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Expand Shared Accumulation in Social Wireless Networks

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Abstract: Cooperative caching policies are introduced in this paper for reducing electronic substance/content provisioning price in SWNET (Social Wireless Networks). Social Wireless Networks are produced by mobile devices, like, electronic book readers, data enabled phones etc., sharing familiar interests in electronic substance, and physically assembling together in public spots. Caching electronic object in those Social Wireless Networks are shown have capable to decrease the content/ substance provisioning price which depends deeply on the service and expenditure dependences among different stakeholders including CP (content providers), End Consumers (EC) and network service providers. From Electronic book delivery business of Amazon's Kindle Drawing motivation, this paper build up practical n/w, service, and expenditure models which are then utilized for making couple of strategies which are object caching for decreasing content/ substance provisioning prices in networks with heterogeneous and homogenous object demands. The paper develops simulation and analytical models for analyzing the projected caching strategies in the existence of selfish clients that turn aside from network-wide price-optimal rules. It also gives results from an Android phone depended prototype Social Wireless Networks, authenticating the presented simulation and analytical results.

Keywords: Network, Service And Pricing Model, SWNET, Split Cache Replacement.

I. INTRODUCTION

Data enabled mobile devices present usage and wireless-enabled data apps have promoted new content broadcasting models in present mobile ecosystem. Those devices list includes Apple's iPhone, Google's Android, Amazon's Kindle, and other vendor's electronic book readers. The data applications array contains mobile phone Apps and magazine readers and electronic book. Mobile applications proliferation level of is point out by the sample case fact that Apple's App Store presented over one hundred thousand apps that are downloadable with the help of smart phone clients as of October 2010. A user with the conventional download model downloads contents/substances directly from aCP (Content Provider's) server over a CSP (Communication Service Provider's) network. Downloading substance/content via Communication Service Provider's network engages a price which should be paid either by the content provider or by end users. In this work, we take up electronic book delivery business model of Amazon Kindle in which the Content Provider's (Amazon), pays to Sprint, the Communication Service Provider's, for the price of network usage cause of Kindle users downloaded e-books.

When mobile devices carrying physically by clients get together in settings like work place, University campus, Airport, Mall and other public spots, SWNETs (Social Wireless Networks) can be formed by utilizing the devices ad hoc wireless connections. With the subsistence of such Social Wireless Networks, substitute approach to content/substance access by a mobile device would be to initially search the local Social Wireless Network for the demanded content before retrieving it from the Content Provider's server. The estimated content provisioning price of such an approach can be appreciably lesser since the download price to the Communication Service Provider's would be neglected when the content/substance is found within the local Social Wireless Networks. This mechanism is named as cooperative caching. In order to cheer the EC's (End-Consumers) to cache formerly downloaded content/substance and to distribute it with other EC's mechanism is projected. This mechanism can utilize as an incentive so that the EC's (end-consumers) are attracted to partake in cooperative content caching rather than the energy and storage prices. In the way for cooperative caching to offer price benefits, this peer-to peer reimbursement must be dimensioned to be lesser than the substance download price paid to the Communication Service Provider.

This reimbursement should be factored in the CP's (content provider's) overall expenditure. Because of their limited storage, mobile handheld devices are not estimated to preserve all downloaded substance for lengthy. That indicates after downloading and utilizing a paid electronic content, a device may decrease it from the storage. Let us take a simple case of Amazon Kindle clients an archive mode is obtainable utilizing which a client simply decreases a book after finishing it, any have it stays archived as a paid item in cloud server of Amazon's. As per above cost and information storage model a key query for cooperative caching is: The procedure to preserve contents in nodes like that the average substance provisioning price in the network is decreased.

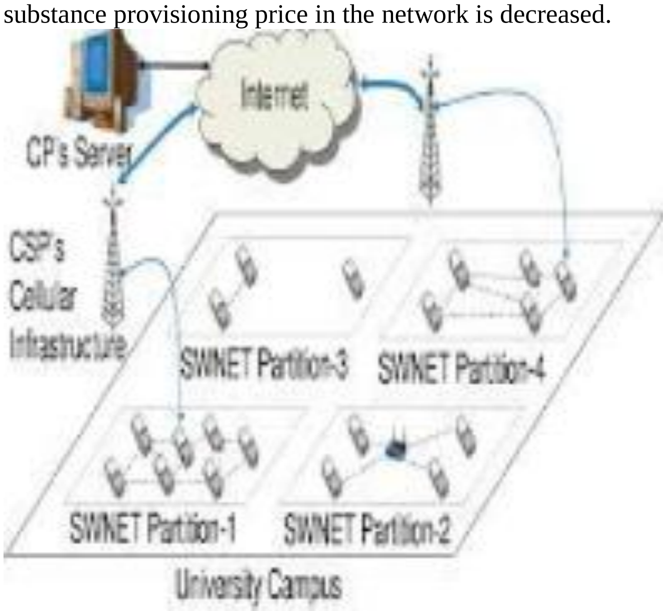

Fig.1. Social wireless Networks architecture.

II. NETWORK, SERVICE AND PRICING MODEL

A. Network Model

Fig.1 describes a model SWNET within a University grounds. People carrying mobile devices form SWNET partitions are the end consumers, which can be whichever multi-hop (i.e. MANET) as shown for partitions 1, 3, and 4, or single hop contact point based as shown for partition 2. A movable device can download some data (i.e., content) from the CP's server using the CSP's cellular system, or from its home SWNET partition. In the remaining paper, the terms object and content are used synonymously. We regard as two types of SWNETs. The foremost one involves motionless SWNET partitions. Meaning, after a partition is formed, it is maintained for sufficiently long so that the cooperative object caches can be formed and reach fixed states. We also consider a second type to explore as to what happens when the still assumption is relaxed. To investigate this effect, caching is applied to SWNETs formed using human interaction traces obtained from a set of real SWNET nodes.

B. Search Model

After an object call is originated by a mobile tool, it first finds in its local cache. If the local search fails, it searches the object within its SWNET division using limited transmit note. If the search in division also fails, the data is downloaded from the CP's server using the CSP's 3G/4G cellular arrangement. In this paper, we have designed objects such as electronic books, music, etc., which does not vary on time, and therefore cache constancy is not a serious issue. We first suppose that all objects have the equivalent size and each terminal is able to store up to "C" dissimilar data in its cache. Later on, we let go this supposition to sustain objects with variable size. We also believe that all objects are popularity-tagged by the CP's server. The popularity-tag of an object points out its universal recognition; it also indicates the chances that a subjective request in the network is produced for this specific object.

C. Pricing Model

We use a pricing model similar to the Amazon Kindle business model in which the CP (e.g., Amazon) pays a download cost Cd to the CSP when an End-Consumer downloads an object from the CP's server through the CSP's cellular network. Moreover, at any time an EC provides a nearby cached object to another EC within its home SWNET division, the supplier EC is rewarded a refund Cr by the CP. Optionally, this return can also be distributed among the provider EC and the ECs of all the intermediate mobile devices that take part in content forwarding. Cd corresponds to the CP's object delivering cost when it is delivered through the CSP's network, and Cr corresponds to the rebate given out to an EC when the object is found within the SWNET (e.g., node A receives rebate Cr after it provides a content to node B over the SWNET).

III. CACHING FOR OPTIMAL OBJECT PLACEMENT

A. Split Cache Replacement

To understand the optimal object placement under homogeneous object request model we propose the following Split Cache policy in which the available cache space in each device is divided into a duplicate segment and a unique segment. In the first segment, nodes can store the most popular objects without worrying about the object duplication and in the second segment only unique objects are allowed to be stored. Among the Split Cache replacement policy, almost immediately following an object is downloaded from the CP's server, it is categorized as only one of its kind object as there is only one copy of this object in the network. In addition, when a node downloads an object from another SWNET node, that object is categorized as a replica object as there are now at least two duplicates of that object in the network. For storing a new exclusive object, the least popular object in the whole cache is selected as a candidate and it is replaced with the new object if it is less popular than the new received object. For a duplicated object, however, the evictee candidate is selected only from the first duplicate segment of the cache. In other words, a unique object is never dispossessed in order to put up a duplicated object. The Split Cache object replacement mechanism realizes the optimal strategy. With this mechanism, at steady state all devices' caches preserve the same object set in their duplicate areas, but distinct objects in their unique areas.

IV. PROPOSED SYSTEM

In this article depicting motivation from Amazon's Kindle e-book delivery commerce, this paper builds up practical system, service, and pricing models which are then used for generating two object caching approach for limiting content provisioning expenses in networks with homogenous and heterogeneous object requests. The paper creates logical and imitation models for analyzing the designed caching approaches in the happening of selfish consumers that diverge from system-wide cost-optimal plans. It also informs outcomes from an Android cell phone based model SWNET, validating the presented logical and imitation outcomes.

Advantages of Proposed System: Based on a convenient service and pricing case, a stochastic model for the content provider's cost calculation is developed. A cooperative caching approach, Split Cache, is proposed, numerically analyzed, and theoretically proven to provide best possible object placement for systems with homogenous content demands. A benefit-based strategy, Distributed Benefit, is proposed to reduce the provisioning cost in heterogeneous networks consisting of nodes with different content request rates and patterns.

V. CONCLUSION

The objective of this work was to develop a cooperative caching strategy for provisioning cost minimization in Social Wireless Networks. The key contribution is to demonstrate that the best cooperative caching for provisioning cost reduction in networks with homogeneous content demands requires an optimal split between object duplication and uniqueness. Such a split replacement policy was proposed and evaluated using ns2 simulation and on an experimental tested of seven android mobile phones. Furthermore, we experimentally (using simulation) and analytically evaluated the algorithm's performance in the presence of user selfishness. It was shown that selfishness can increase user rebate only when the number of selfish nodes in an SWNET is less than a critical number. It was shown that with heterogeneous requests, a benefit based heuristics strategy provides better performance compared to split cache which is proposed mainly for homogeneous demand. Ongoing work on this topic includes the development of an efficient algorithm for the heterogeneous demand scenario, with a goal of bridging the performance gap between the Benefit Based heuristics and the centralized greedy mechanism which was proven to be optimal in Section 6.4. Removal of the no-collusion assumption for user selfishness is also being worked on.

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