International Journal of Innovative Technology and Exploring Engineering (IJITEE)
ISSN: 2278-3075 (Online), Volume-5 Issue-6, November 2015

Optimized WiMAX Network Model on The Basis of Traffic Load

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Abstract— ***With the development of wireless network, new technology, and growing needs of human being on the network services, it is essential for the network engineer that they will look forward to provide that Quality of Service (QoS) which is unbreakable, and suitable for future perspective. To provide the best QoS from any network required, the best optimized algorithm, strategies and decision parameter. The current study reviewed the best algorithm present for Wi-MAX network optimization and tries to find the parameter which is basically required to develop a wireless network which will provide QoS.***

Index Terms— ***Wi-MAX, Wireless Network, QoS, Traffic Load, power consumption***

I. INTRODUCTION

Today's has number of accessible technologies for wireless Communication. Different families of wireless network are existing using these technologies with regard to the range of the network, like wireless LAN, wireless MAN and personal network. In addition, refined technologies services available such as mobile wireless and internet world high data rate are the focus demand of wireless deployments. The technologies which promise a high data rate are the core attraction for vendors as well as operators. One of the most promising technologies in this area is Wi-MAX.

Network is growing day by day, so it is essential for any network administrator, that network planning can be done at the initial state, which is also a requirement for successful operation of Wi-max (Worldwide Interoperability for Microwave Access) Network.

Wi-MAX are the standard given by Wi-max forum for providing high speed communication channel of nearly 30 to 40 megabit-per-second data rates [1]which make it suitable for providing different network communication services for remote areas.

Future wireless networks have to able Wi-Max service coordinate within a various network environment, for example generally deployed 3G cellular and data service, GPRS may be complement by the local operation of high bandwidth Wi-max, such as IEEE 802.16 j and Hi-Per LAN-. Furthermore, existing networks such as satellite, cellular, and WLAN, will need to integrate with emerging networks and technologies.

II. NETWORK CHARACTERISTICS

A. Traffic load

The traffic load is the ratio of arrival rate of request to served request by the server, which is represented by $= \frac{\lambda}{\mu}$, where λ is the arrival rate of service requests, μ is the departure rate. To provide a better service the higher priority is given to that request comes from the mobile users who change its service provider, and for simplicity, a buffer-less handoff algorithm is used.

B. Power consumption

We have assumed that the power consumption is composed of two main parts: transmission power and operating power

i) Transmission power is the power consumed during the transmission of Wi-MAX frames. The transparent relays are designed to increase the capacity of a Wi-MAX cell.

ii) Operating power consumption is independent of transmission power consumption and consists of power consumed for operations such as channel listening, data reception and processing, scheduling [3], and other related activities.

C. Blocking Probability

Traffic load is an important factor to define blocking probability, the blocking probability Pbn of network n is defined by the given equation 1.1 below

$$P_{bn} = \frac{\rho_n^{N_n}(1-\rho_n)}{1-\rho_n^{N_n+1}}$$

Where ρ_n is the effective load experienced by Network n.

$$\rho_n = r_n \rho$$

and r_n is the percentage of total requests that will go to Network n.

D. APUSR (Active packet unit for received signal)

Due to congestion of the network, and the increase velocity of incoming different requests (for data and services), it is required to track the request rate. The APUSR keeps tracks the percentage of incoming request satisfied by any existing network.

APUSR is evaluated by the network as follows

$$E[A_r] = \sum_i A_{r_i} P(R_i)$$

Manuscript published on 30 November 2015.
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Where, A_{r_i} is the APSUR for region i, and is given by

$$A_{r_i} = \sum_j t_{ij} P(N_{ij})$$

Where t_{ij} is the maximum value of APUSR for network N_{ij} in region i and $P(N_{ij})$ represent the probability for network N_{ij} existing and selected by user. Finally $P(R_i)$ is the probability that a user is located in region i:

$$P(R_i) = \frac{S_i}{S_{BOUND}}$$

And $P(R_i)$ is the probability of a user located in region i.

III. SIMULATION RESULTS

A. Relationship between APUSR and Traffic load:

To describe graphically the relationship between APUSR and the traffic load for different session table 1, the current study plot the graph fig. 1 between these two parameters for four different session, here session represent the time zone which has been taken for finding the traffic load on the network.

Table 1Traffic with respect to different sessions

Sessions	Time Zone	Time Period
Session 1	Morning Hour]	6 AM to 10 AM
Session 2	Office Hour	10 AM to 6 PM
Session 3	Night Hour	6 PM to 12 AM
Session 4	Ideal Hour	12 AM to 6 AM

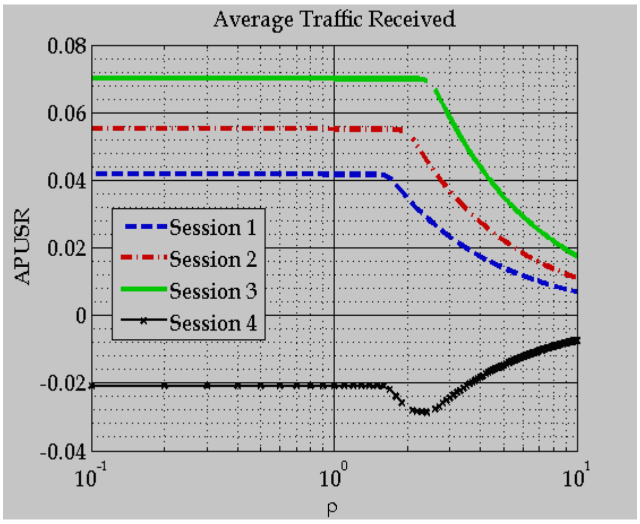

Fig 1: The graph between APUSR and traffic load (ρ)

B. Relationship between Blocking Probability and Traffic load:

Figure 2 describes the relation between blocking probability and network load/traffic. Itshows relation between these parameters for four different sessions.

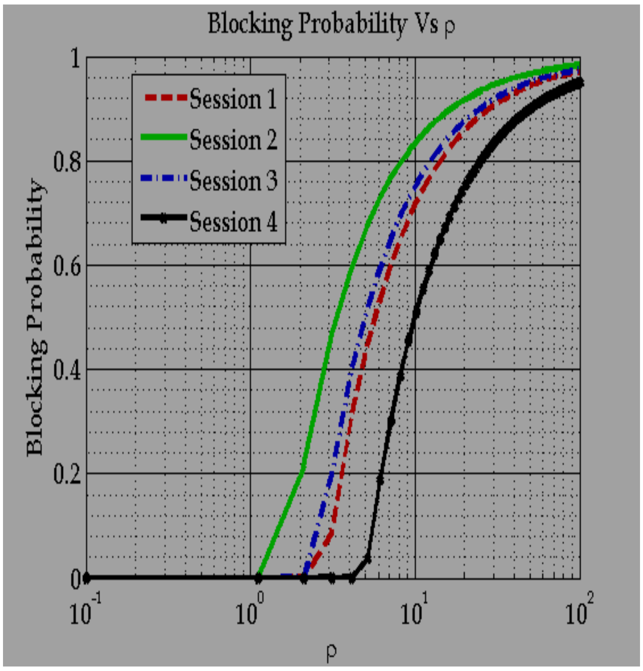

Fig 2: The graph between blocking probability and traffic load (ρ)

From the above results plotted in figure 1 and 2 it can be concluded that traffic load during 10 AM to 6 PM (during working hours) is very high. In that situation most of the subscriber's stations are active and session blocking probability is very high so there is a chance of lost packets. In this hour the power of the base station should be kept high as compared to other sessions. In the session 4 most of the subscriber's station is inactive, in this session blocking probability is less. At this time performance is good because less transmitting power is required because of fewer loads.

IV. CONCLUSION & FUTURE SCOPE

From the simulated result It can be concluded that, by setting different power profiles for different sessions it is possible to get efficient power utilization, that increase system performance in less cost. Our proposed scheme improves the performance of the Wi-MAX system in terms of power management, Wi-MAX delay and average traffic data received with respect to traffic load as compared to the existing technique. The simulation has been done in MATLAB environment giving satisfactory results. Our proposed techniques and Result has given clear idea about the performance comparison of power allocation with different sessions along with the network delay and data packet received.

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Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP)

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