

# **Energy-Efficient Communications System Design Based on The Characteristics of User Behaviors**

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The widespread requirement of wide-band multimedia communication has leading to rapidly rising energy consumption. In recent years green communications have attracted more and more attentions from operators, governments, equipment manufacturers, academia, etc. The traditional communications protocol design and development in wireless networks is on the purpose of maximization of the performance observed by the end-users, in terms of perceived throughput, delay, Quality of Service (QoS), etc. However, this trend does not consider the power consumed by wireless devices and networks (especially the radio access network which is the major source of energy consumed) which creates a gap between the energy a wireless network needs to operate and the battery capacity of the wireless devices. Hence, the requirement of Energy-Efficiency appears as an extremely important property of new protocols for wireless networks with battery-powered mobile nodes.

The characteristics of broadcasting nature of wireless networks are very important for the energy-efficient design for wireless communication systems. When the bandwidth and data rate for new generation wireless system become larger and wider, more best-effort traffics or delay-tolerant services appear to be popular. One of the features of this kind of traffics is that such traffic can tolerate a certain delay provided that the delay not exceeding the target QoS requirement. On the other hand, due to social nature of human-being, users close in vicinity will have similar habits and mobility rules. For a given geographical area and a certain time period, a group users/subscribers will probably request the same traffics, thus the system can uniformly transmit the traffic to all the users through multicasting instead of unicasting and more energy will be saved.

In this paper, we study the users behaviors which characterizes the general behavior and rules of a group of users, for example, user requirements, user traffics fluctuations (in both space and time domains), users mobility, etc. Based on the traffics characteristics, the pattern or behavior of users or subscribers of the network will be analyzed and studied. In details we study the users/subscribers behavior from a group users' perspective. This is because that compared to single user character the group users' behavior can more be easily utilized in the network design, optimization and configurations.