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A New Supportive Approach for Cost Minimization in SWN

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Abstract
This paper introduces cooperative caching policies for minimizing electronic content provisioning cost in Social Wireless Networks (SWNET). SWNETs are formed by mobile devices, such as data enabled phones, electronic book readers etc., sharing common interests in electronic content, and physically gathering together in public places. Electronic object caching in such SWNETs are shown to be able to reduce the content provisioning cost which depends heavily on the service and pricing dependences among various stakeholders including content providers (CP), network service providers, and End Consumers (EC). Drawing motivation from Amazon's Kindle electronic book delivery business, this paper develops practical network, service, and pricing models which are then used for creating two object caching strategies for minimizing content provisioning costs in networks with homogenous and heterogeneous object demands. The paper constructs analytical and simulation models for analyzing the proposed caching strategies in the presence of selfish users that deviate from network-wide cost-optimal policies. It also reports results from an Android phone based prototype SWNET, validating the presented analytical and simulation results.

Keywords
Social Wireless Networks, data enabled phones, electronic book readers, content providers, End Consumers

I. Introduction

Wireless devices have scarcity of resources such as storage capacity and processing power. For WANETs, cooperative caching strategies are proposed in this paper to improve efficiency in information exchange in peer –to-peer fashion. The caching strategies such as small sized caches and large sized caches depend on the estimation of density off information being flown in the network. In the former strategy content replacement takes place when new information is received while in the latter a decision is made as to whether the information is to be cached and for how long. In either case every node is capable of deciding as per the content in the caches of nearby nodes. This is to ensure that each node has different content that is content diversity and share the content of other nodes thus managing memory efficiently. Rajkumar etal. expressed that features is the simulations made using NS2 show that our caching strategies are capable of making expected content diversity and improve of information sharing in wireless ad hoc network. Guohong Cao says that cooperative caching, in which multiple nodes share and coordinates cached data, is widely used to improve web performance in wired networks. However, resources constraints and node mobility have limited the application of these techniques in ad hoc networks. We propose caching techniques that use the underlying routing protocols to overcome these constraints and further improve performance. Saihan and Issarny [1] proposed a cooperative caching scheme to increase data accessibility by P2P communication among MHs, when they are out of bound of a fixed infrastructure. It is implemented on the top of Zone Routing Protocol (ZRP). The authors proposed a fixed broadcast range based on the underlying routing protocol. However, the mobile environment, so the fixed broadcast scheme is hard to adapt to real mobile applications.

II. Related Work

There is a rich body of the existing literature [2, 3] on several aspects of cooperative caching including object replacements, reducing cooperation overhead [4], and cooperation performance in traditional wired networks. The Social Wireless Networks explored in this paper, which areoften formed using mobile ad hoc network protocols, are different in the caching context due to their additional constraints such as topological insatiability and limited resources. As a result, most of the available cooperative caching solutions for traditional static networks are not directly applicable for the SWNETs.The second approach, CachePath, is different in that theintermediate nodes do not save the objects; instead they only record paths to the closest node where the objects can be found. The idea in CachePath is to reduce latency and overhead of cache resolution by finding the location of objects. This strategy works poorly in a highly mobile environment since most of the recorded paths become obsolete very soon. The last approach in [5] is the HybridCache in which either CacheData or CachePath is used based on the properties of the passing-by objects through an intermediate node. While all three mechanisms
offer a reasonable solution, it is shown in [6-8] that relying only on the nodes in an object's path is not most efficient. Using a limited broadcast-based cache resolution can significantly improve the overall hit rate and the effective capacity overhead of cooperative caching.

III. Problem Statement:

A. Existing System

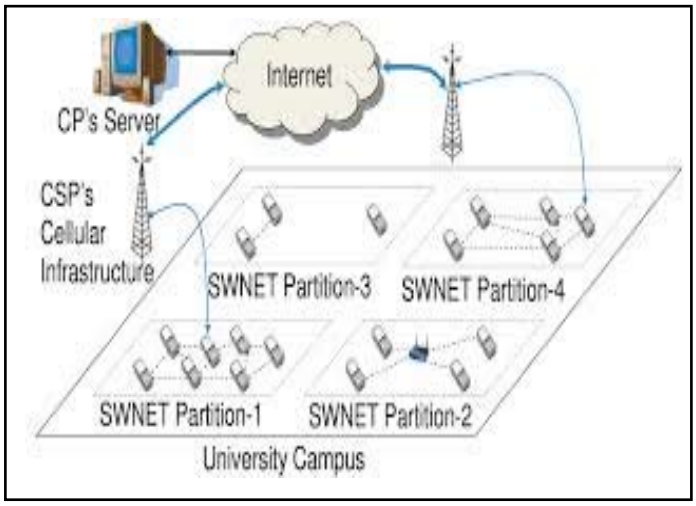
With the existence of such SWNETs, an alternative approach to content access by a device would be to first search the local SWNET for the requested content before downloading it from the CP's server. The expected content provisioning cost of such an approach can be significantly lower since the download cost to the CSP would be avoided when the content is found within the local SWNET. This mechanism is termed as cooperative caching. In order to encourage the End-Consumers (EC) to cache previously downloaded content and to share it with other end-consumers, a peer-to-peer rebate mechanism is proposed. This mechanism can serve as an incentive so that the end-consumers are enticed to participate in cooperative content caching in spite of the storage and energy costs. In order for cooperative caching to provide cost benefits, this peer-to-peer rebate must be dimensioned to be smaller than the content download cost paid to the CSP. This rebate should be factored in the content provider's overall cost.

Disadvantage
Due to their limited storage, The main server speed could become slow. This means after downloading and using a content, a content to be stored in local cache.

B. Proposed System
In this paper drawing motivation from Amazon's Kindle electronic book delivery business, this paper develops practical network, service, and pricing models which are then used for creating two object caching strategies for minimizing content provisioning costs in networks with homogenous and heterogeneous object demands. The paper constructs analytical and simulation models for analyzing the proposed caching strategies in the presence of selfish users that deviate from network-wide cost-optimal policies.

Advantages
- Based on a practical service and pricing case, a stochastic model for the content provider's cost computation is developed.
- A cooperative caching strategy, Split Cache, is proposed, numerically analyzed, and theoretically proven to provide optimal object placement for networks with homogenous content demands.
- A benefit-based strategy, Distributed Benefit, is proposed to minimize the provisioning cost in heterogeneous networks consisting of nodes with different content request rates and patterns.
- The impacts of user selfishness on object provisioning cost and earned rebate is analyzed.

IV. System Architecture



Proposed Algorithm

INPUT: O_j
flag
IF (O_j *is downloaded from Internet || flag == True*)
$O_j.benefit = U_j + D_{ij}$
$O_j.label = Primary$
ELSE
$O_j.benefit = D_{ij}$
$O_j.label = l\,econdary$
END
O_{min} = *Object l ith minimum benefit*
IF ($O_j.benefit > O_{min}.benefit$)
replace O_{min} *l ith* O_j
send *change status message to the provider node*
END

V. Modules
Module Description:

A. Network Model
We consider two types of SWNETs. The first one involves stationary 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 steady states. We also investigate a second type to explore as to what happens when the stationary 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
We search the file means, it first searches its local cache. If the local search fails, it searches the object within its SWNET partition using limited broadcast message. If the search in partition also fails, the object is downloaded from the CP's server. In this paper, we have modeled objects such as electronic books, music, etc., which are time non varying, and therefore cache consistency is not a critical issue. The popularity-tag of an object indicates its global popularity; it also indicates the probability that an arbitrary request in the network is generated for this specific object.

C. Pricing Model
We use a pricing model similar to the Amazon Kindle business model in which the CP 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. Also, whenever an EC provides a locally cached object to another EC within its local SWNET partition, the provider EC is paid a rebate Cr by the CP. Optionally, this rebate can also be distributed among the provider EC and the ECs of all the intermediate mobile devices that take part in content forwarding .The selling price is directly paid to the CP by an EC through an out-of-band secure payment system. A digitally signed rebate framework needs to be supported so that the rebate recipient ECs can electronically validate and redeem the rebate with the CP. We assume the presence of these two mechanisms on which the proposed caching mechanism is built.

VI. Experimental Results:
Home page:

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VII. Conclusion

The objective of this paper was to develop a cooperative object caching Strategy for provisioning cost minimization in social wireless networks. The key contribution was to demonstrate that the best cooperative caching for provisioning cost reduction requires an optimal split between object duplication and uniqueness. The paperanalytically develops this optimal split point and subsequently develops the caching performance using a practical network, service and cost formulation that is motivated by Amazon's Kindle electronic book delivery model. It constructs analytical and simulation models for analyzing the proposed caching strategies in the presence of selfish users that deviate from network-wide cost optimal policies. Based on a practical service and pricing case, a defined model for the content provider's cost computation is developed. A co-operative caching strategy, split cache, is proposed numerically analyzed, and theoretically proven to provide optimal object placement for networks with homogeneous content demands. It also report results from an Android phone based prototype SWNET, validating the presented analytical and simulation results. Cooperative caching in mobile environments and propose a cooperative caching scheme for mobile systems. It extends beyond these populations to distributed cooperative caching behavior in regions with millions of clients. Overall, system demonstrates that cooperative caching has performance benefits only within limited population bounds.

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Biography

Authors Profile

Ch.Sireesha pursuing M.Tech Degree in Software Engineering from Lakireddy Bali Reddy College of Engineering, Vijayawada, AP, INDIA. Her research Interests include Wireless networks.

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