Improving the Performance of WiMax Networks using Load Balancing Algorithm*

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Abstract

Nowadays, wireless networks are spreading more and more. The majority of installed networks have become wireless due to the simplicity of installation; where they do not need an infrastructure. This does not mean that the role of the wired networks is being eliminated. Instead, the wireless networks are considered as a complementary of the wired networks. With all types of networks from personal and local area networks (PAN and LAN) to wide area networks (WAN) especially the Internet, research has become oriented to focus on the quality of service (QoS) and the integration among all these networks taking into account the Internet which is considered as the backbone for each network that wants to exchange the information with any other network all over the world. In our research, we take into account the quality of service in the broadband networks such as the WiMax network (Worldwide Interoperability for Microwave Access) with IEEE 802.16e standard which covers cities and supports the mobility. This network can be used to interconnect the rural zones with the center of cities, this kind is called point-to-point, or it can be used to cover the cities and is called point-to-multipoint, The last one is used to interconnect different wireless networks especially the local one which has infrastructure (Wi-fi: Wireless Fidelity) and networks which have many users and called hotspots. However, the cells of Wi Max in the cities are called hotzones.

We propose a system model that performs the load balancing process between the base stations of WiMax network. This means, the proposed load balancing algorithm exchanges the terminals between the adjacent base stations in order to make the throughput in each base station equals to the throughput in the others. This will improve the performance of the overall network and increase the available bandwidth for each terminal; in addition, this will increase the number of terminals which can be served. On one side, these advantages return to the subscribers, they also return to the operator on the other side, not to mention the good renown that the operator will get from subscribers that will make more subscribers join to this network.

The proposed load balancing system can be centralized; implemented in a centralized server connected to all base stations or distributed system implemented in each base station. The load balancing algorithm which consists of several steps is placed in a controller that achieves it. The load balancing process and the handover procedure have to be fast enough in order to prevent the adverse effect on the quality of service especially for the real-time applications users.

Keywords: Wi Max network, Wi-fi network, load balancing algorithm, real-time applications

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