

## **An optimized energy saving mechanism in IEEE 802.16e mobile WiMAX systems**

### **ABSTRACT**

The IEEE 802.16e standard defines a sleep mode operation for conserving power to support the battery life of mobile broadband wireless access (BWA) devices. The system saves energy when it goes through a sleep period with some delay in packet arrival response time. The relationship between energy consumption and the delay is studied to ensure best performance for mobile devices. This relationship has been analyzed by using a mathematical model. A new scheduling method is proposed to adjust the sleep cycle periods by adding a small increase to the next sleep cycle compared with the previous cycle instead of just simply doubling the previous cycle. The simulated results were obtained after adjusting the length of the first sleep cycle period ( $T_{min}$ ). Adjusting  $T_{min}$  provides a result of 54% reduction in the time needed for every frame to get a response especially in a lower traffic region. In a high traffic region, a reduction of 21.5% has been obtained in energy consumption for each sleep mode operation. Therefore, the proposed idea confirms a faster frame response time at lower energy consumption.

**Keyword:** Energy consumption; Frame response time; IEEE 802.16e; Sleep mode; WiMAX