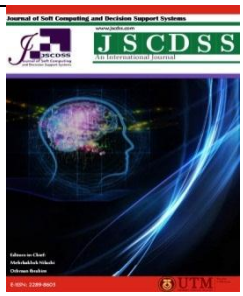
An International Journal
JSCDSS
http://www.jscdss.com
Vol.4 No.1 February 2017: 1-6
Article history:
Accepted 16 January 2017
Published online 17 January 2017

Journal of Soft Computing and Decision Support Systems



E-ISSN: 2289-8603

# A Congestion-Aware Routing Algorithms Based on Traffic Priority in Wireless Sensor Networks

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**Abstract**

Wireless sensor network allow the network manager to measure the observed events in a short radio range and give them an appropriate response. In many applications of wireless sensor network, due to the high volume of traffic, probability of congestion and packet loss increases. Congestion in sensor networks has a direct effect on energy efficiency and quality of service applications. Congestion may cause a buffer overflow, longer queuing time and higher packet loss. Packet loss not only reduces the reliability and quality of service application but also wastes energy. In this paper, a scheme for controlling congestion in wireless sensor network is proposed. The aim of the proposed method is to reduce congestion by considering the priority of data. In the proposed algorithm, according to the data priority, the packets will be classified. According to type of packet, traffic is redirected to control congestion in the network. Finally, the proposed algorithm is simulated and the result shows that the proposed algorithm improves the number of packet loss, energy consumption and average buffer size rather than the similar algorithm.

Keywords: Wireless Sensor Networks, Congestion Control, Traffic Prioritization, Routing.

## 1. Introduction

Romer and Mattern (2004) applied Wireless Sensor Networks (WSNs) for wireless networks consisting of distributed autonomous nodes to analyse physical or information of environmental such as temperature, pressure, sound, weather, and motion among others at different locations. Cerpa et al. 2001) presented a various range of sensors in civilian areas such as habitat observation. Schwiebert et al. (2001) presented for healthcare applications based on this WSNs (Kung and Vlah, 2003) and introduced object tracking for this model based on WSNs. Recently, the problem of congestion control and avoidance has been presented for attracted a lot of attention. Hence, many researchers presented the need of congestion control in WSNs. Researchers presented argue on this issue and provide numerical results, while a number of other documents like analyse and provide specific solutions on this problem (Sergiou and Vassiliou, 2013) (Sergiou, 2013) and (Antoniou and Αντωνίου, 2012). In many applications of WSNs, due to the high volume of traffic, congestion and packet loss probability increases.

Two important factors in WSNs are buffer overflow and link congestion. Buffer overflow occurs when the packet arrival rate increases more than packet service rate which occur in nodes near the sink (Sergiou, Antoniou et al., 2014). And link congestion, such as competition, interference and bit error that this type of congestion occurs on the link.

A node in a WSN is a small embedded computing device that interfaces with sensors/actuators and communicates using short-range wireless transmitters. Such nodes work autonomously but this working to form a logical network in which data packets are routed hop-by-hop towards management nodes, generally called sinks or base stations. Sensors typically work under light load and suddenly become active in response to a detected or monitored event. In many applications, this can conclude in the generation of large, sudden, and correlated impulses of data that must be delivered to a small number of sinks without significantly disrupting the performance of the sensing application. This high generation rate of data packets is usually uncontrolled and often leads to congestion. In this state, collisions occur in the medium or in case of existence of an effective Medium Access Control (MAC) protocol, the node buffers overflow (Woo and Culler, 2001), resulting in random drops of data packets and increased delay. Dropped packets are a major handicap for these networks since they result in severe energy consumption (Wan et al. 2003). In the case that no countermeasures are taken, the power of congested nodes can be exhausted leading to the creation of routing “holes” in the network.

Mechanism of Congestion control is carried out in three sequential phases: congestion detection, notification and