

Chapter 4.4

Data Broadcast Management in Wireless Communication: An Emerging Research Area

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ABSTRACT

Recently, the wireless data broadcast has been receiving a lot of attention, both from industries and academia. The recent advances in the field of Wireless Communication Technology (WCT) have increased the functionality of mobile information services. Various technologies like CDMA, 3G, and smart personal technologies (SPOT) and the advent of new gadgets of communication have made many mobile communication applications a reality. The prime feature of Wireless Communication Technology is that users can retrieve information from wireless channels anytime, anywhere. Attempting to disseminate data effectively to a large number of users with minimum consumption of time and physical resources of client in WCT environment is a challenge to system. There are two modes to disseminate data in WCT: (i) broadcast mode, where the client can retrieve data by simply listening to channel and (ii) on-demand mode, where the client can send the request to the operator to get data, and the operator in turn can serve data to the former in response. Both modes have significance in their domain, and sometimes, overlap of both modes may bring out better performance. The WCT is hindered by factors like low battery power, frequent disconnection, asymmetric and heterogeneous broadcast, scalability, et cetera. To overcome these difficulties, various data management strategies, along with broadcast mode of dissemination, are implemented. These data management strategies involve scheduling, hashing, indexing, and replication of data to be broadcasted. Building an index of broadcast data can help the user to find out when and where the desired data item will be available. If the arrival time of demanded data items is known a priori, clients can go to doze (power saving) mode to save energy, and if data are indexed, clients may have direct access to desired data to save time.

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The data broadcast policies have been developed for single channel and multi channel with various scheduling and indexing techniques. For the data management policies which consider the different broadcast cycles for different broadcast operators, it can be said that traditional types of data management policies are known previously, and the policies of Central Server (CS) and Unified Index Hub (UIH), which consider single broadcast cycle for all operators, are recent. This chapter presents both strategies very simply for better understanding, discusses the work done in the past and present on data broadcast management, along with suggestions for the future possibilities to explore the field.

1. INTRODUCTION

In recent years, the use of wireless technology devices has been growing at an exponential rate. Most people are now able to access information systems located in wired networks anywhere and anytime using portable size wireless computing devices like notebooks, tablet PCs, personal digital assistants (PDAs) and GPRS-enabled cellular phones, laptops, palmtops which are powered by small batteries. These portable computing devices communicate with a central stationary server via a wireless channel and become the integral part of the existing distributed computing environment. These mobile clients can have access to database information systems located at the static network while they are traveling and this type of computing is known as wireless computing or mobile computing. Figure 1, shows the architecture of wireless computing network.

Wireless computing provides database applications with useful aspects of wireless technology and a subset of mobile computing that focuses on querying central database servers is referred as wireless databases. Mobile service providers have established a number of information services including weather information services, news, stock indices information, foreign exchange rates, election results, tourist services, airlines, railways schedules etc. Apart from this there is enormous number of operators transmitting data on consecutive band widths. The major shortcoming with broadcast data items in a wireless environment is that data are accessed sequentially; the increasing number of broadcast items

causes mobile clients to wait for a large time before receiving desired data item. Consequently, dependence of mobile devices on rechargeable batteries, which has limited capacities, is a drawback for mobile data retrieval. To study these drawbacks and develop remedies for them, it is necessary to visualize the following two parameters of mobile client:

- **Access time:** It is the time elapse from the moment a request is initiated until all data items of interest are received. Access time represents the fastness or delay in retrieving the desired data from broadcast channel.
- **Tuning time:** It is the time spent by the client to listen for the desired broadcast data item. The tuning time represents the power consumption in filtering required data from broadcast channel.

Tuning time comprises time taken in two modes viz: *active and doze mode*.

For successful retrieval of information from wireless network the mobile clients have to tune to broadcast channel. The proliferation of mobile computing environment demands that the queries of client must be satisfied, by whatever way it may be. Queries in a mobile environment can be classified into two categories *traditional queries and location-dependent queries*. The queries that invoke in traditional wired environment are traditional queries, while when these are transmitted over a wireless communication network, are called *location-dependent queries*. For example

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