

Abstract

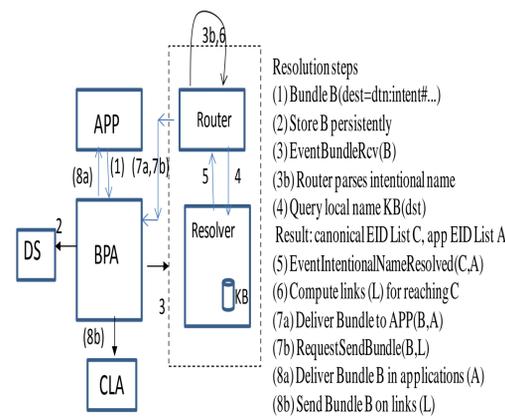
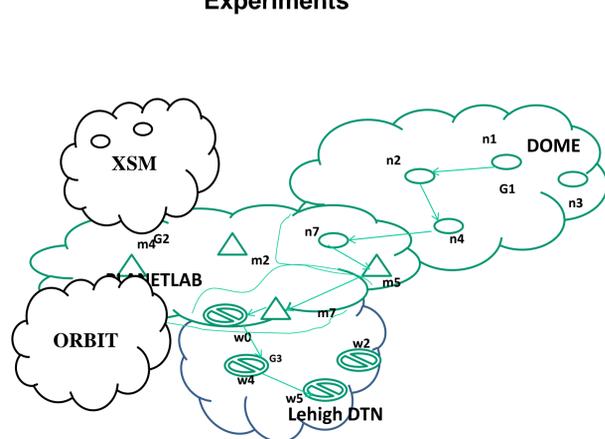
New wireless technologies allow mobile users to have easy access to real time data, and stay connected with friends, colleagues, & business partners. However emerging applications are usually data-centric but existing IP oriented paradigms are not flexible enough to support this. To support emerging mobile applications, we are developing a next generation mobile network that supports mobile content centric networking features. Here we focus on the first feature, namely intentional named message delivery feature.

We are currently designing and implementing a late-binding router that can parse intentional named messages and decide on the appropriate forwarding scheme to deliver such messages. We hope to deploy our prototype on ORBIT and DOME testbeds.

Research Objectives

- Design and implement intra/interdomain intentional named message delivery
- Evaluate implemented prototype using at least two GENI testbeds, namely DOME and ORBIT
- May need to evaluate emulation and testbed options
- May explore the impacts of having different DTN forwarding schemes.
- Possibly add security feature in the future.

Experiments



(a) Intentional Name Capable Router

In the left diagram, we show the initial prototype of our late binding router, built on top of the IETF DTN reference implementation version 2.6.

When data bundles are received, the bundle processing agent generates bundle received event to an external router daemon. The external router daemon will parse the intentional name and query the resolver for potential resolution of this intentional name.

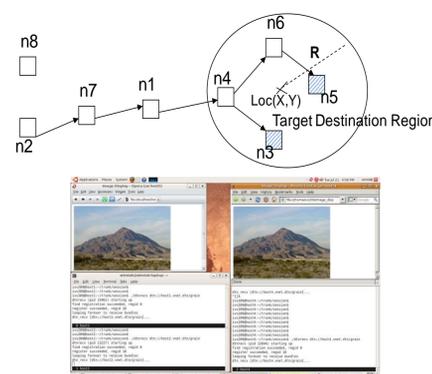
Upon receiving a response from the resolver, the router determines the next hop router that is useful for forwarding this bundle downstream.

Upon receiving data bundles from the application, similar process is used to decide how to forward the data bundles.

Intentional Named Message Delivery in Heterogeneous Networks

In the above diagram, we show a few domains: ORBIT, Lehigh DTN, and DOME are infrastructureless wireless networks, PlanetLab is a wired IP-based testbed, XSM is a sensor network. We intend to deploy late binding routers and some mobile applications in each of these testbeds to demonstrate our intentional named message delivery feature. We will add security feature later on.

Our intentional named message delivery feature allows messages such as “dtm://intent:((role=students, university=lehigh, loc=(Packard Lab, 100m)) to be delivered to all lehigh students that are currently located in a target region described as within 100m of Packard Lab (our CS building).



The diagram on the left shows a 8-node testbed we deployed in ORBIT recently. A message destined to nodes n5 & n8 is sent by node n2. Initially, a geographical forwarding scheme is used to route the message to the destination target region. Once the message arrives at this target region, a flooding scheme is used to flood the message. Any node that receives the message will determine if it owns attributes specified in the message.

If it does, then its BPA will route this message to its matched application. Otherwise, it will decide if it needs to forward this message.

Current Prototype

Future Work

- Implement lighter weight late-binding router
- Add additional reasoning capability
- Evaluate emulation and testbed options
- Learn how to use DOME
- Add security features

Use of Glab/GENI Infrastructure

ORBIT/DOME

- Develop scripts that mimic nodes moving according to certain mobility models, e.g. Random Waypoint Group Mobility Model, Manhattan Mobility Model.
- Develop some sample applications that use intentional named message delivery
- Develop GUI for these applications.
- Deploy our prototypes on ORBIT & DOME
- Evaluate delivery performance.

Current and Proposed Publications

- [Not yet, coming soon](#)