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# ·GENI Experiments on P2P and MANET Networks

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## ·Abstract

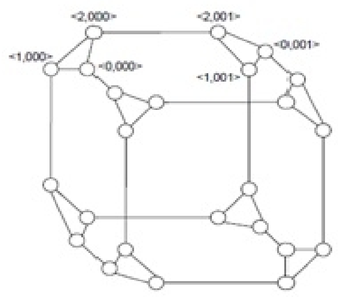
·Today's society is witnessing a tremendous increase in digital information. Myriads of applications call for the pooling and sharing of massive amounts of widely-scattered data at ever increasing scales that require a commensurate infrastructure of powerful networked distributed systems across wide and diverse areas. We will implement two existing data sharing algorithms, Cycloid and LORD, on the P2P and MANET networks, and thus identify and investigate potential issues in data sharing applications in these different heterogeneous networks. We are using GENI as the testbed for simulating the P2P and MANET network environments in order to produce real-world testbed data to compare to our previously obtained simulation and theoretical results.

## ·Research Objectives

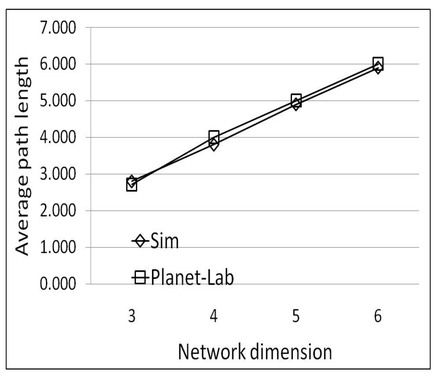
·The goal of this project is to first deploy the following file sharing algorithms and investigate their performance on the GENI real-world testbed:
1)Data sharing in P2P networks (Cycloid P2P).
2)Locality-based distributed data sharing protocol (LORD) in MANETs.
3)Ultimately, to achieve both of these tests through Omni across testbeds.
·)

## ·Data sharing in P2P networks · (Cycloid P2P)

·Features:
·(1) Constant maintenance overhead regardless of the system scale.
·(2) Scalability, reliability, dynamism-resilience, self-organizing.

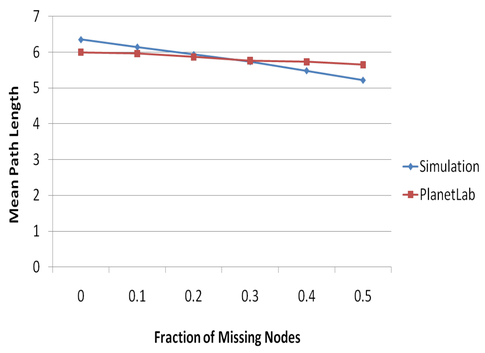



·Cycloid topology



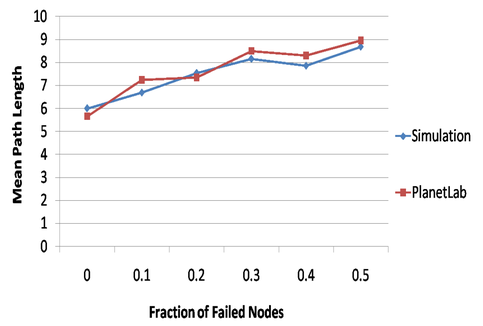

## ·Experiments on Planetlab

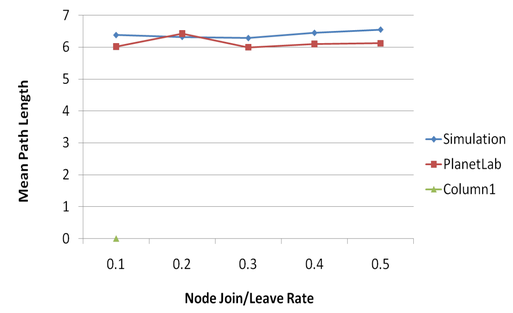
· We have deployed Cycloid P2P structure, over Planetlab with 24-364 nodes under different conditions. The results are:




## ·Issues/Problems

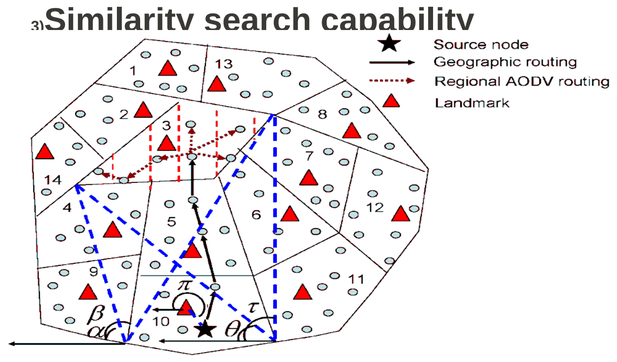
· The only major issue encountered by running our experiments on PlanetLab was encountering nodes that responded with high latency or not at all. This limited the range of our experiments to a maximum of a 6-degree Cycloid as the next degree requires over 1000 working nodes.




## ·Locality-based distributed data sharing protocol (LORD) in MANETs

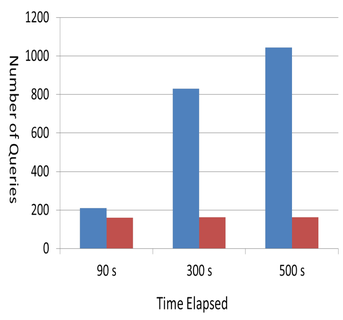
·Features:
1)Energy-efficient & scalable.
2)Reliable & dynamism-resilient.
3)Similarity search capability

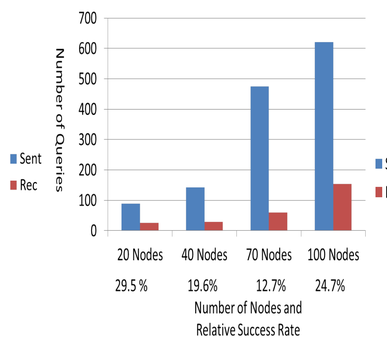



·Algorithm overview

## ·Experiments on Orbit

· We have implemented Greedy Perimeter Stateless Routing (GPSR) algorithm and basic LORD over ORBIT. The results are:




## ·Issues/Problems

· Orbit presented several problems when trying to run the LORD experiments. Mainly, we were not able to obtain a stable set of nodes that would interact correctly with one another long enough for the algorithm to produce accurate data. On the main grid of Orbit, it appears that node interaction is limited and unstable. As the experiment runs, node interaction seems to fluctuate; for example, two nodes may be able to communicate at one point in the program, then not be able to send and receive data a few seconds later. Also, node interaction seems to diminish as more queries are generated.

## ·Future Work

a.Implement deployment of the SDS over the wireless sensor network.
b.Fully Implement the designed algorithm for LORD over Orbit to obtain desired results through improving code and achieving node stability.
c.Use Omni to implement Cycloid and LORD to interact simultaneously across testbeds.

## ·Use of GENI Infrastructure

·We first deploy two algorithms on two parts of GENI: Planetlab and Orbit. Currently, we can use the Omni tool to request Planetlab resources through the ProtoGENI control framework. We will use this tool to request the heterogeneous resources in the next step. Further, we hope the communication between nodes from different parts can be realized.

## ·Reference papers:

·H. Shen, C. Xu, and G. Chen, "Cycloid: A scalable constant-degree P2P overlay network," *Performance Evaluation*, vol. 63, 2006, pp. 195-216.
· Z. Li and H. Shen, A Mobility and Congestion Resilient Data Management System for Mobile Distributed Networks, Proc. of MASS, 2009.
· H. Shen, L. Zhao, Z. Li, A Distributed Spatial-Temporal Similarity Data Storage Scheme in Wireless Sensor Networks, TMC, 2011

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