sChat: A Group Communication Service Over Wireless Sensor Networks

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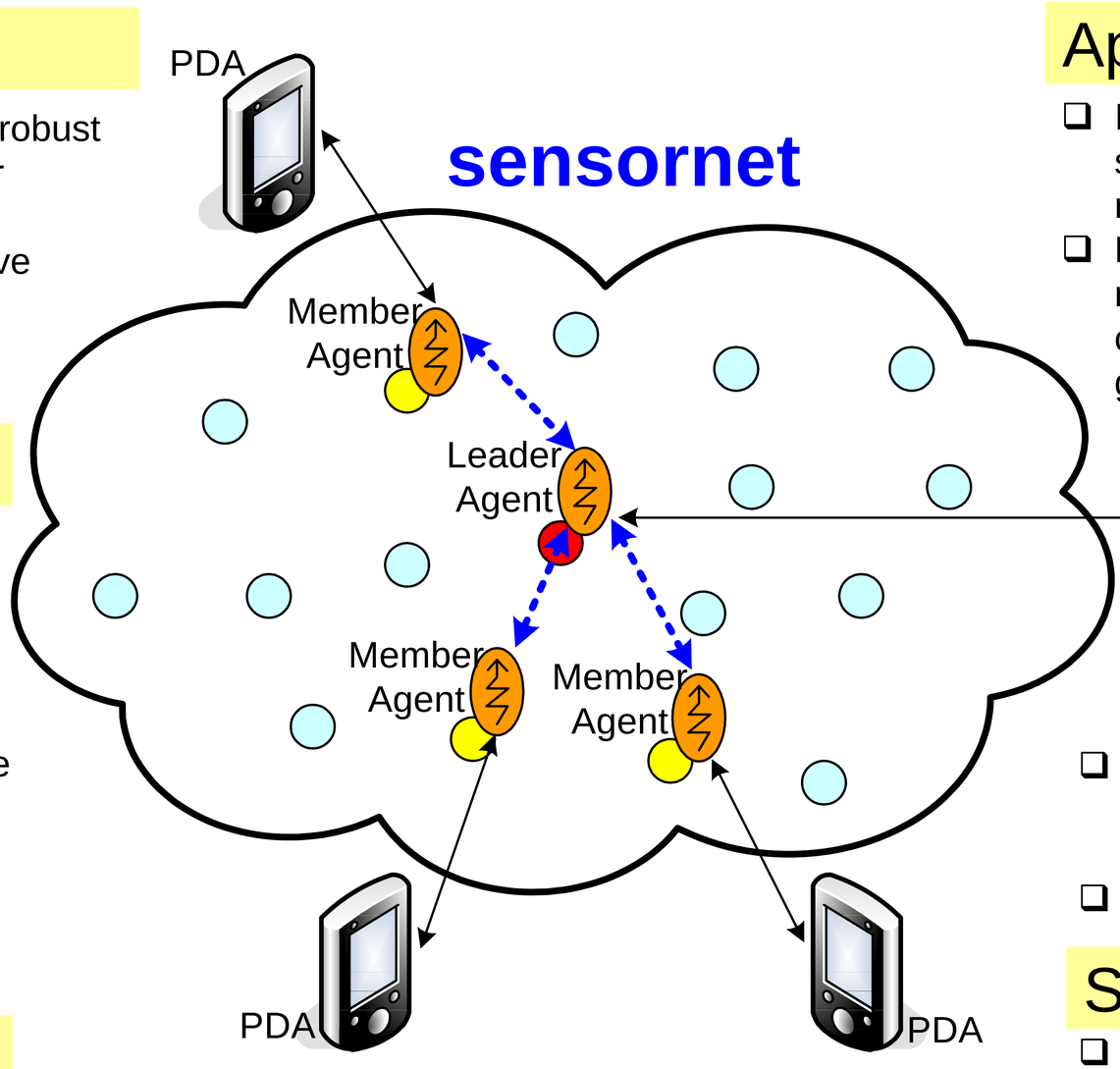
Motivation

- Wireless sensornets are more robust and less likely to fail in disaster scenarios
- They can serve as an alternative medium through which rescuers can communicate

Problem Statement

- The sensornet is initially deployed for some other purpose (e.g., environmental monitoring)
- Users (rescuers) must remain in contact with each other while continuously moving.
- Limited resources
- Membership?
- Unreliable wireless links

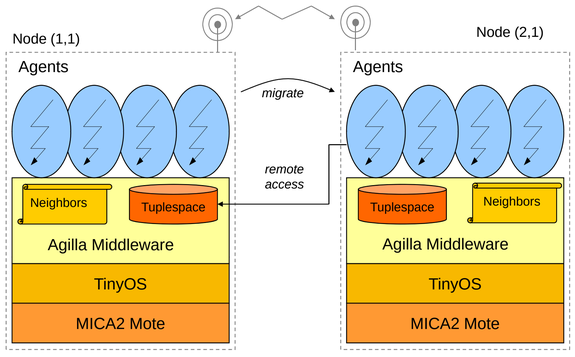


Approach

- Implement the group communication service on top of *Agilla*, a mobile agent middleware for sensornets
- Each user has a *member agent* in the network that "follows" the user and handles communication between the user and the group
- When a user moves, it "drags" its member to its new location. Member updates its new location with leader when it is dragged. User injects a new member if it fails to drag its old member.
- *The leader agent* keeps track of member locations and distributes group broadcast messages
- *The registry* keeps track of leader location

Agilla Middleware

- Mobile agents
  - move and clone across nodes
  - can be dynamically injected
- Simplifies development
  - high-level agent abstraction
  - context discovery
  - multi-hop geographic greedy routing



Leader Tuplespace

<"mbr", enumerator, agent id, location>

- Enumerator: iterative access for broadcast
- Agent id: random access for member location updates

Supported Operations

- Join - Member agents can join a specific group to exchange messages within the group. A group is formed when the first member joins.
- Leave - A member agent can leave a specific group to stop sending or receiving messages within the group. A group is disbanded when the last member leaves.
- Send - Member agents can send messages that will be forwarded to all the other members in the same group.

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