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Comprehensive Performance Analysis And Sleep Window Determination For Ieee 802.16 Broadband Wireless Networks

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Abstract: ***To provide energy conservation for the mobile devices. In this paper, the analytical models for sleep mode operations of both the IEEE 802:16e and IEEE 802:16m standards are proposed respectively. The effects of both downlink and uplink traffic are properly considered in the proposed models. Simulations are performed in order to validate the effectiveness of proposed system models. However, according to the performance evaluation for IEEE 802:16e/m system, inefficiency is observed which can be resulted from specific mechanisms within the sleep mode operations, such as frequent state transitions, under-utilized listening windows, and the adoption of binary-exponential growth of sleep window size. A POMDP-based sleep window determination (PSWD) approach is proposed in this paper, which stochastically determines the adequate length of each sleep window according to the traffic pattern. Based on the estimated traffic state, an energy cost-based sleep window determination policy is provided within the PSWD approach in consideration of tolerable network delays. Simulation results show that the proposed PSWD approach outperforms conventional IEEE 802:16e/m power saving mechanisms in terms of energy conservation while the delay constraints are also satisfied corresponding to various traffic demands.***

I. INTRODUCTION

The IEEE working group has developed a series of standards for wireless metropolitan area networks WMANs and next generation broadband wireless access systems. The IEEE specifies the access between a base station BS and fixed subscriber stations SSs; while movable mobile stations MSs are further supported by the IEEE , which lead to the issues of energy saving and handover. The IEEE consolidates the two standards aboveand adds additional management information. The latest standardization is the IEEE :16m which is developed to achieve the requirements for future IMTAdvanced networks with higher data rate and higher mobility. Since mobility is considered a key feature in wireless networks, how to prolong the battery lifetime of MSs has been recognized as one of the critical issues.

II. EXISTING SYSTEM:

By means of a pre-negotiation process, an MS can be absent from the air interface of its serving BS. In other words, the MS may power down several physical operation components or perform other activities that do not require communication with the BS. Three types of power-saving classes (PSCs) are defined in the sleep mode to satisfy demands for packets with different traffic patterns. The PSC of Type I with binary exponential growing sleep windows is suitable for both best-effort (BE) and non-real time variable-rate (NRT-VR) service flows. On the other hand, the quality-of-service (QoS) guaranteed services, including unsolicited grant service (UGS) and real time variable-rate (RT-VR) traffic,

The sleep mode with generalized traffic processes is analyzed in, wherein an enhanced scheme is also addressed to improve the performance of power management by adjusting the trade-off between energy consumption and packet delay. The work in intends to find the optimal sleep policy to minimize energy consumption and delay simultaneously with three types of inactive period distribution including exponential, hyper-exponential, and general distribution. From the analytical results of these studies, it can be observed that the inefficiency of comes from the configuration of sleep mode operation, e.g., the mechanism of binary-exponential traffic detection, and frequent transitions between sleep modes and normal modes.

PROPOSED SYSTEM:

Responsible for excessive energy cost during state transition, i.e., switching from sleep windows to listening windows and vice versa. It is thus motivated that a more flexible sleep mode mechanism, sleep window decision approach, should be designed which adaptively adjusts the length of sleep windows based on the traffic state.

The sleep windows decision problem under tolerable average packet delay for non-real time DL traffic, i.e., In this work, the design concept is further extended in order to fulfill all traffic patterns and power saving types in, including both. Furthermore, both DL and UL traffic are also considered during the selection of sleep window sizes.

MODULE DESCRIPTION:

IEEE 802.16E

In order to reveal the novelty of proposed analytical model for sleep mode, Table 1 is utilized to illustrate the comparison between different models from various perspectives. Note that most existing works focused on deriving analytical models for IEEE 802.16e system; while less amount of works were on the most recent IEEE 802.16m standard. On the other hand, the models for DL transmission and sleep mode have been widely developed, however, only a few researches focused on the UL transmission and mixed normal sleep mode operations.

SLEEP MODE OPERATION

The rest of this paper is organized as follows. Section 2 briefly introduces and compares the IEEE 802:16e and IEEE 802:16m sleep mode operations. The proposed analytical models for these two standards are described in Section 3; while the performance analysis of the models are investigated in Section 4. The detailed procedures of proposed PSWD approach are described in Section 5. Section 6 validates the effectiveness of the two analytical models and conducts the performance evaluation of proposed PSWD method. Section 7 draws the conclusion.

PERFORMANCE ANALYSIS

There are several works focused on the performance analysis and modeling of the IEEE 802:16e sleep modeoperation. Xiao and Zhang set up analytical models for the sleep mode with the Poisson arrival process and the hyper Erlang distribution, respectively. A traffic model with mixture exponential distribution is

utilized by J. Almhana et al. to approximate packets inter-arrival times, which possess the characteristics of heavy tailed distributions. The work in and apply an M G 1 model with multiple vacations and with traffic correlation respectively to achieve energy efficiency while satisfying delay requirement. Y. Park et al. models the system by an M G 1 K finite queue with multiple server vacations in . Moreover, the research proposed in fully considers the mixed effect from both downlink DL uplink UL traffic and multiple connections between an MS and its serving BS in the IEEE 802:16e power saving operation.

PARTIALLY OBSERVABLE MARKOV DECISION PROCESS

Nevertheless, inefficiency can still be observed from the existing sleep mode operation in IEEE 802:16m system which can be improved accordingly. A partially observable Markov decision process POMDP model is suitable for the purpose of conjecturing unobservable present traffic state. Therefore, in this paper, a POMDPbased sleep window determination PSWD approach is proposed in order to improve the performance of energy conservation in the IEEE 802:16m systems. Based on the present traffic state with consideration of tolerable delay, the proposed PSWD approach determines the appropriate length

of each sleep indow. In accordance with the rewards calculated via POMDP formulation, an energy cost-based sleep window determination policy can be acquired.

III. PROPOSED SYSTEM:

Responsible for excessive energy cost during state transition, i.e., switching from sleep windows to listening windows and vice versa. It is thus motivated that a more flexible sleep mode mechanism, sleep window decision approach, should be designed which adaptively adjusts the length of sleep windows based on the traffic state.

The sleep windows decision problem under tolerable average packet delay for non-real time DL traffic, i.e., In this work, the design concept is further extended in order to fulfill all traffic patterns and power saving types in, including both. Furthermore, both DL and UL traffic are also considered during the selection of sleep window sizes.

IV. CONCLUSION

In this paper, two comprehensive analytical system models are proposed according to the sleep mode operations of Type I Type II for the IEEE 802 16e and the IEEE 802 16m broadband wireless networks respectively. Both the downlink and uplink traffic are considered simultaneously, with sleep ratio and mean packet delay as the measures for performance analysis. The effectiveness of analytical models are validated through numerical simulations. Furthermore, a POMDP based sleep window determination PSWD approach for improving the performance of sleep mode operation of IEEE 802 16m is presented. The PSWD approach obtains the length of each sleep window based on the rewards calculated by means of a POMDP model, which speculates the present traffic state via the concept of belief states at each decision epoch. The efficiency of PSWD approach is evaluated by simulations in terms of energy cost and mean packet delay with the consideration of tolerable delay. Simulations show that proposed PSWD scheme outperforms.

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