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# Using CSI In Multiple Access Channels By Exploiting Packet Dropping and Transmitter Buffering

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***Abstract-****Wireless Adhoc Network is a temporary network that consists of individual devices which can communicate with each other without any help from infrastructure. Nodes in the network can communicate by using multi hop transmission. This work focuses on modeling and analyzing the effects of packet buffering capabilities of the transmitter on the system energy for a packet loss tolerant application. We discuss low complexity schemes which show comparable performance to the proposed scheme. And also improve the performance of network life time, and reduce the packet loss.Using CSI techniques improve the channel allocation and a scheduling scheme which takes into ACD account channel distribution, packet loss characteristics and maximum delay limitations for a packet.*

***Keywords:****CSI, ACD,WSN*

## I. INTRODUCTION

Wireless Sensor Networks (WSNs) are composed of a large number of sensor nodes deployed in a field. They have wide-ranging applications, some of which include military [1]–[3], environment monitoring [4], [5], agriculture [6], [7],home automation [8], smart transportation [9], [10], and health[11]. Each sensor node has the capability to collect and process data, and to forward any sensed data back to one or more sink nodes via their wireless transceiver in a multihop manner. In addition, it is equipped with a battery, which may be difficult or impractical to replace, given the number of sensor nodes and deployed environment. These constraints have led to intensive research efforts on designing energy-efficient protocols [12].In multihop communications, nodes that are near a sink tend to become congested as they are responsible for forwarding data from nodes that are farther away. Thus, the closer a sensor node is to a sink, the faster its battery runs out, whereas those farther away may maintain more than 90% of their initial energy[13]. This leads to non uniform depletion of energy, which results in network partition due to the formation of energy holes [14], [15]. As a result, the sink becomes disconnected from other nodes, thereby impairing the WSN. Hence, balancing the energy consumption of sensor nodes to prevent energy holes is a critical issue in WSNs. The QoS parameters like throughput, latency, packet loss rate etc., characterize the behavior of network traffic. Specifically, there are some strict hard requirements in terms of worst case behavior for multimedia traffic like minimum throughput and maximum tolerable packet delay, which need to be fulfilled to maintain the quality of experience (QoE) of the application. At the same time, system energy efficiency has emerged as one of the key performance indicators for the wireless network [2]–[4]. For the system design, QoS parameters can be treated as degrees of freedom (DoF) to achieve high system level energy efficiency. If the application is loss and delay tolerant, the DoFs can be exploited to maximize the system energy efficiency.

We allow buffering at transmitter side which allows multi-packet scheduling as compared to a single packet scheduling in [13]. The buffering effect to exploit channel diversity has been well studied in literature, but average and successive packet (bursty) loss constraints have not been investigated simultaneously over fading channels for the buffering system. The modeling of successive packet loss constraint requires not only to decide how many(average) packets need to be transmitted, but which of them are more significant with respect to QoE. We propose a novel scheduling scheme which takes into account channel distribution, packet loss characteristics and maximum delay limitations for a packet. This generalized framework is more complex due to involvement of an additional DoF, but provides better results in terms of energy efficiency as demonstrated through asymptotic case analysis and numerical evaluation.

We investigate and quantify the effect of buffer size on system energy mathematically and characterize the dominating regions for each system parameter (e.g., buffer size, θtar, N ) in terms of energy efficiency. We show that increasing buffer size indefinitely does not help to increase energy efficiency of the system for a fixed N and θ tar . The complexity of the proposed scheme is quite high for large buffer size. Therefore, we propose and analyze the low complexity solutions. The energy loss due to sub-optimality is evaluated numerically, which reveals the interesting result that the optimal and low complexity schemes show comparable energy performance.

In this paper, we investigate Event-to-sink Reliable Algorithm for the binary hypothesis detection problem over WSN. We focus on distributed protocols that exploit local CSI and local observations, without sharing CSI and observations between sensors. Our goal is to decide in a distributed fashion, based on local CSI and local informative observations, which set of sensors should transmit during each data collection so as to minimize the total transmission energy until the optimal decision regarding the binary hypothesis testing problem is made. To achieve our goal, we formulate the access problem as a history-dependent decision process. Obtaining the optimal solution to this control problem is mathematically intractable and the complexity is high. Hence, we propose improving the packet dropping and transmitting buffering .A scheduling scheme which takes into account channel distribution, packet loss characteristics and maximum delay limitations for a packet. To using CSI technique decreases the packet loss and energy consumption. And also improve the sensors network lifetime.

## II. RELATED WORKS

In the literature, energy efficient scheduling has been discussed in different settings for delay limited systems [5]–[8].The authors in [9] propose a scheme which schedules the transmission of multimedia packets in such a way that all the users have a fair share of packet loss according to their QoS requirements, and maximizes the number of the served users under the QoS constraints. The author in [10] addresses the importance of packet dropping mechanisms by energy point of view. Traditionally, average packet drop rate is considered to be one of the most important parameters for system design [11], [12]. However, QoE for the application, specifically multimedia streaming depends on the other characteristics of packet dropping. Average packet drop parameter characterizes the behavior of the application on long term basis only. In multimedia applications, short term behavior dictates the QoE. For example, consider a scenario where the average packet drop rate θ tar is quite small but a large number of packets are dropped successively due to the deeply faded wireless channel (called bursty packet loss). In spite of fulfilling an average packet drop rate guarantee (on long term basis), the users will experience a jitter in the perceived QoE (for a multimedia application). Thus, QoS must also be defined in terms of maximum number of packets allowed to be dropped successively in addition to the average packet drop probability.

This additional parameter characterizing the pattern of the dropped packets is termed continuity constraint parameter N [13]. Packet scheduling constrained by average packet drop rate and maximum successive packet drop belongs to a class of sequential resource allocation problems, known as Restless Multi armed Bandit Processes (RMBPs) [14]. This problem has been addressed for Asynchronous Transfer Mode (ATM) networks in [15]. The authors in [16] discuss a similar problem and an optimal dropping scheme with the objective to minimize/maximize the packet drop gap is proposed. A useful analytical framework is discussed in [17] to dimension the packet loss burstiness over generic wireless channels and a new metric to characterize the packet loss burstiness is proposed.

## III.SYSTEM MODEL

A constant arrival of a single packet with normalized size is assumed for simplicity. However, the scheme is not restricted to this assumption as a random packet arrival process can be modeled as a constant arrival process where multiple arrived packets in the same time slot are merged as a single packet with random packet size following the framework in[6], [13]. The packet arrival occurs at the start of a time slot and the scheduling is performed afterwards taking into account the newly queued packet. All the arriving packets are queued sequentially, i.e., the oldest arrived packet .If a single packet has to be scheduled or dropped, it has to be the HOL packet. Note that successive packet drop constraint inspires us to buffer and drop the packets sequentially (as compared to any random queuing strategy) because it is essential to maintain a sequence of the packets in the transmitter buffer. The newly arrived packet is the pointer to indicate how essential it is to transmit or drop a packet in relation to successive packet drop constraint while the scheduling of the other buffered packets is essential to maintain a cerate in average packet drop rate.

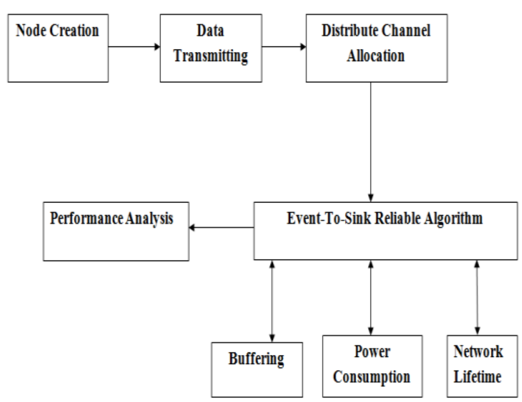


**Figure 1,packet sending,transmitting and node creation.**

### A. NODE CREATION

In a network, a node is a connection point, either a redistribution point or an end point for data transmissions. In general, a node has programmed or engineered capability to recognize and process or forward transmissions to other nodes. Number of nodes is fixed in the program. Nodes are configured with specific parameters of a mobile wireless node. After creating the nam file and trace file, we set up topography object.

## B. DATA TRANSMITTING

Data transmitted may be digital messages originating from a data source, for example a computer or a keyboard. It may also be an analog signal such as a phone call or a video signal, digitized into a bit-stream for example using pulse-code modulation (PCM) or more advanced source coding (analog-to-digital conversion and data compression) schemes. This source coding and decoding is carried out by codec equipment.

## C. BUFFERING

The data is stored in a buffer as it is retrieved from an input device (such as a microphone) or just before it is sent to an output device (such as speakers). However, a buffer may be used when moving data between processes within a computer. Buffers can be implemented in a fixed memory location in hardware or by using a virtual data buffer in software, pointing at a location in the physical memory. In all cases, the data stored in a data buffer are stored on a physical storage medium. A majority of buffers are implemented in software, which typically use the faster RAM to store temporary data, due to the much faster access time compared with hard disk drives. In this section, we characterize the effect of buffer size on system energy. For a fixed N, an increase in buffer size B causes increase in quantization levels for (per state) fading vector. Larger the quantization levels, the better the use of fading to improve energy consumption in our scheduling scheme. Technically, larger the buffer size, the more is the waiting time for a specific packet to wait for an optimal timeslot to get scheduled. This result follows directly from the finite horizon optimal stopping theory.

## D. DISTRIBUTE CHANNEL ALLOCATION

In radio resource management for wireless and cellular networks, **channel allocation** schemes allocate bandwidth and communication channels to base stations, access points and terminal equipment. The objective is to achieve maximum system spectral efficiency in bit/s/Hz/site by means of frequency reuse, but still assure a certain grade of service by avoiding co-channel interference and adjacent channel interference among nearby cells or networks that share the bandwidth.

## E. SIMULATED ANNEALING ALGORTHIM

Simulated annealing (SA) is a probabilistic technique for approximating the buffering the data optimum of a given function. The difference between the two systems emerges from the fact that a proportion of the packets for a buffering system is scheduled before reaching state .The increased energy efficiency in the system with buffering is due to the packets .

Optimal schemes share one property that scheduling of at least one packet per state must be facilitated to maximize the satisfaction continuity constraint before reaching.

## F. SIMULATION RESULT

The computational complexity of the scheme depends on the number of quantization levels (thresholds) per state which in turn depend on buffer size. In practice, the buffer size is of the order of a few tens to hundreds. In this case, the scheduler presented in our work results in computational complexity (for the thresholds) of the order O(MB) and in the case B >> N , it becomes O(B2). In the following, we 4Please note that we avoid using term optimal as the solution of the scheme presented cannot be proven optimal in the mathematical sense. To differentiate this scheme with low complexity schemes, we term the scheme as in the subsequent propose suboptimal schedulers which reduce the complexity at the marginal energy loss. These schedulers exploit non-uniform distribution of transition probabilities in the original optimal scheme. For every state p, the original scheduling scheme is based on the idea of allowing scheduling of multiple packets for opportunistic use of good channels. However, the computational complexity can greatly be reduced by merging some of the transition probabilities in a smart way. All the suboptimal schemes share one property that scheduling of at least one packet per state must be facilitated to maximize the satisfaction of continuity constraint before reaching M Th state. Note that the forced transmission in Mth time slot results in large energy expenditure.

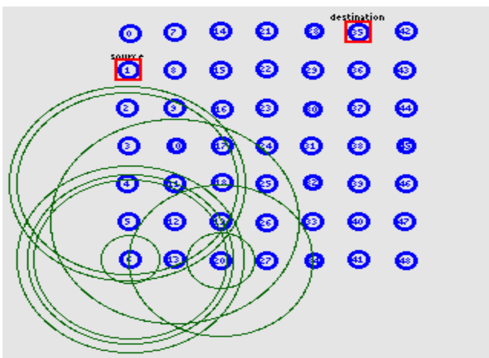


**Figure 2,** Data transmitting source to desination.

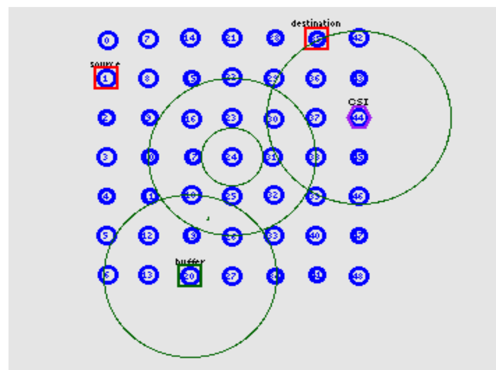


**Figure 3,** Data transmittimg Buffer to CSI.

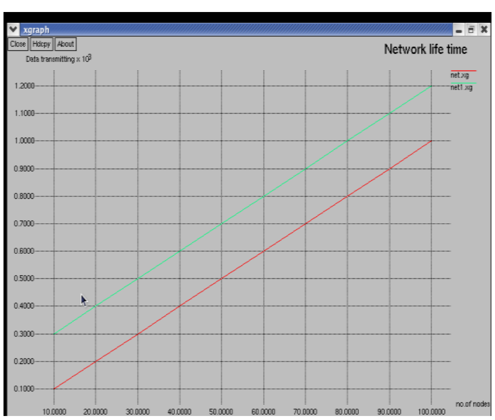


**Figure 4,** Network life time.

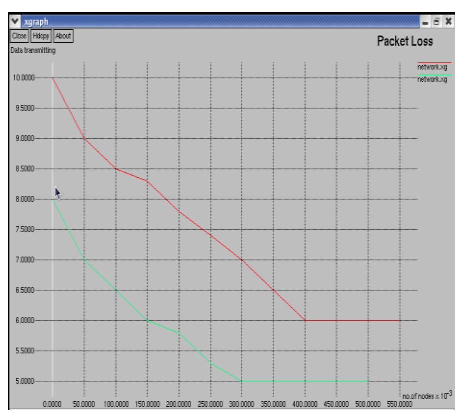


**Figure 5,** Packet loss.

The system energy as a function of average packet dropping probability and buffer size parameters for a fixed N. The values for have been pointed with elliptical shapes for every curve.

State transition diagrams for different buffer size and continuity constraint parameters. The green colored states represent the buffering states while red state is the Mth state. The superscript notation with transition probabilities depict the actions associated with the transitions.

## IV. DICUSSION

A scheduling scheme which takes into account channel distribution, packet loss characteristics and maximum delay limitations for a packet. To using CSI techniques decrease the packet loss and energy consumption. And also improve the sensors network lifetime.

The study reveals that system energy is influenced by different parameters in different operating regions and it is important to quantify the effect of each parameter to opportunistically make use of the channel for energy efficient system design. Improving the packet dropping and transmitting buffering .A scheduling scheme which takes into account channel distribution, packet loss characteristics and maximum delay limitations for a packet. To using CSI technique decreases the packet loss and energy consumption. And also improve the sensors network lifetime.

## V. CONCLUSION

We proposed a packet scheduling scheme and analyze it using MDP under large user limit. As the formulated optimization problem is non-convex for a multiuser system, the heuristic solution is presented. We also propose suboptimal low complexity schemes which show negligible energy loss as compared to the proposed"Best" scheme. The numerical results evaluate trade-offs between the system energy and QoS parameters. The study reveals that system energy is influenced by different parameters in different operating regions and it is important to quantify the effect of each parameter to opportunistically make use of the channel for energy efficient system design. Improving the packet dropping and transmitting buffering .A scheduling scheme which takes into account channel distribution, packet loss characteristics and maximum delay limitations for a packet. To using CSI technique decreases the packet loss and energy consumption. And also improve the sensors network lifetime.

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