Cooperative Caching Strategy For Provisioning Cost Minimization In Social Wireless Networks(Swnet’s)

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ABSTRACT:

Social Wireless Networks are formed by mobile devices such as data enabled phones, electronic book readers etc., allocating common interests in electronic content and physically gathering together in public places. Electronic object caching in such social wireless networks (SWNETs) are capable to diminish the content provisioning cost which depends greatly on the service and pricing dependences amide range of stakeholders together with content providers (CP), network service providers and End Consumers (EC). Drawing inspiration from Amazon’s Kindle electronic book delivery business, this paper build up practical network, service and pricing models which are then used for creating two object caching approaches for diminishing content provisioning costs in networks with homogenous and assorted object demands. The paper creates logical and replication models for analyzing the proposed caching approaches in the presence of selfish users that diverge from network-wide cost-optimal policies.

KEYWORDS: Social wireless networks, cooperative caching, content provisioning, ad hoc networks, SWNET, cost-optimal policies, simulation, consumers.

INTRODUCTION:

A user downloads contents directly from a Content Provider’s (CP) server over a Communication Service Provider’s (CSP) network. Downloading content through CSP’s network incurs a cost which must be paid either by end users or by the content provider. In this work we adopt Amazon Kindle electronic book delivery business model in which the CP (Amazon) pays to Sprint (CSP) for the cost of network procedure due to downloaded E-books by Kindle users. Social Wireless Networks (SWNETs) can be formed using ad hoc wireless connections between the devices. With the survival of such SWNETs, content access by a device would be the first look for the local SWNET for the application content before downloading it from the CP’s server. The normal content provisioning cost of such an approach can be considerably lower since the download cost to the CSP would be avoided when the content is found within the local SWNET and this mechanism is termed as cooperative caching.

RELATED WORK:

The Social Wireless Networks investigated which are often formed using mobile ad hoc network protocols are dissimilar in the caching context due to their supplementary constraints such as topological insatiable and limited resources. Cache Data at forwarding node make sure the passing-by objects and caches the ones consider useful according to some predefined criteria. This way the succeeding requests for the cached objects can be satisfied by an intermediate node. An issue with this approach is that storing large number of popular objects in large numbers of intermediate nodes does not scale well. Cache Path is different in that the in-between nodes do not save the objects instead they only record paths to the nearby node where the objects can be found. The thought in Cache Path is to lessen latency and overhead of cache resolution by finding the location of objects. This approach works poorly in a highly mobile environment since most of the recorded paths become outdated very soon. Hybrid Cache in which either Cache Data or Cache Path is used based on the properties of the passing-by objects through an intermediate node.

EXISTING METHOD:

The estimated content provisioning cost of an approach can be considerably lesser since the download cost to the CSP would be evade when the
content is found within the local SWNET. This method is expressed as cooperative caching. In order to support the End-Consumers (EC) to cache formerly downloaded content and to distribute it with other end-consumers a peer-to-peer rebate mechanism is proposed. This method can provide as an incentive so that the end-consumers are persuaded to contribute in cooperative content caching in spite of the storage and energy costs. In order for cooperative caching to provide cost benefits the 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.

DISADVANTAGES:

Because of the inadequate storage mobile handheld devices are not probable to store all downloaded content for long. This means after downloading and using a purchased electronic content a device may take away it from the storage.

PROPOSED METHOD:

The paper expand practical network, service and pricing models which are then used for generating two object caching strategies for diminishing content provisioning costs in networks with homogenous and heterogeneous object demands. The paper creates analytical and simulation models for analyzing the proposed caching strategies in the presence of selfish users that diverge from network-wide cost-optimal policies. It also reports results from an Android phone based prototype SWNET authenticate the presented analytical and simulation results.

ADVANTAGES:

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 reduce the provisioning cost in heterogeneous networks consisting of nodes with dissimilar content request rates and patterns. The impacts of user selfishness on object provisioning cost and earned rebate is analyzed.

SYSTEM ARCHITECTURE:

NETWORK MODEL:

We believe two types of SWNETs. The first one engage stationary SWNET panel that means after a partition is formed it is preserved for adequately long so that the supportive object caches can be formed and reach steady states. And the second type is to investigate as to what happens when the stationary assumption is relaxed. To examine this effect caching is applied to SWNETs formed using human interaction traces obtained from a set of real SWNET nodes.

SEARCH MODEL:

If the local search fails it look for the object within its SWNET partition using inadequate broadcast message. If the search in partition also fails the object is downloaded from the CP’s server. In this paper, we have replica objects such as electronic books, music, etc., which are time conveying and therefore cache reliability is not a critical issue. The popularity-tag of an object point to its global popularity. It also indicates the probability that random request in the network is generated for this specific object.

PRICING MODEL:

We make use of a pricing model alike 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 nearby 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 dispersed 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 desires to be supported so that the rebate recipient ECs can automatically authenticate and convert the rebate with the CP.

**FIND SELFISH USER**

In this module we detect the selfish node based on credit risk scores. At each relocation period, node detects selfish nodes based on normalized credit score. Each node may have its own initial value of Pki as a system parameter. Interestingly, the initial value of Pki can represent the basic attitude toward strangers. For instance, if the initial value equals zero, node Ni always treats a new node as a non-selfish node. Therefore, node can cooperate with strangers easily for cooperative replica sharing. Replicas of data items are allocated by allocation techniques. After replica allocation, node sets NDki and SSki accordingly. Recall that both NDki and SSki are estimated values, not accurate ones.

**SPLIT CACHE REPLACEMET:**

With the Split Cache replacement strategy rapidly after an object is downloaded from the CP’s server it is considered as a distinctive object as there is only one copy of this object in the network. Also when a node downloads an object from another SWNET node that objects is considered as duplicated object as there are now at least two copies of that object in the network.

**BENEFIT BASED DISTRIBUTED CACHING:**

Ahead unloading of the object and the change status flag the requesting node believe the object as a primary copy and if it can find an object with lower benefit or if it has an empty slot it stores the new object in its cache. After storing it the requesting node sends another change status message to the provider node which grounds the provider node labels its object as a secondary copy. The complete logic of the Distributed Benefit heuristics is summarized.

**OBJECT REPLACEMENT POLICY ALGORITHM**

```
if (the new object comes from another device in the Domain) then
    candid = the least popular object in the "duplicate"
    area of the local cache;
else /* object comes from outside of domain */
    candid = the least popular object in the entire cache;
end
if (new object.popularity > candid.popularity) then
    replace candid with the new object;
else
    do not cache the new object;
end
```

**DYNAMIC CONNECTIVITY GROUPING ALGORITHM**

1) Each mobile node broadcast its host id and information about its access frequency with data items to other nodes.
2) By using the broadcasting information every node identifies the bi-connected component nodes.
3) In each group, an access frequency of the group to each data item is calculated by adding all the access frequencies of mobile node in that group.
4) According to the access frequencies of the group, replicas of data items are allocated until memory of all mobile nodes in the group becomes full.
5) After allocating replicas of all data items, if the mobile nodes have any free space then replicas are allocated according to their access frequencies until the memory space is full.

EXPERIMENTAL RESULTS:

(a) Cost and (b) rebate with one selfish node in SWNET. The impacts of different $\lambda$ on the object provisioning cost of no selfish nodes when there is exactly one selfish node in the network. The average provisioning cost for no selfish node does not change considerably in the occurrence of a single selfish node. Though the object provisioning cost for selfish node reduces as we increase $\lambda$. The cause is that more object scan be found locally as we increase $\lambda$. The rebate with one selfish node shows the amount of rebate for each object request when there is exactly one selfish node in the network. With a single selfish node choosing any $\lambda$ that is different from the optimal $\lambda$ increases the amount of rebate for the selfish node. The maximum value of earned rebate however depends on the value of $\lambda^\text{opt}$ which is a function of $\beta$.

CONCLUSION:

The key involvement is to show that the best cooperative caching for provisioning cost decrease in networks with uniform content demands requires an optimal split between object repetition and individuality. Such a split replacement policy was proposed and evaluated using ns2 simulation and on an experimental tested of seven android mobile phones. In addition we experimentally using simulation and systematically calculated the algorithm’s performance in the presence of user selfishness. It was shown that selfishness can augment user rebate only when the number of selfish nodes in an SWNET is less than a critical number. The objective of this work was to develop a cooperative caching strategy for provisioning cost minimization in Social Wireless Networks.

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