Routing Layer Support for Service Discovery in Mobile Ad Hoc Networks

Christopher N. Ververidis & George C. Polyzos

Mobile Multimedia Laboratory
Department of Informatics
Athens University of Economics and Business
Athens 10434, Greece

polyzos@aueb.gr

http://mm.aueb.gr/
Tel.: +30 10 8203 650, Fax: +30 10 8203 686

Outline

- Service Discovery in MANETs
- M-ZRP: Routing Layer based Service Discovery
- Simulation Results
- Conclusions & Future Work

Service Discovery in MANETs

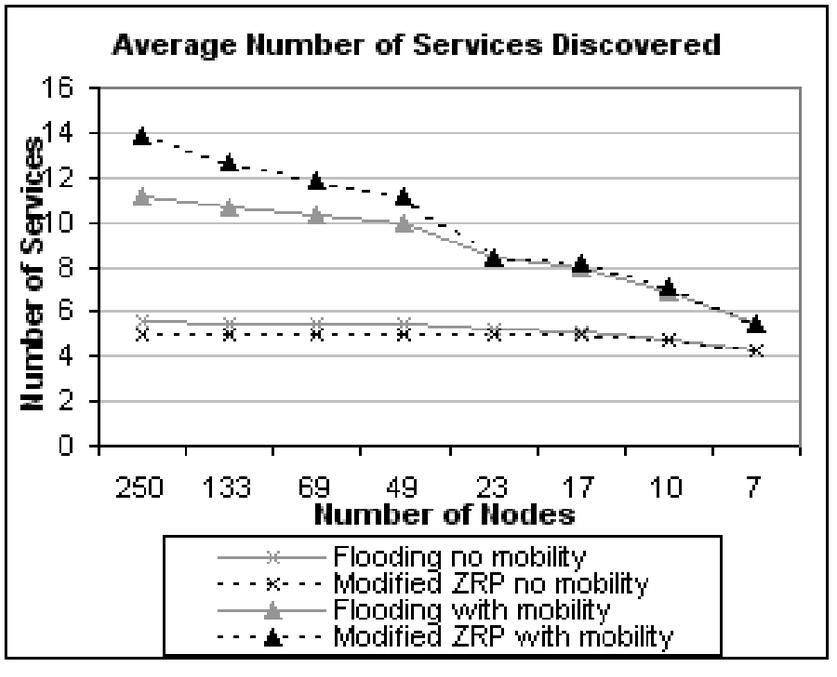
- Service Discovery in fixed networks
  - Assumes reliable communication
  - Mainly centralized approaches
    (UDDI,Salutation,JINI,SLP,SDP)
- Service Discovery in MANETs
  - Needs to be distributed-decentralized
  - Needs to be scalable
  - Needs to **minimize energy consumption**
    (Allia,GSD,DEAPspace,Konark,SANDMAN)
- SANDMAN and DEAPspace only implement power saving by allowing Nodes to go into ‘sleep mode’.
  - What if continuous connectivity is mandatory?

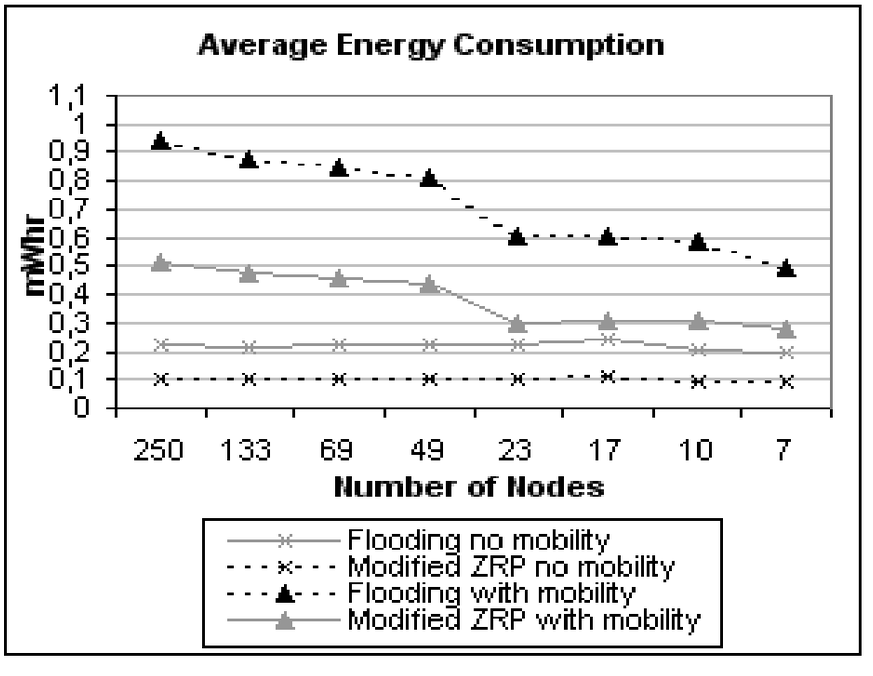
M-ZRP: Routing Layer based Service Discovery

- Motivation
  - If Service Discovery is implemented above the routing layer then 2 message producing processes coexist:
    - One for communicating service information among nodes
    - One for communicating routing information among nodes
  - Hence a node is forced to perform multiple times the battery-draining operation of receiving and transmitting packets.
- Our approach
  - Exploit the capability of acquiring service information along with routing information (by piggybacking service information into routing messages) following Koodli's and Perkins' idea.
  - Modified the proactive part of ZRP (Zone Routing Protocol)
    - Services are described using UUIDs (Unique Universal Identifiers), in order to keep small packet lengths of routing messages.
- Our goal
  - To provide an experimental assessment of energy savings, obtained by implementing service discovery at the routing layer.

Simulation Results

- M-ZRP was compared to a traditional Flooding application protocol.
  - Flooding radius equals to M-ZRP Zone Radius
  - A message in M-ZRP contains info about the sending node's service and also about the services of its intra-zone neighbors. A Flooding message contains info only about the sending node's service in order to be more 'economic'.
  - Broadcast intervals are the same for both protocols
  - Both protocols where tested both in a static and a mobile context with various node populations





Conclusions & Future Work

- Conclusions on M-ZRP's performance:
  - In a static context
    - M-ZRP manages to discover 7% fewer services (avg. per node), but achieves battery savings up to 50% (avg. per node)!
  - In a mobile context
    - M-ZRP manages to discover 9% more services (avg. per node), and also achieves battery savings up to 50% (avg. per node)!
- Future Work
  - Identify the effects of density and mobility on the quality of discovered services
  - As a possible metric of quality we consider the availability duration of discovered services (i.e. the length of time that elapses from the moment the service is discovered until that time when the service is lost, as a result of mobility or interferences)

Thank you!

For your questions please contact us at:

chris@aueb.gr or polyzos@aueb.gr