Multimedia Mesh Networking Review

“An Experimental Study of Multimedia Traffic Performance in Mesh Networks” was published by Yuan Sun, Irfan Sheriff, Elizabeth M. Belding-Royer, and Kevin C. Almeroth in MobiSys International Workshop on Wireless Traffic Measurements and Modeling (WitMeMo), Seattle, Washington, in June 2005. The paper provides experimental data and analysis of multimedia traffic over wireless mesh networks.

The paper chooses to conduct testbed experiments rather than simulations because of the many flaws that the simulations have due to simplification and other factors. The paper analyzes mesh networks because of their growing popularity as testbeds for wireless analysis, and selects multimedia traffic because of it's growing popularity as a percentage of the Internet traffic.

The paper, however, does not cite any sources for these claims. While it does not make the stated facts not true, it would have given more credit to their claims about the flaws in the simulations, the use of mesh networks in testbeds, and the increase in multimedia traffic.

Next the UCSB MeshNet testbed is introduced. The nodes, or Mesh Gateways, are explained along with the method for identifying the link quality of individual hops and asymmetric links used in creating paths. It is also explained that for time synchronization, the Network Time Protocol was investigated but proved to be too inaccurate, thus a wired management over a LAN provided time synchronization accurate up to 10 microseconds.

For two nodes to be asymmetric, or a pair, the packet delivery on the forward and reverse paths is above 70%. It is not explained why this value was selected to determine bidirectional links for using in the experiment.

The next section focuses on the setup of the experiment. The physical topology of the selected nodes are quickly explained, followed by a quick explanation of the UDP video and voice streaming applications. Figure 3 shows that the video packets are sent in a bursty fashion, sending a few larger packets every second. The MAC Layer configuration is explained, with the data rates used explained. Finally, the different scenarios and metrics measured are listed.

The paper does not explain why channel 6 is used in the experiment. Channel 6 is one of the most commonly used default channel for wireless routers. It is very likely that there was wireless traffic outside the test also using channel 6. Both channels 1 and 11 do not overlap with the default channel 6 and could reduce the amount of interference on the channel. Or the tests could be repeated to see the impact of other traffic on the same channel. The paper compensates for congestion on channel 6 by running the tests at night versus daytime.

The capacity of the mesh network was tested by transmitting multiple streams of video or multiple streams of audio and measuring the latency at each increment. Figure 2 shows the results of this test with one, two, three, and four node hops for an increasing number of video

streams with either a set data rate or auto-rated. It can clearly be seen that the increase in number of videos and an increase in number of hops causes an increase in latency. The auto-rated on average preformed with better latency, and as seen in Table 1, allowed for more streams at acceptable losses at once for each setting, accept when the number of hops increased.

The paper concludes that RTS/CTS does not reduce packet loss and latency when dealing with larger packets, and reduces the number of acceptable video streams when enabled. MAC retransmissions were also found to be beneficial to the wireless system, and the paper explains that more research into finding an optimal value would further improve the system's performance.

The paper concludes by summarizing the observations made. The paper overall was well written and well structured. The paper lacks in it's explanation for the choices it makes for setting up the experiments.