Available Online at www.ijcsmc.com

International Journal of Computer Science and Mobile Computing

A Monthly Journal of Computer Science and Information Technology

ISSN 2320–088X
IMPACT FACTOR: 6.017

IJCSMC, Vol. 6, Issue. 4, April 2017, pg.427 – 432

Decreasing Congestion in Mobile Nodes over Wireless Networks

Vinod Kumar.M

Assistant Professor, Department of Computer Applications, KG College of Arts & Science

Abstract: Nowadays we encounter the challenges of mobile data burst and data lost. During the data transmission in, GSM and GPS double their mobile data traffic because of the high usage of mobiles and laptop and this trend is expected to continue given the rapid development of mobile social applications. It is vital that the novel architectures be developed to handle such ample mobile data. In this thesis, we propose and evaluate an integrated architecture manipulating the opportunistic networking pattern to move the data traffic from to metropolitan Wi-Fi access points (APs). Evaluating the benefits of such architecture, we consider the mass file transfer and video streaming over 3G networks and simulate data delivery using real mobility data set of 500 taxis in a metropolitan area. Here we are evaluating the pros of citywide Wi-Fi offloading using vast real traces. Our results give the numbers of access points needed for different requirements of quality of service for data delivery in large urban area. We shows that even with a sparse WiFi network the delivery performance can be drastically improved. This effort serves as an important feasibility study and provides guidelines for operators to evaluate the possibility and cost of this solution.

1. INTRODUCTION

Mobile data traffic grows at a compound annual growth rate (CAGR) of 131 percent between 2008 and 2013, and will exceed two Exabyte per month in 2013[1]. Simultaneously, mobile network operators are investing a outsized amount of money to push machine-to-machine (M2M) communications for billions of smart devices (e.g., automobile and sensors), which could create additional mobile traffic. However, currently do not have adequate capacity to have room for such an exponential growth of data. Thus, there is urgency for the research community to look for new solution.

Operators are rolling out increased bandwidth via High Speed Packet Access (HSPA), Long Term Evolution (LTE) and other upgrades. But simply increasing the speed may not always be economically effective, and there may not be enough bandwidth even with 4G. Moreover, there is always a need to balance end-user satisfaction, infrastructure investments (CAPEX) and operating expenses (OPEX) current flat-rate charging model, mobile networks operators can still integrate low-cost technologies to reduce the OPEX. Since users are paying a flat rate for the data services, the operators will not gain more from extra consumption of data by the users from their networks. Some operators have realized this issue, and have applied Delay Tolerant Networking (DTN) technologies to transfer bulk data across the Internet [2].

In this study, we propose a DTN approach [3] by leveraging the fact that a significant amount of mobile data is indeed delay tolerant in nature. The target data types are bulk data and videos, which will account for 64% of the world's mobile traffic by 2013 [1]. Bulk data, for example, large MPEG data, can usually tolerate particular delay. Certain uplink data created by sensors and M2M applications such as remote sensing do not require real-time data transmission. By exploiting this intrinsic feature of data, we propose an integrated architecture, Metropolitan Advanced Delivery Network (MADNet), that consists of mobile networks networks, WiFi networks, and Pocket Switched Networks (PSNs) [4]. We believe that this architecture can provide a low-cost solution in parallel with other solutions like HSPA. We focus on metropolitan areas since they have high population density, and high content demands. We consider a scenario in which there is abundant coverage of 3G network in large areas with a flat-rate payment plan for data services. Users have mobile devices that can download and produce rich multimedia contents. The devices have large, but limitless, amount of constant storage. Users may want to upload their content to remote servers. There will be ubiquitous availability of low cost cloud computing resources, and users will upload their files and download media files from the cloud easily. This will be a common development in the future.

In large scale systems, full-work dynamic examining of end-to end execution measurements is infeasible. Guaranteeing a little arrangement of sets and foreseeing the others is more versatile. Under this system, we make the expectation issue as lattice consummation, whereby obscure sections of a deficient framework of combine shrewd estimations are to be anticipated. This issue can be illuminated by framework factorization since execution lattices have a second rate connections among estimations. In addition, its determination can be completely decentralized without really fabricating lattices or depending on uncommon historic points or focal servers. In this paper we show that this approach is likewise material when the execution qualities are not measured precisely, but rather are just known to have a place with one among some predefined execution classes, for example, "great" and "terrible". Such order based detailing not just satisfies the necessities of numerous Internet applications additionally diminishes the estimation cost and empowers a bound together treatment of different execution measurements. We propose a decentralized approach in light of Stochastic Gradient Descent to explain this class-based network fulfillment issue. Probes different datasets, with respect to two sorts of measurements, demonstrate the exactness of the approach, its vigor against mistaken estimations and its ease of use on associate choice.

2. MOBILE NETWORKS TRAFFIC OFFLOADING

MANet provides an integrated solution for the latter two cases and uses the mobile networks network as signaling channel for controlling deliveries. Femtocell technique was initially projected to improve inside voice and data services of mobile networks networks. Femtocells operate on the same licensed spectrum as the macrocells of mobile networks and thus do not require special hardware support on mobile phones. Mobile network operators can reduce the traffic on their networks when indoor users move from macrocells to femtocells. The disadvantages include the need to install short-range base stations in residential or small-business environments, and the solution is usually for indoor environments and cannot handle macroscopic mobility. B. Opportunistic Peer-to-Peer Offloading Han et al. proposed to offload traffic from the mobile networks network to opportunistic peer-to-peer mobile network by selecting n-no of users as the initial set to drive the contents. Then, the primary set of users aids the broadcast of the contents to further users through short-range wireless connectivity (e.g., Bluetooth and ad hoc WiFi). To improve the delivery efficiency, the system can identify the social networks of the users and deliver specific contents to a particular social group. WiFi for Outdoor Offloading WiFi networks operate on the unlicensed frequency bands and cause no interference with 3G mobile networks. WiFi is usually far and wide available in urban areas, either deployed by operators as commercial testbed, shared out as community network (e.g., FON), or deployed by users for residential usage. Meanwhile, there are already several offloading solutions and applications proposed from the industry. For example, the Line2 iPhone application can kick off voice calls over WiFi networks.

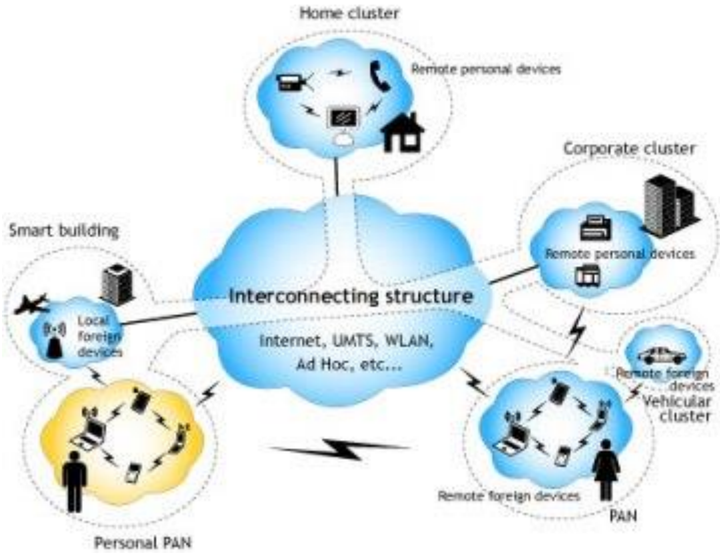

Figure: MADNET architecture

MADNet is designed as a middleware between the applications and the physical connectivity. It basically consists of six modules. The Connectivity module is responsible for choosing the underlying type of connection for the application. By default for streaming and downloading, it will first choose the mobile networks (we include femtocells in mobile networks), but at the same time it will also launch a local search for available WiFi APs or content. The Location module provides location services to applications through the information supplied by GPS, mobile networks tower triangulation, and WiFi signal. Users can prefer the locations in which they want to pick up the data using a Google map like interface. The Protocol module handles the application layer protocols (e.g., HTTP) for data transmission. The Naming and Forwarding modules are for peer relay purpose. They are responsible for the naming of mobile devices and content, and also the data forwarding for a particular name. The Data module is responsible for the assembly of data from different connections (e.g., real time streaming from the mobile networks network and supplementary data from local search) and pass it to applications.

The framework comprises of cell phones that can be conveyed by individuals (i.e., hubs). Every hub is equipped for producing substance to transfer and asking for substance to download. With "substance" we allude to a record or a snippet of data of enthusiasm for the hub. At the point when a hub needs to download content, it issues a demand to the base station at present in range, which answers in two non-elite courses: by sending the asked for substance specifically through the 3G arrange and by utilizing the APs conveyed in the city. The sending of the substance through the APs may occur in various ways. In this paper, we expect that the asking for hub gives some status data about itself (e.g., position, speed, heading) to the base station, which is additionally mindful of the area of the APs (since MADNet is a versatile systems administrator helped arrangement). By using this data, the base station predicts the course of the hub and produces a rundown of APs that can serve up the hub. In parallel, the rundown is sent back to the hub, and the recorded APs are encourage with the substance. At long last, the hub counsels the rundown to associate with the giving AP and download the substance. The transfer procedure works similarly, with the exception of that no status data is sent by the hub. Subsequent to downloading the substance, the hub keeps it in its stockpiling to encourage future distributed downloading by its neighbors through nearby associations, for example, Bluetooth or WiFi.

Advanced Deliveries

In MADNet, the delivery methods can be classified into two categories: downstream and upstream.

(1) Signaling and Pickup: This is the basic method for downloading bulk content that is not time-critical. Users will select some content to download and use mobile cellular networks to initiate fetching of this content. The user interface will also inform users of WiFi APs in the user's vicinity. Users can choose one or more APs where they want the data to be available for pickup, based

on their route the system will then move the data to those particular APs using the backbone network, and the user can pick it up when she arrives at the AP using WiFi. We further divide this category in four sub-categories:

(a)Complete Oracle: This is the upper bound for the performance of opportunistic delivery, in which service providers Signaling are able to accurately predict user movement and can ship the content to the hotspot to be visited in advance. This may be practical if MADNet uses mobile networks as a control channel to instruct servers where to deliver the data.

(b) Regular Oracle: In this case, the system cannot predict the complete movement of users but it knows their regular traveling patterns and can predict the probability of their approximate positions. This is practical if a central server can learn the regularity (if any) from user mobility history.

(c) Popular Hotspots: Some popular content is shipped and cached at hotspots in advance, or the content is shipped to several popular hotspots when the content is requested by a certain user. In this case, we assume the central server does not have any knowledge about the location of users. (d) Pure Opportunistic: We assume a certain distribution of media files, for example, on other mobile devices, and when a user requests some content from the network, the MADNet software on the mobile devices will also issue a local search.

2) Peer Relay: The upstream category can be divided into two sub-cases. In the first case, the entities that are uploading a file are mobile. The files/data to be uploaded may be user-generated contents, for example, pictures and videos produced by the handhelds. The alternative way of uploading data for this case is that users can always wait until they arrive to places with reliable wireless connections (e.g., home or office). The only issue for this case is the incentives to use WiFi instead of persistent 3G uploading. One possible reason that discourages a user from using mobile networks for this purpose is battery consumption.

Application Scenarios

We consider three application scenarios: high quality video-on-demand, bulk data transfer, persistent uploading.

1) High Quality Video Streaming: We offered to utilize shrewd systems administration to upgrade the nature of recordings gushed to the client. At present, clients associate with surely understood online administrations (e.g., Youtube.com) and download favored video by means of 3G systems. As an option, MADNet acquaints the likelihood with pursuit a similar video inside the clients' neighborhood or their nearby system (i.e., WiFi APs). In the event that the substance is accessible locally, the principal lumps of the video can be supported specifically. Generally the video will be gushed through cell organizes instantly and resulting lumps will be sent to the anticipated APs and will be downloaded deftly.
2) File Sharing and Bulk Data Transfer, where we look at bulk data which is not time critical and therefore there is no need to contend for bandwidth with time-critical applications. Through MADNet, mobile data can be downloaded in a fully opportunistic manner. The delay tolerant techniques include pure opportunistic forwarding between mobile nodes.
3) Persistent Uploading: In a somewhat different application scenario, we consider file uploads instead of downloads. In this scenario, users produce large quantities of content that, on the long run, exceed the storage capacity of their mobile devices.

3. EVALUATION RESULTS

In this section, we compare the performance of MADNet against 3G networks when users download and upload data. We report the results of the two cases separately, characterizing the system, considering the satisfaction of users, delays and network load.

A. MADNet Download

1) Satisfaction of the Users if we have a tendency to deploy too few APs (e.g., D5 and D6), the requests can not be happy with constant quantitative relation as in 3G networks. Despite this, we discover that regarding constant satisfaction quantitative relation of 3G networks is obtained through eighty two APs. With relevance the results, we have a tendency to observe that decreasing the brink keeps the SR at

regarding constant worth for each cases. In fact, for a given threshold the presence of cellular networks is that the solely distinction between the 2 cases.

2) Delays: The cellular network is combined with the WiFi network. In fact, requests that were not satisfied through the WiFi due to a lack of coverage are satisfied through the cellular networks anyway. In the bulk data ransfer cases the network consists of APs only and therefore some requests are satisfied after longer time.

3 Network Load: The total amount of data downloaded in the cellular network grows linearly at a verage rate of 28:16 MBps. Given that we obtain a similar growth in each download case

B. MADNet Upload

1) Satisfaction of the Users: We obtain SR=1 in each upload simulation run. Indeed, this does not indicate that the users' requests are equally satisfied in each scenario. U0 here makes no exception. Therefore, we evaluate the average gain in number of satisfied requests with respect to U0 and summarize the results in Table IV. As can be seen, the number of additional satisfied requests may grow up of one order of magnitude. We obtain a noticeable growth of this quantity whereas more than 1; 948 APs are deployed, suggesting that a significant increase of satisfied requests can be obtained by deploying few central APs.

2) Delays: We now examine the time required to satisfy the URs with respect to the 3G network. Figure 10 shows how such delays are distributed within some intervals of time. The y-axis shows the fraction of requests that are satisfied in the corresponding interval of time reported on the x-axis. We can see that, in the cellular network (U0), 85% of the URs are satisfied after about 8 minutes and 19 seconds. Within U1, U2, U7 and U8, this delay is reduced by 80% for the majority (>80%) of the URs. We highlight that the request satisfaction delay in MT2 cannot be worse than U0 because in the worst case the URs are satisfied with the same timings of U0.

3) Network Load: The MT2 case can be further detailed. As can be seen in Figure 9, the results are similar to the download case: few APs can contribute significantly in offloading the cellular network. We also observe that the 3G network is here better off-loaded that in the BDT case. In this case, as the throughput offered in U0 is limited for each user (64 Kbps), the upload requests are soon satisfied by the WiFi network.

C. Scalability

We have assessed the normal rate of information downloaded or transferred through WiFi and 3G organizes as we steadily bring the 500 cabs into ensuing reenactment situations. Each of these situations comprises of 4; 271 APs, and is set up as illustrated. As indicated by the outcomes, expanding the quantity of cabs loads the WiFi arranges and offloads the 3G systems of around 0:5% of the downloaded activity. We accomplish the inverse conduct for Transfer case. Be that as it may, this slight increment shows a decent level of strength of the framework in a given situation.

4. CONCLUSIONS

In this paper, we have architecture for the integration of WiFi networks and mobile-to-mobile Pocket Switched Networks (PSN) with cellular networks to provide a low cost solution to handle the exponential growth of mobile data traffic. The MADNet architecture is simple, uses commonly available techniques from current mobile computing research, and can be easily prototyped and deployed using off-the-shelf hardware equipment. Although the results are encouraging and suggest the feasibility of opportunistic data offloading, we believe this is still a fundamental step toward full integration of opportunistic networks with cellular networks. Much more research is required for practical use. We will study efficient data replication and caching schemes, which can reduce the delays induced by transferring data to the APs. We plan to examine centrality metrics used to study spatial urban settings and observe whether any effective deployment scheme can be obtained by considering only the topological structure of the city. The scenario discussed in our paper is similar to Unified Cellular and Ad-Hoc Network (UCAN) [3]. UCAN was designed to increase the throughput of the cell and maintain fairness between users. Similarly to our work, UCAN mobile clients rely on the combination of WiFi and cellular networks. However the paper focuses on improving the throughput of cellular networks by evaluating specific protocols, rather than trying to offload the traffic in a static infrastructure.

REFERENCES

[1] (2009, January) Cisco visual networking index: Global mobile data traffic forecast update.

[2] N. Laoutaris, G. Smaragdakis, R. Sundaram, and P. Rodriguez, “Delay-Tolerant Bulk Data Transfer on the Internet,” in ACM SIGMETRICS 2009, June 2009.

[3] H. Luo, X. Meng, R. Ramjee, P. Sinha, and L. E. Li, “The design and evaluation of unified cellular and ad hoc networks,” IEEE Transactions on Mobile Computing, vol. 6, no. 9, pp. 1060–1074, 2007

[4] A. Chaintreau, P. Hui, J. Crowcroft, C. Diot, R. Gass, and J. Scott, “Impact of human mobility on opportunistic forwarding algorithms,” IEEE Transactions on Mobile Computing, vol. 6, no. 6, pp. 606–620, 2007.

[5] V. Chandrasekhar, J. G. Andrews, and A. Gatherer, “Femtocell networks: A survey,” IEEE Communications Magazine, vol. 46, no. 9, pp. 59–67, September 2008.

