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Content Caching And Scheduling In Wireless Networks With Elastic And Inelastic Traffic

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Abstract: **There is a huge growth in the wireless networks in current days. With this growth, accessing the content through wireless networks needs placing the content at the base stations and scheduling them. Users who are in the network are divided into groups based on the channel conditions, their requests are placed in the front end of the logical queue. All these requests are elastic and inelastic. These requests are placed in the queues which are known as requests queues and the deficit queues contains the deficits which are had in the in elastic services. The data which are stored in the cache are of limited size and they will be getting refreshed frequently to constant time intervals. This paper considering the two different models which will be concentrating on inelastic requests for streaming stored content and real-time streaming of events. In this paper some of the suggestions are made which are used to design the optimal policies which are used to stabilize the request queues and to reduce the deficit to zero**

I. INTRODUCTION

From the last 2 to 3 decades there is a huge growth in usage of hand held devices. These devices may be electrical or electronics and some are called as smart devices. In the current generation usage of smart devices has been grown vastly. These devices are using different resource in achieving their functionality. While working all these devices will work under the constraints which includes hard and soft constraints. For example if we take streaming applications in which chunks of the file must be received under hard delay constraints, as well as file downloads such as software updates that do not have such hard constraints. Since the core of the Internet is far less bandwidth constrained than access wireless networks, a natural location to implement a content distribution network (CDN) would be at the wireless gateway, which could be a cellular base-station through which users obtain network access. Broadcasting the information to the multiple clients simultaneously is one of the natures further, it is natural to try to take advantage of the inherent broadcast nature of the wireless medium to satisfy multiple clients simultaneously.

Every network will be having the base station where the data will be storing in the cache of each station. These caches are periodically refreshed by accessing the media vault. All the nodes are divided into the clusters which are geographically nearer to each other. The front end will be run on any of the device and the requests which are posed will be under tracking by the system.

This paper mainly concentrating on the issues like joint content placement and the problems of scheduling the traffic for both elastic and inelastic wireless networks.

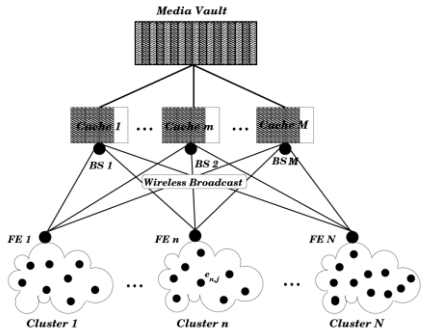

Figure 1: Wireless Broadcast Distribution Network.

II. LITERATURE SURVEY

Jeffrey E. Wieselthier et al develop the Broadcast Incremental Power Algorithm, and adapt it to multicast operation as well. This algorithm exploits the broadcast nature of the wireless communication environment, and addresses the need for energy-efficient operation. we have identified some of the fundamental issues associated with energy-efficient broadcasting and multicasting in infrastructure less wireless networks, and we have presented preliminary algorithms for the solution of this problem. Our studies show that improved performance can be obtained when exploiting the properties of the wireless medium; i.e., networking schemes should reflect the node based nature of wireless communications, rather than simply adapt link-based schemes originally developed for wired networks. In particular, the Broadcast Incremental Power (BIP) Algorithm, which exploits the wireless multicast advantage, provides better performance than the other algorithms we have studied over a wide range of network examples. [1]

Meghana M Amble et al objective is to design policies for request routing, content placement and content eviction with the goal of small user delays. Stable policies ensure the finiteness of the request queues, while good polices also lead to short queue lengths. We first design a throughput-optimal algorithm that solves the routing-placement-eviction problem. The design yields insight into the impact of different cache refresh policies on queue length, and we construct throughput optimal algorithms that engender short queue lengths. We illustrate the potential of our approach through simulations on different CDN topologies.. Future work includes streaming traffic with requests that have hard delay constraints, and which are dropped if such a constraint cannot be met. [2]

Bo Zhou et al formulate this stochastic optimization problem as an infinite horizon average cost Markov decision process (MDP). It is well known to be a difficult problem and there generally only exist numerical solutions. By using relative value iteration algorithm and the special structures of the request queue dynamics,. we consider the optimal dynamic multicast scheduling to jointly minimize the average delay, power and fetching costs for cache-enabled content-centric wireless networks. We formulate this stochastic optimization problem as an infinite horizon average cost MDP. We show that the optimal policy has a switch structure in the uniform case anda partial switch structure in the non-uniform case. Moreover, in the uniform case with two contents, we show that the switch curve is monotonically non-decreasing. The optimality properties obtained in this paper can provide design insights for multicast scheduling in practical cache-enabled content centric wireless networks [4].

III. SYSTEM IMPLEMENTATION

Based on the published content, I have started implementing algorithms for content distribution with elastic and inelastic requests. Here in the implementation of the application used a request queue to implicitly determine the popularity of elastic content. Similarly, the deficit queue determines the necessary service for inelastic requests. It is said that Content may be refreshed periodically at caches. Two different cost models are studied in implementation, each of which is appropriate for a different content distribution scenario. The first is the case of file distribution (elastic) along with streaming of stored content (inelastic), where we model cost in terms of the frequency with which caches are refreshed. The second is the case of streaming of content that is generated in real-time, where content expires after a certain time, and the cost of placement of each packet in the cache is considered.

The following are the main functionalities which we are concentrating in implementation of this application are

a. Creating System Model
b. Content Caching System Module
c. Elastic Traffic Module
d. Inelastic Traffic Module

IV. CONCLUSION

To implement the above system, I have studies different papers and analyzed the whole concept. Mainly, I have concentrated on the algorithms for content placement and scheduling in wireless broadcast networks. While there has been significant work on content caching algorithms, there is much less on the interaction of caching and networks. Converting the caching and load balancing problem into one of queuing and scheduling is hence interesting. A system is considered in which both inelastic and elastic requests coexist. Our objective was to stabilize the system in terms of finite queue lengths for elastic traffic and zero average deficit value for the inelastic traffic. In designing these schemes, showed that knowledge of the arrival process is of limited value to taking content placement decisions. Incorporated the cost of loading caches is in proposed problem with considering two different models. In the first model, cost corresponds to refreshing the caches with unit periodicity. In the second model relating to inelastic caching with expiry, directly assumed a unit cost for replacing each content after expiration. A max-weight-type policy was suggested for this model, which can stabilize the deficit queues and achieves an average cost that is arbitrarily close to the minimum cost.

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