International Journal of Advances in Engineering Research http://www.ijaer.com/

(IJAER) 2012, Vol. No. 3, Issue No.II, February ISSN: 2231-5152

EFFECT OF BAND WIDTH SHARING BETWEEN MULTIPLE MEDIA

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ABSTRACT

Three experiments using the prototype were conducted. The first experiment was conducted to demonstrate that the prototype could effectively divide the available bandwidth between multiple media. This was done by utilizing all available bandwidth and varying the use of audio at Client A in order to show that video would effectively back-off due to price increases in the market. Data was collected multiple times while sending video from each client during a period of 10 minutes. The price recalculation rate was studied by locking the supply recalculation rate to 500 ms and decrementing the price recalculation rate from a high value of 1000 ms to a low value of 20 ms. The supply recalculation rate was studied in a similar way with the price recalculation rate locked to 50 ms, instead of by locking the supply recalculation rate. It shows the benefits of a higher price recalculation rate, in that it leads to a more efficient allocation of bandwidth, as determined by calculating the average over and under demand.

An explanation is that a higher price recalculation rate improved the response time

Key words: *prototype, effectively, video, recalculation, bandwidth.*

INTRODUCTION

Today it is clear that no single wireless access technology will be appropriate for all application scenarios. In fact, it is expected that many wireless networks will coexist and compliment each other in an all-IP based heterogeneous wireless network known as the 4th generation (4G) wireless system . Inexpensive high performance WLAN (WiFi TM) connectivity will for example be available within limited range of “hot-spot” areas and will be complimented with more traditional cellular connectivity offering wide area coverage, but with reduced performance. This 4G-environment will provide mobile end-users with seamless Internet access and IP connectivity to third party services at all times, and in all places, while using the “best” available network. This concept is known as Always-Best- Connected and is a central part of the 4G vision. below shows an example of such a 4G wirelesslandscape.

Despite the vast amount of research in the area of IP mobility and deployment of new wireless systems, the idea of having an Always-Best-Connected Internet connection seems more like a vision than reality today. One possible explanation is that current state-ofthe- art solutions mainly focus on mobility management instead of considering additional application related issues such as adaptation support and failure recovery inconjunction

REVIEW OF LITERATURE

Assuming that applications can manage mobility and intelligently handover to the best network, some method is still needed to adapt media streams to the currently available bandwidth. Media streams suitable for high-bandwidth networks without adaptation support will encounter problems when switching to a network with lower bandwidth. Even if there enough available bandwidth, it is not always the case that the user will want to utilize all the bandwidth. A user might for example only be able to afford to use 80 kbps on a particular network despite there being 2000 kbps of bandwidth available.

In addition, if there is not enough bandwidth for all media, the user will have to manually prioritize how much bandwidth each media stream should be given. If there is 120 kbps of bandwidth available, video might be allocated 100 kbps, with audio being allocated 20 kbps, and so on. Apparently, simply being always best connected is not enough as users also want to maximize their net benefit in order to make the most of their connections and money. While this is a general problem for most application scenarios, creating useful multimedia applications in a 4G environment is even more difficult due to the dynamic nature of the links available in the 4G wireless landscapes.

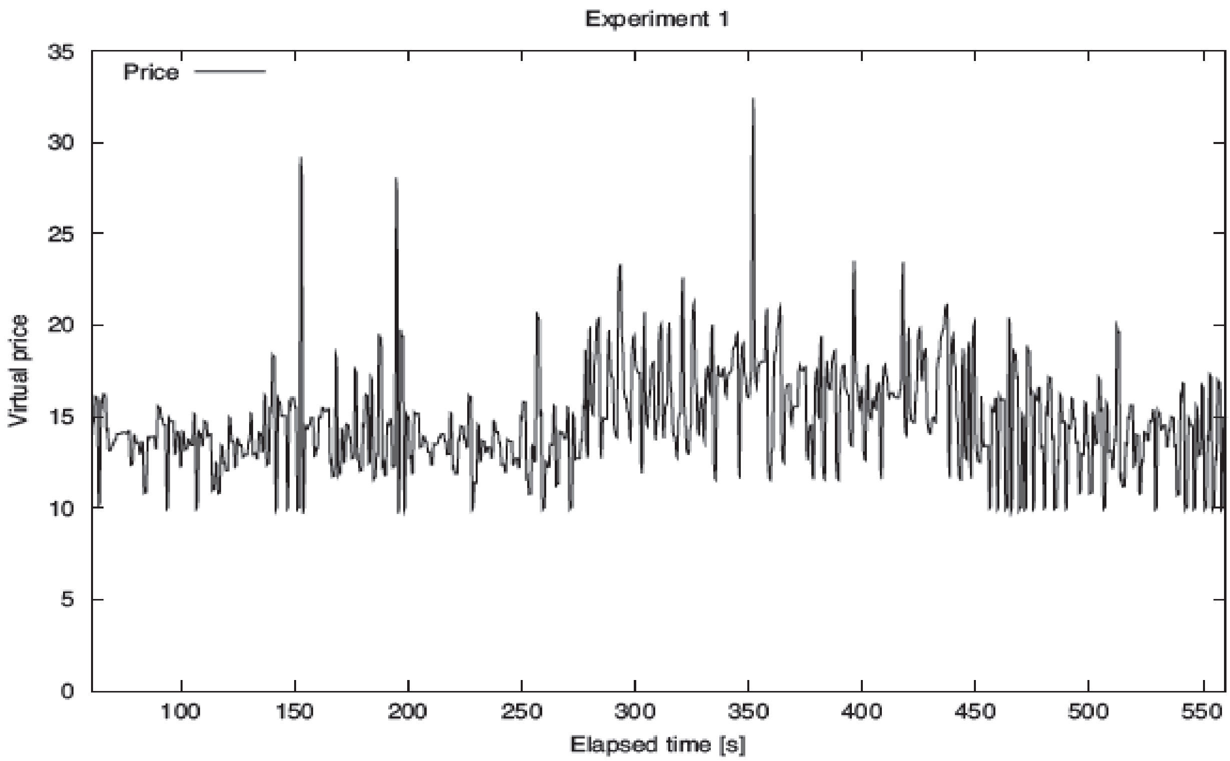
MATERIAL AND METHOD

The first experiment was conducted to demonstrate that the prototype could effectively divide the available bandwidth between multiple media. This was done by utilizing all available bandwidth and varying the use of audio at Client A in order to show that video would effectively back-off due to price increases in themarket.

data was collected multiple times while sending video from each client during a period of 10 minutes. The price recalculation rate was studied by locking the supply recalculation rate to 500 ms and decrementing the price recalculation rate from a high value of 1000 ms to a low value of 20 ms. The supply recalculation rate was studied in a similar way with the price recalculation rate locked to 50 ms, instead of by locking the supply recalculationrate.

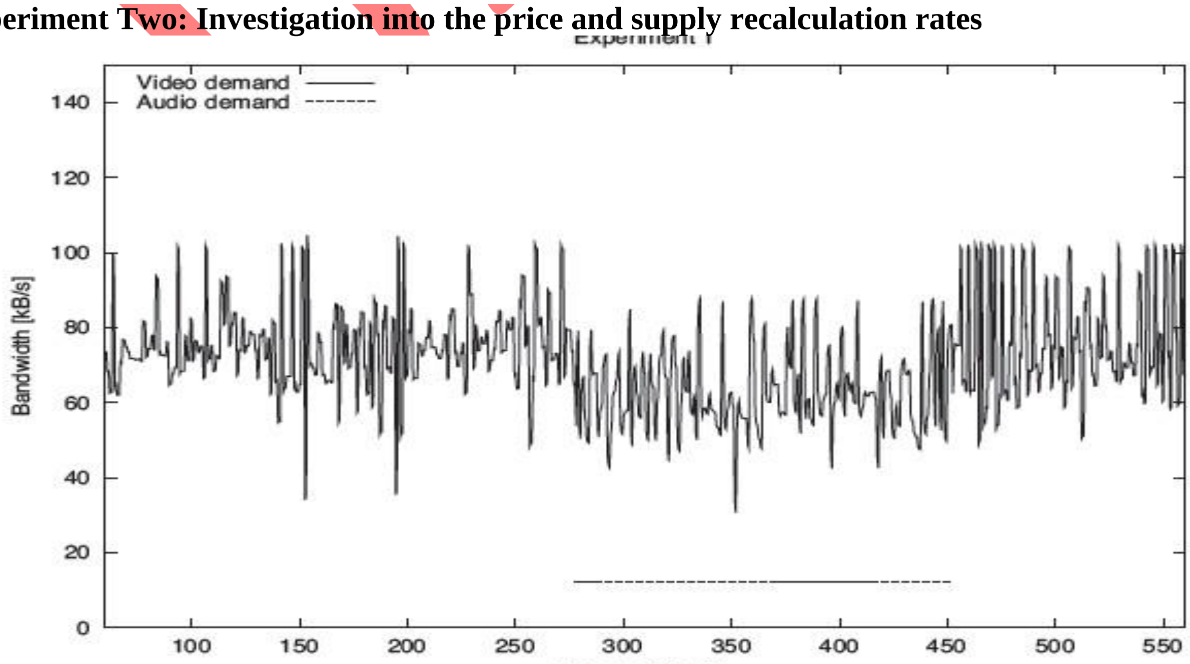
Table 4.1 shows the benefits of a higher price recalculation rate, in that it leads to a more efficient allocation of bandwidth, as determined by calculating the average over and under demand.

An explanation is that a higher price recalculation rate improved the response time



(a) Price variation.

Experiment Two: Investigation into the price and supply recalculation rates



(b) Video and audio demand variation.

In order to investigate how the price and the supply recalculation rates affected the market, data was collected multiple times while sending video from each client during a period of 10 minutes. The price recalculation rate was studied by locking the supply recalculation rate to 500 ms and decrementing the price recalculation rate from a high value of 1000 ms to a low value of 20 ms. The supply recalculation rate was studied in a similar way with the price recalculation rate locked to 50 ms, instead of by locking the supply recalculationrate.

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Figure 4.3: Results from experiment one. The figures show the effect of introducing a new media into the market. The price was recalculated every 100 ms, and the supply every 1200 ms.

Price recalc. rate	Avg. over-demand	Avg. under-demand
20 ms	0.25 kB/s	0.25 kB/s
50 ms	1.14 kB/s	0.87 kB/s
100 ms	2.66 kB/s	2.59 kB/s
200 ms	4.09 kB/s	3.98 kB/s
400 ms	7.18 kB/s	7.10 kB/s
500 ms	7.86 kB/s	7.79 kB/s
800 ms	10.63 kB/s	10.53 kB/s
1000 ms	11.20 kB/s	11.07 kB/s

Table 4.1: The table shows the effects of varying the price recalculation rate. The supply recalculation was recalculated every 500 ms.

Supply recalc.rate	Avg.demand	Avg.supply	Avg.over-demand	Avg.under-demand
200 ms	97.57 kB/s	86.30 kB/s	11.63 kB/s	4.45 kB/s
400 ms	88.77 kB/s	80.20 kB/s	7.26 kB/s	3.64 kB/s
500 ms	76.51 kB/s	75.20 kB/s	6.87 kB/s	2.10 kB/s
600 ms	74.82 kB/s	74.80 kB/s	1.20 kB/s	1.17 kB/s
800 ms	74.97 kB/s	74.95 kB/s	1.06 kB/s	1.04 kB/s
1000 ms	73.57 kB/s	73.56 kB/s	0.96 kB/s	0.94 kB/s

Table 4.2: The table shows the effects of varying the supply recalculation rate. The price recalculation was recalculated every 50 ms. allowing the demand to more closely match variations in supply. A high supply recalculation rate on the other hand did not improve the performance as it resulted in more fluctuation in terms of over and under-demand, which can be seen in Table 4.2. This problem can be explained by the fact that a high supply recalculation rate in combination with variable bitrate video codecs (H.261) causes supply to vary rapidly, making it harder for the market to reach an equilibrium.

Experiment Three: Obtaining and selling bandwidth from multiple networks

The third experiment was conducted to demonstrate that the BBA could sell bandwidth obtained from more than one network. Another purpose was to investigate how the market reacted when there were large variations in supply caused by mobility. In the experiment, NA was configured to trigger a handover as soon as the LAN interface became available in Windows, and similarly trigger a handover to the GPRS interface if the LAN interface became disconnected. This was done by

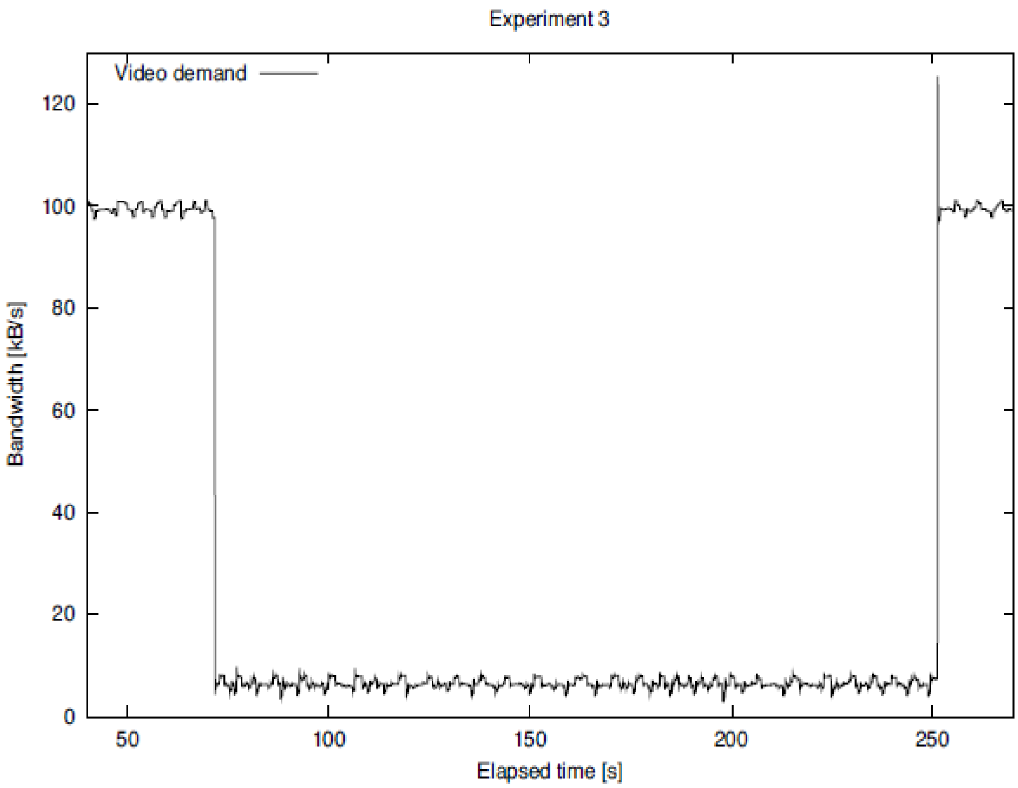

Figure 4: Results from experiment three. The figures show the effect on the market when switching between networks with different bandwidth capacity. The price is recalculated every 100 ms and the supply every 600 ms.

Figure 4.4 shows the result from the experiments. As can be seen in the figure, the supply dramatically decreases from 100 kB/s to only 6 kB/s after switching to the GPRS network, which consequently caused the price to immediately rise and the video BCA to decrease its demand. Note that the price is less stable on the GPRS network compared with the Ethernet network, which can be explained by the fact that the incoming traffic (3 kB/s video data) relatively caused more variations in supply on the GPRS network than on the Ethernet network.

CONCLUSION

This work has presented a middleware framework based on microeconomic principles of supply and demand that deals with bandwidth issues inside a multimedia application. The key design principle that has been proposed is to view bandwidth as a universal commodity that can be consumed and produced by different components in the application. The advantage of this approach is that the system becomes more modular as each component can contribute to the equilibrium separately in the market. This makes it is possible to replace and upgrade each component in the middleware in a “plug and play” style without needing to redesign the whole application. For example, if a new component for mobility management is developed that can take advantage of several wireless base-stations simultaneously [64] it could be integrated into the middleware simply by upgrading the NA. Similarly, if a new method is developed that can better utilize bandwidth in video group communication softwares [40], it can be integrated simply by defining new utility functions in theBCA.

The experiments have shown that it is possible to allocate bandwidth close to an equilibrium allocation by using a high price recalculation rate and a low supply recalculation rate. However, as a high supply recalculation rate negatively affected the market, studying how a real congestion control scheme affects the performance is something that requires further investigations. Hence, for future work we plan to use a real congestion control scheme and study its implications on the market. In addition, we plan to investigate more effective utility functions for the various media contained in Marratech Pro, and integrate some other related prototypes developed by our research group into the system in order to make more sophisticated experiments.

REFERENCES

- *Marratech AB. , 2004.<http://www.marratech.com>.*
- *Microsoft IP Helper API. , 2003.<http://msdn.microsoft.com>.*
- *S. Aust, D. Proetel, N. A. Fikouras, and C. G¨org. Policy based Mobile IP Handoff Decision (POLIMAND) using Generic link Layer Information. In IEEE 5th International Conference on Mobile and Wireless Communication Networks (MWCN'02),2003.*
- *R. Chellappa, A. Jennings, and N. Shenoy. A Comparative Study of Mobility Prediction in Fixed Wireless and Mobile Ad Hoc Networks. In IEEE International Conference on Communications (ICC 2003),2003.*
- *S. Dhananjay and P.T. Goff. Multiple IP Links for Improving Throughput and Reliability in Mobile Environments. In INFOCOM, 2002.*
- *F. Erbas, J. Steuer, K. Kyamakya, D. Eggesieker, and K. Jobmann. A Regular Path Recognition Method and Prediction of User Movements in Wireless Networks. In VTC Fall 2001, Mobile Technology for Third Millennium,2001.*

(IJAER) 2012, Vol. No. 3, Issue No.I, January **ISSN: 2231-5152**

- *R. Stewart et al. Stream Control Transport Protocol, 2001. IETFRFC2960.*
- *F. Feng and D.S. Reeves. Explicit Proactive Handoff with Motion Prediction for MobileIP.*
- *In IEEE Wireless Communications and Networking Conference (WCNC´04),2004.*
- *S. Kashihara, K. Iida, H. Koga, Y. Kadobayashi, and S. Yamaguchi. End-to-End Seamless Handover using Multi-path Transmission Algorithm. In Internet Conference 2002 (IC'02), 2002.*