-senting the code flow of our logic of router. We are presenting the code flow of our algorithm in figure E in which, the first phase is to form the cluster of nodes and the rest of the steps are defined sequentially.

Performance metrics and analysis

The performance parameters which we use for analyzing our algorithm are:

• Simulation time: The total time a simulation run. The default value of simu-
lation time is 43200 seconds = 12 hours.

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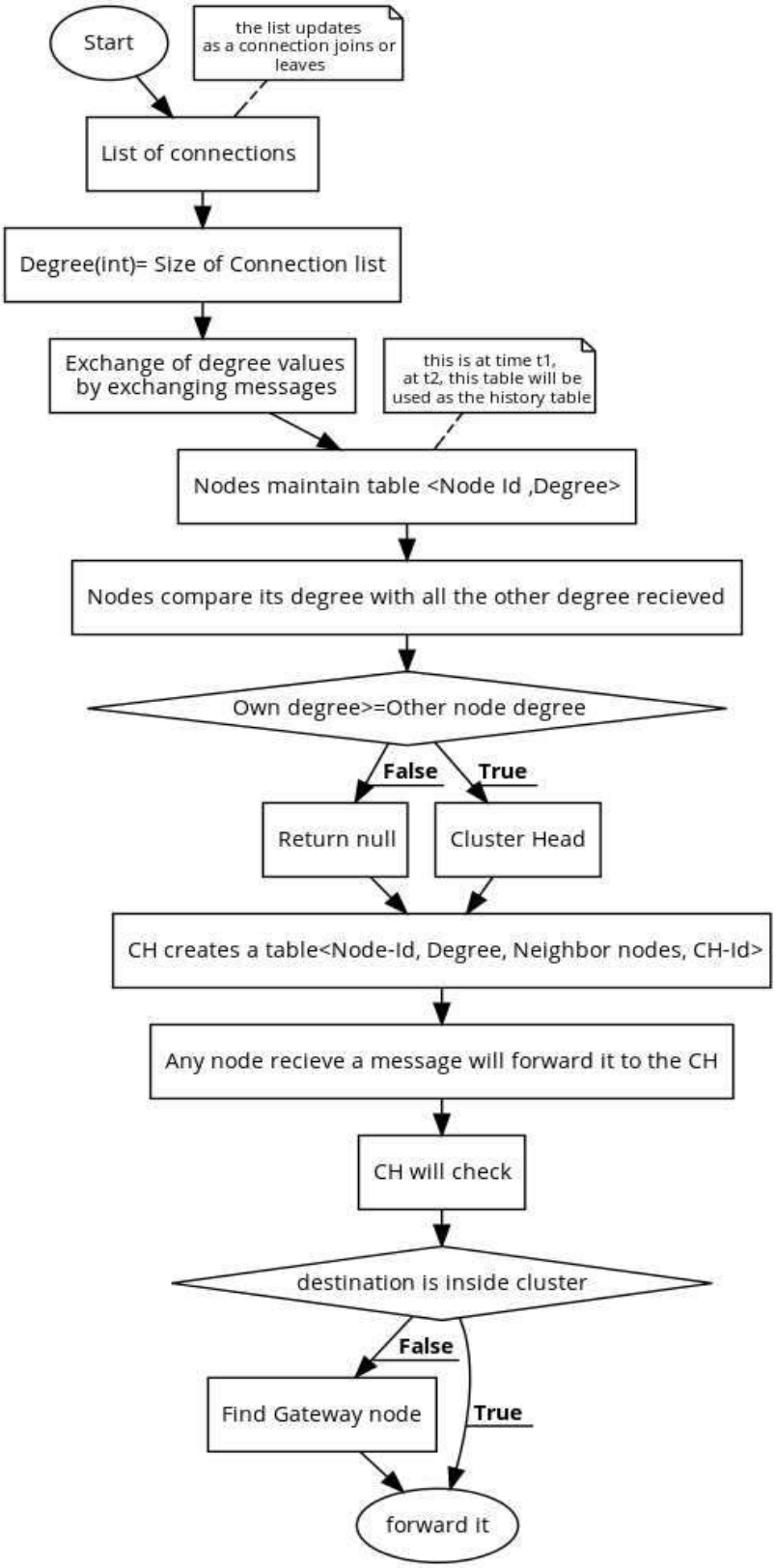

Figure E: Code Flow of Proposed algorithm

• Message created : The total number of messages which are created during the simulation time.
• Message started : The total number of messages created plus the total number of replicas generated for the original message.
• Message relayed : The total number of messages which get connections to get relayed.
• Message aborted : The number of messages which get aborted before the suc-cessful transmission. It could be because of buffer full or message TTL finished or the

message is already delivered.

• Message delivered : The total number of messages received at their intended destination nodes.

• Delivery-Probability : The total number of messages delivered divided by the total number of messages created.

• Overhead ratio : The total number of messages relayed divided by the total number of messages delivered.

Our proposed algorithm is suitable for the college campus or office type environment where nodes come in contact and remain in contact for an adequate time period. We have also calculated the time period which a nodes need to form the cluster, in the Bundlesize following para. Transmission- time = Bundlesize/Bitrate.

If we consider the size of a control messages be 50 k and transmission speed 250kbps, so maximum Transmission time of one message would be .2 sec with overhead included. Considering a scenario of 50 nodes in which 5 nodes come in contact for cluster formation, so the minimum time for which these nodes must be in contact for effective data transfer would be 1 seconds for cluster formation and information maintenance.

After this, the effective data transfer can takes place and the time would then depend upon the size of the data message. So in analysis of performance of proposed algorithm, we can say that it is feasible to use this cluster approach because the cluster formation and information maintenance is not taking much time and the data is effectively being transferred between nodes with less resource consumption.

II. Conclusion

In the proposed algorithm, we are using the current availability of nodes as well as the meeting frequency. This algorithm is suitable for the environment where the nodes have a limited mobility speed or the nodes come in contact with a each other for a while. The cluster based approach has a main advantage that it is better to store the n node information at k nodes only. Where n is the total number of nodes in the network and k is the number of cluster-Head nodes in the network. So this algorithm proposes the idea to consume less network resources in the form of buffer storage.

Bibliography

[1] Cerf, Vinton, et al. Delay-tolerant networking architecture. RFC 4838, April, 2007.online available at http://www.hjp.at/doc/rfc/rfc4838.html

[2] Warthman, Forrest. ”Delay-and Disruption-Tolerant Networks (DTNs).” A Tuto- rial. V.. 0, Interplanetary Internet Special Interest Group (2012).

[3] Burleigh, Scott, et al. ”Delay-tolerant networking: an approach to interplanetary internet.” Communications Magazine, IEEE 41.6 (2003): 128-136.

[4] Mobile Ad-Hoc and DTN Networks at IPCAS Lab, online available:http://www.ece.gatech.edu/research/labs/WCCL/DTN2.html

[5] Santiago, Jos, Augusto Casaca, and Paulo Rogrio Pereira. ”Multicast in Delay Tol- erant Networks Using Probabilities and Mobility Information.” Ad Hoc & Sensor Wireless Networks 7.1-2 (2009): 51-68.

[6] Zhao, Wenrui, Mostafa Ammar, and Ellen Zegura. ”Multicasting in delay tolerant networks: semantic models and routing algorithms.” Proceedings of the 2005 ACM SIGCOMM workshop on Delay-tolerant networking. ACM, 2005.

[7] Karimzadeh, Morteza, et al. ”Information deliveryin delay tolerant networks.” on-line available at http://www.cs.tut.fi/ moltchan/pubs/dtn2011.pdf35

[8] ’Introduction To Delay Tolerant Networks’, presentation. online available at: cherry.cs.nccu.edu.tw/ ttsai/course/inv cs/intro dtn.ppt

[9] Ott, Jrg, Dirk Kutscher, and Christoph Dwertmann. ”Integrating DTN and MANET routing.” Proceedings of the 2006 SIGCOMM workshop on Challenged networks.(pp. 221-228). ACM, 2006.

[10] Daly, Elizabeth M., and Mads Haahr. ”Social network analysis for routing in dis- connected delay-tolerant manets.” Proceedings of the 8th ACM international sym- posium on Mobile ad hoc networking and computing. ACM, 2007.

[11] Presentation by Dukhyun Chang on ”DTN Architecture and Protocols” online available at http://mmlab.snu.ac.kr/courses/2007advanced inter-net/handout/20071008 dhchang.pdf

[12] Ip, Yin-Ki, Wing-Cheong Lau, and On-Ching Yue. ”Forwarding and replication strategies for dtn with resource constraints.” Vehicular Technology Conference, 2007. VTC2007-Spring. IEEE 65th. IEEE, 2007.

[13] Scott, Keith L., and Scott Burleigh. ”Bundle protocol specification.” RFC 5050 (2007) online [available]: http://tools.ietf.org/html/rfc5050

[14] Bindra, Harminder Singh, and A. L. Sangal. ”Need of Removing Delivered Message Replica from Delay Tolerant Network-A Problem Definition.” International Journal of Computer Network and Information Security (IJCNIS) 4.12 (2012): 59.

[15] Erramilli, Vijay, et al. ”Delegation forwarding.” Proceedings of the 9th ACM in- ternational symposium on Mobile ad hoc networking and computing. ACM, 2008.

[16] Clare, Loren, Scott Burleigh, and Keith

Scott. ”Endpoint naming for space de- lay/disruption tolerant networking.” Aerospace Conference, IEEE, 2010.

[17] Das, Priyanka. ”An Analysis of Routing Strategies in MIA-DTN.” American Jour- nal Of Advanced Computing 1.2 (2014).

[18] Dubois Ferriere, Henri, Matthias Grossglauser, and Martin Vetterli.”Age mat- ters efficient routing mobile adhoc networks using encounter ages” Proceedings of the 4th ACM international symposium on mobile ad hoc networking & comput- ing,2003.

[19] Jones, Evan PC, and Paul AS Ward. ”Routing strategies for delay-tolerant net- works.” Submitted to ACM Computer Communication Review (CCR) (2006).

[20] Anthru, Shermina V., and T. P. Jayakumar. ”Opportunistic Routing Protocols In Human Working Day Model Delay Tolerant Networks.” International Journal Of Engineering And Computer Science 3.5 (2014): 5960-5965.

[21] Spyropoulos, Thrasyvoulos, Konstantinos Psounis, and Cauligi S. Raghavendra.”Single-copy routing in intermittently connected mobile networks.” Sensor and AdHoc Communications and Networks, 2004. IEEE SECON 2004. 2004 First Annual IEEE Communications Society Conference on. IEEE, 2004.

[22] Vahdat, Amin, and David Becker. Epidemic routing for partially connected ad hoc networks. Technical Report CS-200006, Duke University, 2000.

[23] Mundur, Padma, Matthew Seligman, and Ginnah Lee. ”Epidemic routing with immunity in delay tolerant networks.” Military Communications Conference, MIL- COM, IEEE, 2008.

[24] Small, Tara, and Zygmunt J. Haas. ”Resource and performance tradeoffs in delay-tolerant wireless networks.” Proceedings of the 2005 ACM SIGCOMM workshop on Delay-tolerant networking. ACM, 2005.BIBLIOGRAPHY

[25] Spyropoulos, Thrasyvoulos, Konstantinos Psounis, and Cauligi S. Raghavendra.”Efficient routing in intermittently connected mobile networks: the multiple-copy case.” Networking, IEEE/ACM Transactions on 16.1 (2008): 77-90.

[26] de Oliveira, Etienne CR, and Clio VN de Albuquerque. ”NECTAR: a DTN routing protocol based on neighborhood contact history.” Proceedings of the 2009 ACM symposium on Applied Computing. ACM, 2009.

[27] Wang, Lei, et al. ”Multipath source routing in wireless ad hoc networks.” Electrical and Computer Engineering, 2000 Canadian Conference on. Vol. 1. IEEE, 2000.

[28] Biswas, Sanjit, and Robert Morris. ”ExOR: opportunistic multi-hop routing for wireless networks.” ACM SIGCOMM Computer Communication Review. Vol. 35. No. 4. ACM, 2005.

[29] Jones, Evan PC, et al. ”Practical routing in delay-tolerant networks.” Mobile Computing, IEEE Transactions on 6.8 (2007): 943-959.

[30] Hua, Daowen, et al. ”A dtn routing protocol based on hierarchy forwarding and cluster control.” Computational Intelligence and Security, 2009. CIS’09. Interna- tional Conference on. Vol. 2. IEEE, 2009.

[31] Mongiovi, Misael, et al. ”Efficient multicasting for delay tolerant networks using graph indexing.” INFOCOM, 2012 Proceedings IEEE. IEEE, 2012.

[32] Chen, Xiao, Jian Shen, and Jie Wu. ”Enhanced delegation forwarding in delay tolerant networks.” International Journal of Parallel, Emergent and Distributed Systems 26.5 (2011): 331-345.

[33] Kernen, Ari, Jrg Ott, and Teemu Krkkinen. ”The ONE simulator for DTN protocol evaluation.” Proceedings of the 2nd international conference on simulation tools38