

University of Mosul
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**Power Consumption Analysis of
Wi-Fi Access Point and Practical
Strategies for Green Networking
Concept Deployment**

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Abstract

The concept of green networks has become the focus of so much attention by researchers in recent years. Researchers have made efforts in network design with energy efficiency in addition to the use of environmentally friendly green sources energy to run computer networks. The overview of Wi-Fi Networks shows that the most of 802.11 standards are designed to serve all user requests such as speed performance and do not define how power consumption should be minimized.

This thesis addresses the problem of energy consumption in Wi-Fi technologies and explores the possibility of using “Green Networks” for Wi-Fi deployment in isolated rural areas which probably lack a main electric power grid. Hence, this study tends to integrate an experimentally-driven power consumption analysis with a solar energy unit designed for different 802.11 technologies (i.e. 802,11a/b/g) in the wireless access point. A backhaul wireless repeater is chosen as a case study and the design is based on real-world traffic, workload and meteorological weather data.

The summary results of the study show that 802.11b can be run with a smaller size solar energy unit. Although 802.11a has the best performance; it needs larger solar energy unit. Our measurements show that the best solution for proposed study case can be obtained using the 802.11g which has an optimal compromise solution between throughput and power consumption.

In addition, this study proposes two new methods to manage and save the energy for a solar powered wireless access point (AP): - The first method is defined as the Equitable Battery Division (EBD) that provides an equitable distribution of battery energy for each of the station associated with the (AP) during a night. The (EBD) works especially on

the days where the battery energy is not enough to operate the wireless (AP) during night hours thus avoiding system downtime. The second method is to prolong battery discharging time by controlling the transmitted data speed through the wireless Access Point. This method has been verified through laboratory experiments that gave a clear idea of battery efficiency and the effect of changing the speed of data transfer on battery discharging time.