A New Approach to Downlink Burst Assignment Algorithm For
WiMAX OFDMA System

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Abstract--- The WiMAX is a rapidly developing technology for broadband wireless access system. The resource allocation problem in OFDMA system is how to assign Burst to multi-users. OFDMA resource allocation algorithms manage the distribution and assignment of shared OFDMA resources among the users serviced by the base station. The OFDMA resource allocation algorithms determine which users to schedule, how to allocate subcarriers to them, and how to determine the appropriate power levels for each user on each subcarrier. It is require doing performance analysis of Burst Mapping algorithm on a WiMAX downlink OFDMA subframe structure subject to minimizing the wastage of bandwidth. Variable length Burst mapping algorithm tries to allocate burst across several subframe so that the bandwidth wastage can further be decreased.

Keywords: Burst mapping, resource allocation, WiMAX, OFDMA, Downlink Subframe

I. INTRODUCTION

A day by day mobile user is demanding increased services provided by wireless network providers for day to day activities and entertainment. This demand requires increased network performance to provide similar services provided by fixed networks. Advances in RF technology lead to an improved spectral efficiency that leads to the fusion of different 3G and 4G broadband wireless access networks such as UMTS, HSPA, CDMA2000 EVDO, WiMAX, and LTE with high data rates.

WiMAX (Worldwide Interoperability for Microwave Access) is a wireless communications standard designed to provide high-speed Internet access to home and business subscribers. WiMAX is the commercialization of the IEEE 802.16 standards; it aims to provide business and consumer wireless broadband services on the scale of the Metropolitan Area Network (MAN). In fact, WiMAX is essentially a fourth generation wireless technology that enhances broadband wireless access. WiMAX applications are engineered to deliver ubiquitous, high-throughput broadband wireless services at a low cost. The WiMAX MAC uses a scheduling algorithm for which the subscriber station needs to compete only once for initial entry into the network. After network entry is allowed, the subscriber station is allocated an access slot by the base station.

Orthogonal Frequency-Division Multiple Access (OFDMA) is based on Orthogonal Frequency-Division Multiplexing (OFDM) a transmission scheme that partitions the available bandwidth into N orthogonal narrowband subcarriers. The subcarriers are placed very close to each other, which results in high spectral efficiency. By dividing the bandwidth into N subcarriers, a data stream with high bit rate will be divided into N parallel low bit rate substreams. This results in longer symbol duration for each substream which reduces the influence of multipath propagation and fading and resolves intersymbol interference (ISI). In OFDMA, subcarriers are divided into groups of subcarriers, each group is named a subchannel, subchannel is what gets allocated to a user at a given symbol.
• DL-MAP and UL-MAP: The DL-MAP and UL-MAP provide sub-channel allocation and other control information for the DL and UL sub-frames respectively.

• Burst: In OFDMA, a data region (or burst) is a two-dimensional allocation of a group of slots, i.e. group contiguous subchannels, in a group of contiguous OFDMA symbols.

Downlink resource allocation can be done in two steps in the first step, the scheduler decides the allocation (number of slots to be allocated) to each MS (mobile station) based on demand (the number of packets to be sent to a station); capacity (total available slots); and quality of service (QoS). Thus Scheduler prioritized the demands or say traffic. In the second step the Mapping Algorithm is used and this traffic is mapped to a Burst.

II. PREVIOUS WORK

The DL Burst Assignment, is the problem of assigning the N subchannels by K slots to users with the objective of maximizing the data transmitted over a single downlink subframe and is constraint by

• The minimum unit of burst allocation is one downlink PUSC slot
• User’s allocated bursts must be rectangular,
• Data transmitted over the allocated slots must meet user’s demand
• allocated slots must be the minimum number of slots required to satisfy user’s demand a user can have a maximum of one allocation in a frame
• Based on subchannel quality, a user might not be assigned slots on subchannels with bad quality.

A. Burst Size Method

The Burst Size Method is one type of Burst Assignment Method which schedules users based on demand as below algorithm:

Where, m=user, Sm=no. of slots, dm= demand of user m, ball= bit/slot that can be achieved by all users over any subchannels, K= Total no. of Slots

In this method, if the assigned user’s demand dm requires more than one subchannel to be satisfied, there could be wasted slots in the last subchannel allocated to user m, denote this wasted slot as SWn. The wasted slots per assigned user can be calculated as

$$SW_n = K \left[ \frac{S_m}{K} \right] - \left[ \frac{dm}{ball} \right]$$

III. PROPOSE WORK

If Base Station cannot efficiently schedule and allocate bursts, bandwidth resource will be wasted in or among bursts. Then propose a Variable-Length Burst Mapping Algorithm by replacing the Burst Size Method to minimizing the bandwidth wastage. It can be considered as the allocation of bursts in the framework of DL. The allocation of rectangles of different sizes and positions in two dimensional areas, and Burst Allocation is Optimal Problem then proposes Variable Length Burst Mapping Algorithm. The Variable Length Burst Mapping Algorithm of is as shown below.

• Subchannel Construction (Conflict Free) : Solving an Optimization problem needed a high computation complexity. It is used to allocate Burst with lower computation complexity.
• LRU Allocation: The LRU allocation is performed per subframe.
• Burst Compression: allocate bursts without degrading the level of the burst profile and can be compressed to alleviate the amount of over allocated bandwidth.

IV. RESULTS AND DISCUSSION
WiMAX Network has been created with one Base Station and two Subscriber Stations using OFDMA Channel in NS3. Implemented data transmission and reception between two Subscriber Stations (SS). SS with IP address 10.1.1.2 transmits and SS with IP address 10.1.1.1 receives data. Here the location of SS with IP address 10.1.1.1 has been changed and it is located at the range out of the BS. So SS with IP address 10.1.1.1 cannot receive the data packet and transmitted packets have been lost.

V. CONCLUSION

A WiMAX network has been created which uses OFDMA channel which has been performed in network simulator 3 (NS3). The transmission and reception with OFDMA has been achieved. The subframes will be added into this OFDMA channel and Burst will be implemented using Burst Size Algorithm. A variable length burst will be implemented to reduce the wastage bandwidth and allocate the burst using Variable Length Burst Mapping Algorithm.

REFERENCES


