2/1/05

Data dissemination models:
- pull - request for data - on demand
- push - publish - subscribe.

Difference from perspective of resource consumption:

Pull
- more explicit request
- Energy $\Rightarrow$ energy consumption by mobile client

Push
- no explicit request, but in order to save energy some scheduling is required so that the client knows when the data will be pushed.

Bandwidth
- required for both request & response
- one-to-one
- one-to-many delivery
  - big adv in terms of scalability of system.
Latency (Response time) depends on the
system being pushed. The number of data items
being pushed is \( \frac{M}{2} \).

When the system is lightly loaded, the
latency is low. When the system is
heavily loaded, the latency is high.

A large number of clients
requesting simultaneously
causes an increase in response time.

Response time increases with query load.
Combining push & pull:

Available
BW
B

Push/Broadcast Channel
Push/Broadcast Channel

B

response channel (downlink) server → mobile client

query channel (uplink) mobile client → server

B = B_b + B_o

Assume there are M data items.

Since popular data items should belong to broadcast channel assume that the data items D_1, D_2, …, D_M are sorted according to their popularity.

\[ p_1 \leq p_2 \leq … \leq p_m \\]

probability that given a data request what is the likelihood that the request is for that particular data item.

\[ 0 \leq p_i \leq 1 \quad \text{and} \quad \sum_{i=1}^{M} p_i = 1 \]
D_1, D_2, D_3, \ldots, D_m

these items are on broadcast channel

there will be provided on demand

where you partition depends on latency

\[ P_{ij} = \frac{B_b}{B_0} \times P_{ij} \]

\[ P_{ji, h} \]

\[ \text{Avg latency} = \frac{P_{ij} \cdot L_b + P_{ji, h} \cdot L_o}{L} \]

Avg latency on broadcast channel

Avg latency on on-demand channel