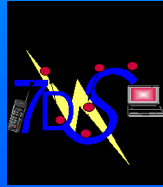


Design & implementation of a peer-to-peer data dissemination and prefetching tool for mobile users



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Outline

- Assumptions and motivation
- Basic architectural components & protocol
- Performance Analysis
- Conclusions and future work

Data Access to Mobile Users

- Using infrastructure :
 - Access to the Internet via base stations (**BS**)
 - Fixed caches or information servers (**FIS**) in the wireless coverage of the mobile host, eg Rutgers *Infostations*, Lancaster *GUIDE* projects
- Ad Hoc :
 - **Peer-to-peer** data sharing among the mobile hosts

Wireless Internet Access via Base Stations or Info Servers

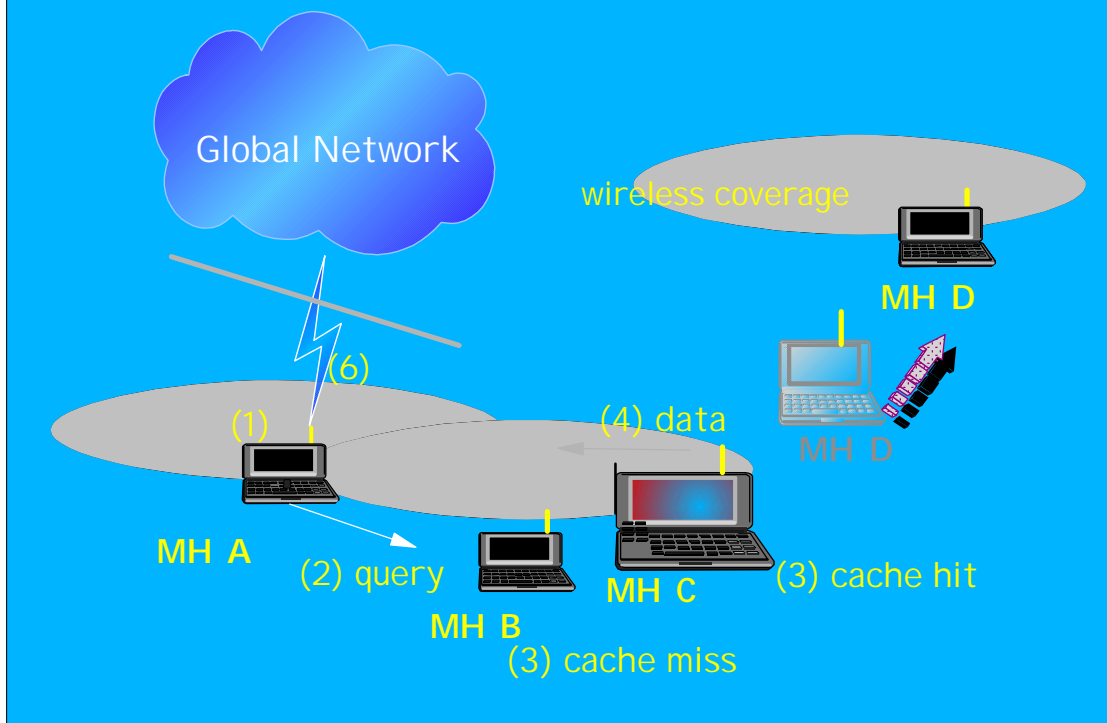
- Sparse coverage
- Low bit rates
- High end-to-end delays
- High cost

Not expected to change in the next couple of years

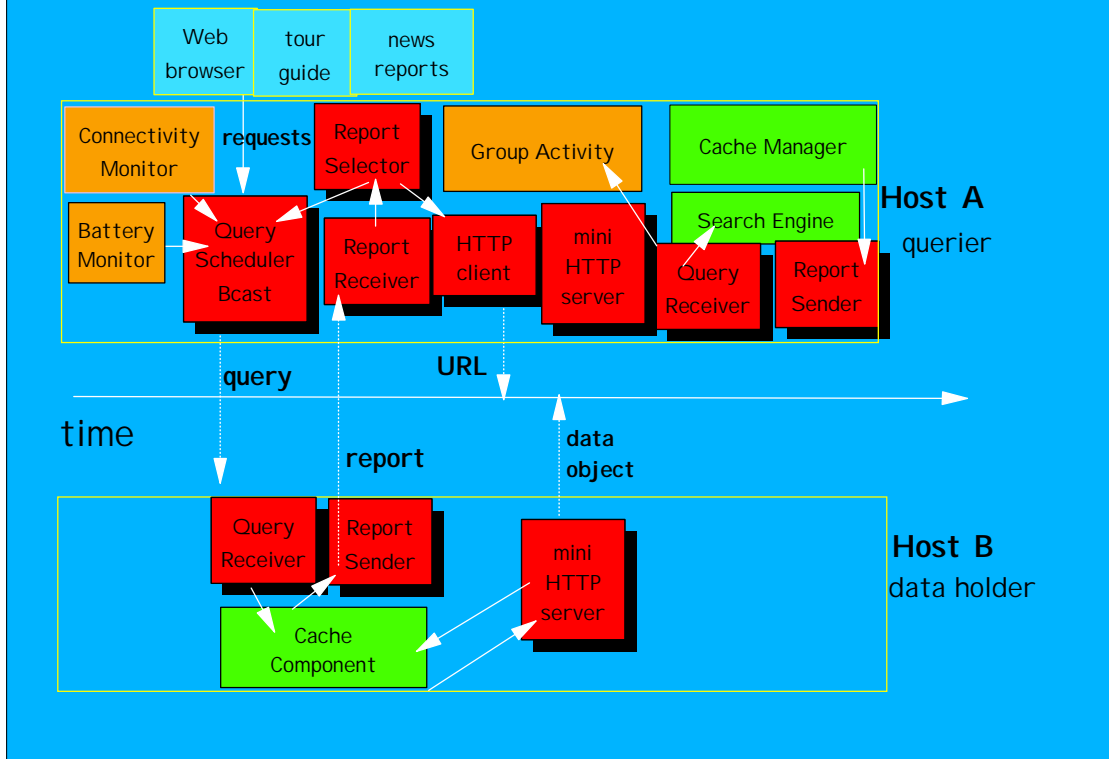
Observations

- Demand for **location-dependent** services for mobile users
- Spatial locality implies **locality in the data** that mobile users want to access and their **access patterns**
- Mobile users flexible in their info needs
- If no data access via BS or FIS, ask your peer!

Example of 7DS



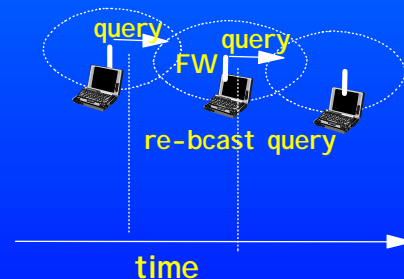
7DS Architecture



Communication Protocol

- **Periodic** and/or event-based query scheduler
- **Forwarding Mode (FW)**
When cache miss occurs, 7DS bcast the query that the peer sent to "expand" the coverage.
- **Active** and **passive** querying

- **Power conservation (P)**
Alternates network interface from UP/DOWN



Performance Evaluation

- Effectiveness of 7DS on data propagation to mobile users
 - **average delay** a host will receive the data after its first query
 - **number of nodes** will have the data after a time period
- Effect of **network size, collaboration strategy, transmission power, power conservation mechanism** in the data dissemination

Summary of modes of operation

Simulation Set	Query	Power Cons.	Cooperation Strategy
P (NP)	Active	yes (no)	data sharing
FW	Active	yes	data sharing, forwarding
FIS	Active	no	no cooperation
FIS-P(NP)	Passive	yes (no)	data sharing, forwarding
FIS-NDS	Passive	no	forwarding

Simulations: General Assumptions

- NS-2 with the CMU-mobility, wireless extensions
- Mobility pattern: **randway** model
- Data popularity
 - fix the data item
 - initially, only one node has the data (*dataholder*)
 - the remaining nodes are interested in that data item
 - requester: periodic bcast of query till receives the data
 - query transmitted at times randomly selected from query interval

Conclusions

- 7DS is effective as data dissemination tool
- 7DS density (network size, wireless coverage) & power-on interval have prominent effect on data propagation
- Prototype in Java on Linux (completed) & WinCE (in progress)
- More info:

<http://www.cs.columbia.edu/~maria/7ds>