Impact of Node Mobility and Network Density on Service Availability in MANETs

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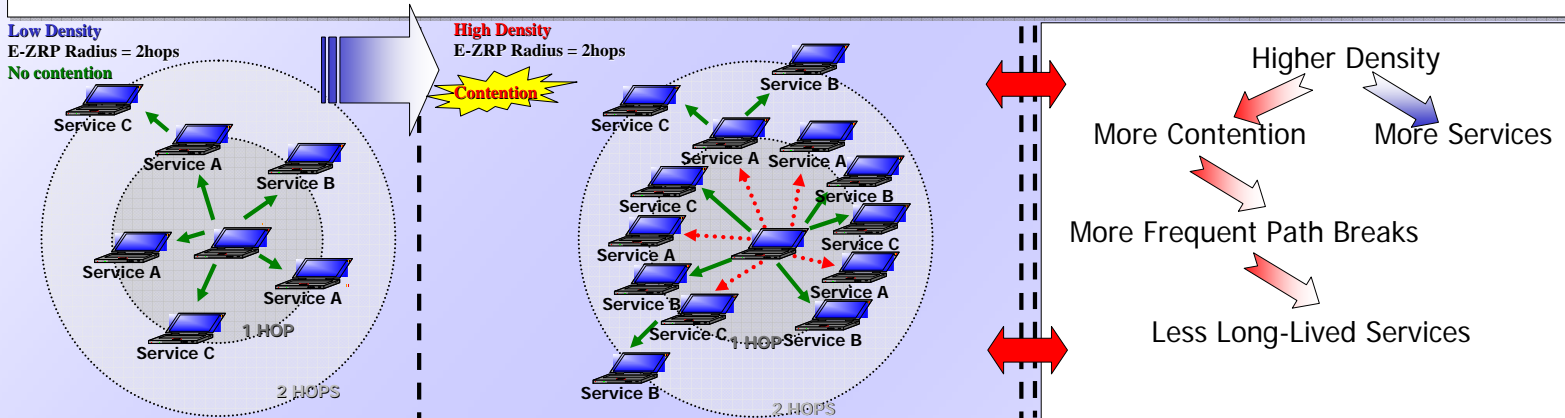Mobile Multimedia Lab
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1. E-ZRP: Routing with Service Discovery

- **Goals:**
  - **Energy efficiency** (no additional message exchange for route accumulation once the node has discovered a service).
  - **Fast adaptation** to changing conditions in the MANET (disconnections, node failures, interference, mobility).
- **The approach:**
  - **Piggybacking service information into routing messages**
  - **Extend ZRP (Zone Routing Protocol)**
    - Services are described using UUIDs (Unique Universal Identifiers), in order to keep small packet lengths for routing messages.
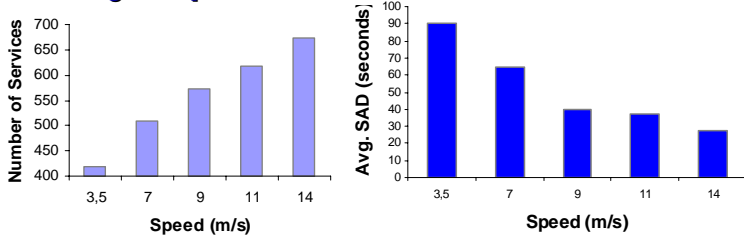
2. Quality of Discovered Services

- Assess quality in terms of availability of services.
- **Service Availability Duration** (**SAD**) is defined as the length of time that elapses from the moment the service is discovered until the time when the service is not available any more, as a result of mobility or interference.
- Only when **all the routes** from a node to **all** the available providers of the service are lost, this particular service is considered not to be available any more to that node.
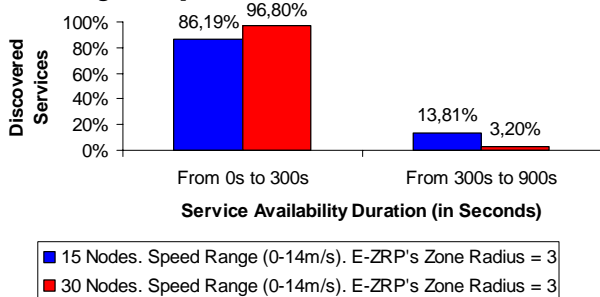

Low Density
E-ZRP Radius = 2hops
No contention

High Density
E-ZRP Radius = 2hops
Contention

Higher Density → More Contention / More Services → More Frequent Path Breaks → Less Long-Lived Services

3. Simulation of Service Availability using E-ZRP

Mobility Impact

Density Impact

- 15 Nodes. Speed Range (0-14m/s). E-ZRP's Zone Radius = 3
- 30 Nodes. Speed Range (0-14m/s). E-ZRP's Zone Radius = 3

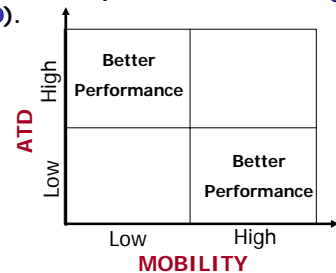## 4. Conclusions

- There is a clear **tradeoff** between average SAD and the number of discovered services depending on mobility.
- **Higher mobility** results to **more** discovered services but **less** average SAD.
- E-ZRP performance depends on the **Average Transaction Duration** (**ATD**).

- The total number of services discovered **is higher** in denser environments.
- The average service duration **is decreased** in higher density environments.
- This means that high density may **increase** the number of discovered services but it **deteriorates** their quality in terms of availability.