

Mobile data retrieval improved with new algorithm

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Penn State researchers have developed a new algorithm which enables cell-phone users to fetch data from music to TV shows as quickly as feasible with minimal channel switches.

With the computing technique, mobile devices can pick up data that may have been "missed" when first broadcast, thereby alleviating the wait for subsequent broadcast cycles. Because it minimizes channel switching, the new algorithm also reduces power use, thereby extending battery life.

"Currently, mobile devices retrieve broadcast data similar to how TV viewers watch TV shows simultaneously broadcast-by switching channels," said Prasenjit Mitra, assistant professor in the College of Information Sciences and Technology (IST). "But with our algorithm, cell-phone users don't have to wait for fewer broadcast cycles to retrieve the data as the mobile device can pick up objects broadcast across parallel air channels."

The technique is described in a paper, "Efficient Object Retrieval from Parallel Air Channels in the Presence of Replicated Objects," that appears in the proceedings of the Seventh International Conference on Mobile Data Management, held in Japan in May. The other authors are Padmapriya Ayyagari, an IST graduate student, and Ali Hurson, a professor of computer science.

According to the researchers, data dissemination for mobile devices now occurs through one of two techniques: unicast, which is common when

data is sent to a single person, and broadcast, when data is sent to multiple people over parallel air channels. Broadcast is more common when the same content such as emergency alerts, weather information or television shows reaches multiple people.

But the algorithm currently used can't take advantage of data that is broadcast repeatedly on different channels. Instead the data has to be broadcast in cycles. This is both time and power consuming.

"If you can retrieve all the data you want in fewer broadcast cycles, then the user saves on time and battery power," Mitra said. "The power-consumption reduction is achieved because the technique fetches all the objects requested by a client while minimizing the number of channel switches required."

As part of their study, the researchers developed and compared the performance of the four kinds of algorithms-greedy, random, branch-and-bound and select first-that could be used to improve object retrieval and reduce power consumption. Of these, the researchers' greedy algorithms created an efficient and quick solution to object retrieval that also decreased battery drain.

The researchers are continuing to explore algorithms for mobile data retrieval and anticipate developing additional ones that will even further reduce power consumption and time, Mitra said.

Source: Penn State

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