

# A Survey on-data Dissemination Methods and Protocols

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**Abstract:-**In this paper, we have focused on the major issue of mobile computing that is efficient data dissemination from transactions to mobile clients. This problem is due to low transmission quality of the mobile network. While data items are being broadcast, update transaction can insert new values for same data item say d, so it is possible that mobile clients may observe inconsistent data values. To resolve this problem different algorithms and protocols are studied.

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## 1. INTRODUCTION

With the rapid growth of wireless communication technology, there have been increased in mobile information services and also many mobile applications are developed. Examples: - real time traffic information and navigation systems, stock trading system, etc.

Mobile information services are many online shopping sites and finance information is accessible to mobile clients via palmtops, notebook computer, etc. All these applications require instant access to information from anywhere.

In wireless mobile network, server has high bandwidth broadcast capability compare to mobile clients. This is asymmetric communication. While transaction processing, bidirectional communication is needed between server and mobile clients. The reason is time taken for message passing among server and mobile clients is too long [2].

Challenges in mobile computing systems are:

1. Bandwidth is limited.
2. To design an efficient and cost effective systems
3. Electric power supply is limited.
4. Efficient Data dissemination to mobile clients.
5. Unreliable communication.
6. Low transmission quality of mobile networks.

### 1.1 Data dissemination process

Data dissemination in asymmetrical communication environment, where the downlink communication capacity is much greater than the uplink communication capacity, is best suited for mobile environment. In this architecture there will be a stationary server continuously broadcasting different data items over the air. The mobile clients continuously listen to the channel and access the data of their interest whenever it appears on the channel and download the same. The typical applications of such architecture are stock market information, weather information, traffic information etc.

There are two fundamental information delivery methods for wireless data applications: Point-to-Point access and Broadcast. Compared with Point-to-Point access, broadcast is a more attractive method. As such, broadcast can scale up to an arbitrary number of users. There are three kinds of broadcast models, namely push-based broadcast,

On-demand (or pull-based) broadcast, and hybrid broadcast. In push based broadcast the server disseminates information using a periodic/a periodic broadcast program. In on demand broadcast the server disseminates information based on the requests submitted by clients. In hybrid broadcast, push based broadcast and on demand data deliveries are combined to complement each other.

#### 1.1.1 Characteristics of data dissemination

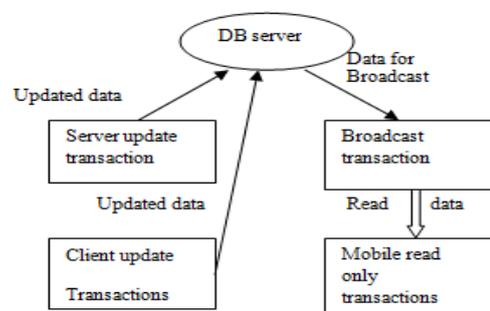
- a. A mobile client is able to retrieve information without wasting power to transmit a request to the server.
- b. Scalability as it supports a large number of queries
- c. Query performance which is not affected by the number of users in a cell
- d. Request rate is also unaffected.

#### 1.1.2 Challenges of data dissemination

The ultimate challenge in data dissemination is to minimize the response time and tuning time of retrieving database items.

Response time is the total of elapsed time required for the data of interest to arrive in the channel and the download time and tuning time is the amount of time that a client is required to listen to the channel, which is used to indicate its energy consumption [10]

## 1.2 System Model



**Fig 1: Architecture model for read-write mobile transactions [8]**

This database server maintains the highly sensitive data items. For example recent traded price of stock, location of moving object, weather temperature, etc. To maintain the validity of data items server update transactions must be installed

immediately. In our system model, assumption is made that update transactions are short and they are generated either from external sources or from mobile clients. The database server periodically broadcasts the data items. Time required to broadcast the data is called as broadcast cycle.

The length of broadcast cycle can be variable. The broadcasts process of data items in multiple cycles is called as broadcast transactions. Mobile clients could be able to issue read only and update transactions to the database server. A mobile read only transaction is assumed to access one data item from the broadcast list. Mobile update

Transaction is assumed to update one fresh data item from the current broadcasted data items [8].

## 2. RELATED WORK

A mobile computing system consists of an Information server and a number of mobile clients Connected to the server through a mobile network such as a cellular radio system. The mobile clients represent users equipped with mobile units which communicate on low bandwidth wireless channels with the information server [1]. Many applications in mobile broadcast environments have read-only transactions. Read-only transactions do not modify any data. Examples include information dispersal systems for temporal or time-sensitive information such as stock prices, traffic condition, weather information and electronic auctions [2]. In the current broadcast schemes, only the last committed value for each data item is broadcast. Instead, in our proposed multiversion scheme, the server maintains and broadcasts multiple versions for each data item. Versions correspond to different values at the beginning of each cycle and version numbers to the corresponding cycle.

Let  $v_0$  be the cycle at which R performs its first read operation. During  $v_0$ , R reads the most current versions, that is, the versions with the largest version numbers. In subsequent cycles, for each data item in its read set, R must read the version with the largest version number  $v_c$  smaller than or equal to  $v_0$ .

If such a version exists in the broadcast, R proceeds, else R is aborted. We call this scheme multi versioning [3].

Whenever the update transaction is interleaved with the execution of broadcast transaction then mobile transaction may observe inconsistent data items (Not a fresh updated data). Maintaining data consistency is the major criteria for mobile databases with highly sensitive (temporal) data items. Data inconsistency may occur when the mobile client's issues update request. This problem is resolved through a separate procedure [6].

Multiple physical channels have capabilities and applications that cannot be mapped on to single channels. By having access to multiple physical channels fault tolerance are improved. For example if a server broadcasting on a certain frequency crashes, its work must be migrated to another server. If this server is already broadcasting on another frequency it can only accept the additional work if it has the

ability to access multiple channels.

Minimizing Query response time:

There are several data dissemination schemes, which include: (i) Selection of Data Items to be broadcast, (ii) Non-Uniform Frequency Distribution of Broadcast Data Items, (iii) Distribution of Data Items over Multiple Channels, and (iv) Organization of Data Items. These schemes aim to minimize the query response time by either reducing the waiting time for the desired data to arrive, or, both waiting and download time [10].

## 3. ALGORITHMS AND PROTOCOLS

### 3.1 Update-First Order(UFO) Algorithm

Principal- UFO algorithm is designed in order to check whether there exists any data conflict between broadcast transactions and update transactions [1].

Advantages-

- Maintaining serializability of update transaction at database server and read-only mobile transactions.
- It has minimal overhead and it can be applied in different broadcast.
- Reduce number of abort at mobile clients.

Disadvantages-

- It requires high bandwidth for re-broadcast.

Analysis-

This algorithm is efficient to check the data conflict and for concurrency control in broadcast environment. The server is needed to re-broadcast data items. The client will listen to broadcast channel and capture those items that are required. This can be further enhancing to minimize bandwidth required to re-broadcast.

### 3.2 Broadcast Concurrency Control with Forward Validation (BCC\_FV)

Principal- In this protocol, the server stores the write set of all transactions committed in current broadcast cycle. In next broadcast cycle, the information stored in previous cycle is broadcast along with data objects to determine the data conflicts with committed transactions at the server. The conflict occurred between committed and read-only transaction will be write-read conflict [2].

If there is data conflict then the read-only transactions are aborted and restarted.

Advantages-

- Data conflict can be detected at early stage of the read-only transactions.
- Read-only transactions are executed locally without informing server.

Disadvantages-

- It suffers restart problem because of assumption that the committed transaction precede read-only transaction.

Analysis-

It resolves partly restart problem by checking it at early stage of read-only transactions. The miss rate of BCC\_FV is much lower. It is more sensitive to mobile

transaction length.

### 3.3 Broadcast Concurrency Control Using Timestamp Interval (BCC\_TI)

Principal- BCC\_TI protocol is proposed to reduce the number of unnecessary restarts at mobile clients [2].

Advantages-

- Serializability of read-only transactions is maintained.
- Read-only transactions can be locally committed without upstream communication.
- Reduced number of unnecessary restarts and low miss rate.

Disadvantages-

- It has low real-time performance rate.

Analysis-

This protocol is improvised version of Broadcast Concurrency Control with forward validation (BCC\_FV). It has low miss rate due reduce restart rate. BCC\_TI performs better than BCC\_FV.

### 3.4 F-matrix and R-matrix Protocols

Principal - These two protocols that is F-matrix and R-matrix to achieve view consistency.

In F-matrix, server keeps track of read-from relations and record it in N\*N vector.

N is number of data items

In R-matrix, server divides data item into groups so as to reduce the size of vector and records this information in N\*G vector [4].

Advantages-

- Concurrency control information is precise and small in size.
- This is simple to implement by server with low time complexity.

Analysis-

This protocol is efficient for consistent data dissemination in broadcast environments. The computation loads on server and mobile clients are light in this proposed protocol [5].

### 3.5 Time Stamping method for Consistent data dissemination (TSCD)

Principal- It detects the data conflict between the update transactions and broadcast transactions. This is done by comparing the timestamp of Broadcast transactions.

Two processes of TSCD are – server update and client update process.

Server update process- It identifies the conflict and resolve it in following phases viz. updation phase, data conflict resolution phase, data conflict resolution phase, broadcast phase.

Client Update Process- In this, mobile clients are allowed to update the broadcasted data items one by one locally.

After that, server verifies the old value of the updated data item with database. If they are equal then updating is done at

database otherwise updating is cancelled [6].

Advantages-

- The control information overhead is low .
- It maintains the consistency of data items over multiple broadcast cycles.
- Bandwidth requirement is very low.

Disadvantages-

- Waiting time is high for large number of transactions.

Analysis-

This algorithm is mainly designed to disseminate the ordered read set to mobile clients. It is suitable if conflict size is large. Time stamping is used to detect the data conflicts among broadcast and update transactions.

## 4. CONCLUSION

In this paper, we have studied major issues in mobile computing like concurrency control, mainly focusing on data disseminations from transactions to mobile clients. Various methods are studied and compared.

Algorithm/protocol	Aim	Advantages	Disadvantages
UFO	To resolve the data conflict	Reduce the number of aborts, minimal overheads	Requires high bandwidth to re-broadcast
BCC_FV	To maintain serializability .	Randomly, transactions are executed locally.	It suffers restart problem
BCC_TI	To reduce unnecessary restarts.	Low miss rate.	Low real-time performance rate.
F-matrix & R-matrix	To deliver consistent data to mobile clients	Concurrency control information is precise and small in size, low time complexity.	Overhead of computation matrix
TSCD		Control information overhead is low, bandwidth required to re-broadcast is low.	Response time is short

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