

## **ABSTRACT**

Nowadays the process of bandwidth allocation in wireless communication systems is very complex this is due to the large number of users in a BS and their various service needs. To overcome the problem of complexity, IEEE 802.16 MAC as a standard of WiMAX implements bandwidth request grant mechanism for uplink bandwidth allocation between the base station (BS) and subscriber station (SS).

This thesis was to analyze and evaluate the guaranteed bandwidth such as parameters of throughput, packetloss, delay, and fairness index. The observation was carried out when the users were in mobile by means of simulation using OPNET version 14.0 educational version.

From the simulation obtained two scenarios: scenario 1, the maximum throughput was obtained at 64 kbps of bandwidth request. For 10, 20, 30, 40, and 50 users were at 52.93 kbps, 32.67 kbps, 21.87 kbps, kbps 16:49, and 13:21 kbps respectively. Packet loss during bandwidth request 64 Kbps and 128 Kbps with a number of users 10, 20, and 30 according to ITU G.107 where packet loss is less than 20%. Delay time bandwidth request 128 kbps, 192 kbps, 256 kbps, and 320 kbps with the

number of users increased, but they were still tolerable because it is ranging between 0-150 ms (ITU G.114). Scenario 2, the maximum throughput ~~is~~ was obtained at 64 Kbps of bandwidth request. For user speed of 0 km / h, 5 km / h, 60 km / h and 80 km / h were obtained at 52.93 kbps, 51.21 kbps, 48.04 kbps and 31.97 kbps. The packet loss during bandwidth request 64 kbps and 128 kbps with user speed 0 km / h, 5 km / h, and 60 km / h was tolerated because it ~~is~~ was less than 20% (ITU G.107). At the request bandwidth of 128 Kbps, 192 Kbps, 256 Kbps and 320 Kbps with user speed increasesd, the delay was still tolerable because it ~~is~~ was ranging between 0-150 ms (ITU G.114). The interclass fairness index value of scenarios 1 and 2, are obtained almost all values close to 1. This occurs because the type of user are homogeneous. Whereas the intraclass fairness index premises scenario for 40 and 50 users the obtained ~~a~~ value of fairness was ranging only between 0.3 - 0.5. This occurs because the capacity of the BS that remain but with the amount of bandwidth requests are increasing.

Keywords : WiMAX IEEE 802.16e, bandwidth request grant, and video streaming service

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