



## **ANALYSIS OF MULTI-CHANNEL TWO-DIMENSIONAL PROBABILITY CSMA ADHOC NETWORK PROTOCOL BASED THREE-WAY HANDSHAKE MECHANISM**

Yifan Zhao<sup>1</sup>, Hongwei Ding<sup>1</sup> \*, Yingying Guo<sup>1,2</sup>, Jing Nan<sup>3</sup>, Shengjie Zhou<sup>1</sup>, Shaowen Yao<sup>1</sup>, Qianlin Liu<sup>1</sup>

<sup>1</sup> School of Information, Yunnan University, Kunming, China

<sup>2</sup> Yunnan Radio Monitoring Station of State Radio Monitoring Center, Kunming, China

<sup>3</sup> Xianyang, Branch of China Mobile Communication Co.Ltd, Shanxi, China

\*Emails: dhw1964@163.com

---

*Submitted: Oct. 16, 2016*

*Accepted: Jan. 31, 2017*

*Published: Mar. 1, 2017*

---

*Abstract- In wireless Ad Hoc networks, large number and flexible mobility of terminals lead to the rarity of wireless channel resources. Also the hidden and exposed terminal problem exists in the Ad Hoc network which is the major factors restricting its development and applying. Considering these factors, this paper proposes a new CSMA protocol: multi-channel two-dimensional probability CSMA for wireless Ad Hoc network protocol based on three-way handshake mechanism, and analyzes the system throughput, delay of information packet, energy consumption and other properties under the control of the proposed protocol. By using the cycle analysis method, computer simulation results not only verify the theoretical analysis, but also show that the protocol has the optimum performance. The proposed protocol can not only reduce the collision probability of information packets to some extent, improving the channel utilization, reducing the waste of channel resources, but also achieve the balancing of load in a variety of wireless Ad Hoc network services, meeting the needs by different priorities with different QoS, and ensuring the systematic efficiency and fairness.*

**Index terms:** Two-dimensional CSMA, multi-channel, three-way handshake, throughput, QoS.