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A New Algorithm to Improve the QOS of MANET Network in Media Access Layer

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Abstract

In this paper, the IEEE 802.11 standard DCF algorithm is used in the media access layer to improve the quality of service features including latency, delay and vibration delays. The characteristics examined for service quality vary according to the application of the contingency network. As a result, various applications have been introduced to improve service quality. In general, the DCF algorithm is divided into two subsets called the base DCF algorithm and the DCF algorithm with the sending of RTS / CTS packets. Then, to investigate and demonstrate the ability of the proposed High Quality Performance of Traffic Based Adaptive (HQPTBA) and High Quality Size Based Adaptive (HQSBA) algorithms to improve the quality of service, NS2 software was used to compare delay characteristics, network latency, and delay vibration. The results of the comparison show that due to the greater flexibility of the proposed algorithms as well as the separation of packets by size, the HQSBA algorithm has improved service quality characteristics compared to other previous methods.

Keywords: MANET, QOS, Throughput, Latency, Network.

1. Introduction

The significant development of wireless networks, and the expansion of equipment, such as portable computers, PDAs, cellular phones, as well as military applications of the wireless network, have led to Mobile Ad Hoc networks, especially mobile distributed networks, or MANET as one of the main and most widely used telecommunications networks. As the advantages of these networks, the ability to quickly and easily deploy networks in military environments or areas that suffer from natural disasters such as earthquakes can be mentioned. These types of networks do not require the deployment of complex infrastructures and the use of Base Station to control network traffic like the rest of WLAN networks, therefore the complexity and cost of installing this kind of network is reduced (Mo et al., 2008).This feature has led to the widespread use of MANET networks in wireless sensor networks. In these types of networks, nodes can move freely and communicate with other nodes in their radio range through a common channel to exchange data. As far as the radio range of these nodes is limited, communication requires multi-hop routing algorithms (De Rango et al., 2014; Fan et al., 2014). As mentioned, MANET networks lack infrastructure results in several problems, such as network variable matching, inaccurate information related to the node status, the absence of base station for controlling the remaining nodes and network traffic, the tendency to error in the common channel, the problem of hidden and exposed terminals, limited availability of resources, and low channel security. The pre-mentioned problems in the MANET network will reduce network throughput, and increase characteristics such as end-to-end latency and jitter. Improving these issues is known as improving service quality. The characteristics of the service quality are different in relation to the application of wireless networks. These characteristics include bandwidth, jitter, and latency in audio/video applications, or security in military applications. The existence of route in emergency applications or searches is considered as one of the key features of this type of applications, and also in applications such as wireless communication in wireless network sensors, the minimum energy consumption is an important feature of service quality (Zhong et al., 2014; Syed et al., 2015).

Since the IEEE 802.11 standard is one of the common standards in wireless networks, this article focuses on the implementation of quality of service in the IEEE 802.11