









































































- Used to learn the position of a specific node
- Nodes register their current position information
- Types and scalability
  - Some-for-some
  - Some-for-all
  - All-for-some
  - All-for-all
- Classic example: cellular networks with dedicated position servers

- Analogy to Directory Service (useful for single-hop networks)
- Classic approach not applicable for multi-hop networks
  - Chicken-egg-problem:
    Position of the position server
  - Dynamics of mobile nodes
- Focus on decentralized solutions

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|               | Accuracy                        | Cost   | Limitations                      |  |  |
|---------------|---------------------------------|--|----------------------------------|--|--|
| GPS           | 1-5 meters, 95%<br>(improvable) | Expensive infrastructure                         | Not indoors                      |  |  |
| Active Badges | Room size                       | Administration costs                             | Sunlight and fluorescen<br>light |  |  |
| Active Bat    | 9cm, 95%                        | Administration costs                             | Required Ceiling senso<br>grid   |  |  |
| Cricket       | 1.2m^2 region, ~100%            | \$10 beacons and receivers                       | No central managemen             |  |  |
| RADAR         | 3-4m, 50%                       | 802.11 network installation                      | Wireless NICs required           |  |  |
| MotionStar    | 1mm, 1ms, 0.1°,<br>~100%        | Expensive hardware                               | Control unit tether              |  |  |
| Easy Living   | Variable                        | Processing power, cameras                        | Ubiquitous public<br>cameras     |  |  |
| Smart Floor   | Spacing of sensors, 100%        | Installation of sensor grid, creation of dataset | Large populations                |  |  |
| Mobile Phone  | 150-300m, 95%                   | Upgrading Phone hardware and cell infrastructure | Cell coverage                    |  |  |

|             | DREAM       | Quorum        | GLS          | Homezone     |  |  |
|-------------|-------------|---------------|--------------|--------------|--|--|
| Туре        | All-for-all | Some-for-some | All-for-some | All-for-some |  |  |
| Msg Update  | O(n)        | O(sqrt(n))    | O(sqrt(n))   | O(sqrt(n))   |  |  |
| Msg Lookup  | O(c)        | O(sqrt(n))    | O(sqrt(n))   | O(sqrt(n))   |  |  |
| Time Update | O(sqrt(n))  | O(sqrt(n))    | O(sqrt(n))   | O(sqrt(n))   |  |  |
| Time Lookup | O(c)        | O(sqrt(n))    | O(sqrt(n))   | O(sqrt(n))   |  |  |
| State       | O(n)        | O(c)          | O(log(n))    | O(c)         |  |  |
| Localized   | Yes         | No            | Yes          | No           |  |  |
| Robustness  | High        | Medium        | Medium       | Medium       |  |  |
| Complexity  | Low         | High          | Medium       | Low          |  |  |