

# 以NS2模擬具DSDV的802.11系統效能之最佳參數

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## 摘要

由於近年來無線網路的蓬勃發展，而IEEE 802.11就是目前最熱門的無線網路技術知識，IEEE 802.11定義了兩種運動模式Ad-hoc及Infrastructure。而無線網路最大的問題就在於傳送時易受干擾，猶如地域特徵、霧及人為障礙均會使視線距離(LOS: line of sight)的連接變得極為困難。因此，兩個不在LOS的使用者，其想要互相傳遞或交換訊息則必需藉由多重跳躍分封信文來加以完成，也就是使用Ad-hoc。在這篇文章我們所使用的DSDV(Destination-Sequenced Distance Vector)就是屬於Ad-hoc中的一種系統，所以本篇文章主要探討具DSDV的IEEE 802.11系統的無線區域網路，在模擬中我們試著討論各種參數對Packet Delivery Ratio、Drop與delay time的影響。

關鍵詞: Ad-hoc; DSDV; 802.11

## 目錄

|                          |     |                             |     |                            |    |
|--------------------------|-----|-----------------------------|-----|----------------------------|----|
| 目錄 封面內頁 簽名頁 授權書.....     | iii | 中文摘要.....                   | iv  | 英文摘要.....                  |    |
| v 誌謝.....                | vi  | 目錄.....                     | vii | 圖目錄.....                   | x  |
| 表目錄.....                 | xii | 第一章 緒論.....                 | 1   | 1.1 研究背景.....              | 2  |
| 1.2 研究動機.....            | 3   | 1.3 研究目的.....               | 3   | 1.4 研究方法.....              | 4  |
| 1.5 論文架構.....            | 5   | 第二章 IEEE 802.11.....        | 7   | 2.1 IEEE 802.11 PHY.....   | 7  |
| 2.1.1 PLCP.....          | 8   | 2.1.2 PMD.....              | 11  | 2.2 IEEE 802.11 MAC子層..... | 11 |
| 2.2.1 DCF.....           | 11  | 2.2.1.1 DCF之RTS/CTS.....    | 12  | 2.2.2 內部訊框間距.....          | 14 |
| 2.2.2.1 SIFS.....        | 15  | 2.2.2.2 PIFS.....           | 15  | 2.2.2.3 DIFS.....          | 15 |
| 2.2.2.4 EIFS.....        | 16  | 2.2.3 PCF.....              | 17  | 2.2.3.1 無競爭下的媒介使用權.....    | 19 |
| 2.2.3.2 輪詢機制.....        | 19  | 2.2.3.3 無競爭區間內部訊框的使用格式..... | 20  | 2.2.4 無競爭區間的長度.....        | 22 |
| 2.2.4.1 CF-End訊框格式.....  | 23  | 2.2.5 DCF的競爭存取.....         | 24  | 第三章 Ad-hoc.....            | 27 |
| 3.1 Ad-hoc網路特性.....      | 28  | 3.1.1 Ad-hoc路由技術總覽.....     | 30  | 3.2 DSDV基本原理.....          | 30 |
| 3.2.1 DSDV的路由通知.....     | 31  | 3.2.2 拓撲改變時的回應.....         | 32  | 3.2.3 路由選擇要素.....          | 34 |
| 3.2.4 DSDV的運作.....       | 35  | 第四章 模擬.....                 | 39  | 4.1 模擬方法.....              | 39 |
| 4.2 模擬結果.....            | 40  | 第五章 結論.....                 | 51  | 參考文獻.....                  | 52 |
| 附錄A IEEE 802.11訊框格式..... | 55  | A.1 訊框格式.....               | 55  | A.2 控制訊框.....              | 60 |
| A.3 資料訊框.....            | 62  | A.4 管理訊框.....               | 63  | A.4.1 探詢信號之訊框本體.....       | 63 |

## 參考文獻

- [1]. IEEE Std 802.11-1997 Information Technology- telecommunications And Information exchange Between Systems-Local And Metropolitan Area Networks-specific Requirements-part 11: Wireless Lan Medium Access Control (MAC) And Physical Layer (PHY) Specifications [2]. Frederico Cali, Marco Conti, and Znrco Gregori, " Dynamic Tuning of the IEEE 802.11 Protocol to Achieve a Theoretical Throughput Limit ", IEEE/ACM Transactions on Networking, Vol. 8, No. 6, pp. 785-799, December 2000.
- [3]. Frederico Cali, Marco Conti, and Znrco Gregori, " IEEE 802.11 Protocol Design and Performance Evaluation of an Adaptive Backoff Mechanism ", IEEE Journal on Selected Areas in Communications, Vol. 18, No. 9, pp. 1774-1786, September, 2000.
- [4]. J.F. Kuros, M. Schwartz, and Y. Yemini, " Multiple Access Protocols and Time Constraint Communications ", ACM Computing Surveys, Vol. 16, pp. 43-70, 1984.
- [5]. J.H. Kim, and J.K. Lee, " Throughput and Packet Delay Analysis of IEEE 802.11 MAC Protocols for Wireless LANs ", Proc. MDMC ' 96, Seoul, Korea, pp. 530-535, 1996.
- [6]. M. Nor, and J. Semarak, " Performance of CSMA-CA MAC Protocol for Distributed Radio Local Area Network ", in Proc. IEEE PIMRC ' 95, pp. 912-916, September, pp. 27-29, 1995.
- [7]. 唐政編著, 802.11無線網路通訊協定與應用, 文魁資訊股份有限公司 August 2004.
- [8]. 柯志亨、程榮祥、謝錫?、黃文祥編著, 計算機網路實驗, 學貫行銷股份有限公司 June 2005.

- [9]. <http://personales.upv.es/pmanzoni/pubs/docs/ISCC2001.pdf> [10]. 戴江淮著，行動路由技術，博碩文化股份有限公司 February 2005
- [11]. L. Buttyan and J.P. Hubaux, "Stimulating cooperation in self-organizing mobile ad hoc networks," ACM Journal for Mobile Networks (MONET), Vol. 8, No. 5, Oct. 2003.
- [12]. Sampo Naski, "Performance of Ad hoc Routing Protocols: Characteristics and Comparison", Computer Communications and Networks, pp. 547-554, 2001.
- [13]. Kevin Fall, and Kannan Varadhan, The ns Manual (formerly ns Notes and Documentation), November 1, 2006.
- [14]. Savyasachi Samal, Mobility Pattern Aware Routing in Mobile Ad Hoc Networks, Master Thesis, Blacksburg, Virginia, May 2003.
- [15]. Charles E. Perkins, Ad Hoc Networking, Addison-Wesley, 2001.
- [16]. J. W. Dai, Chan-Chin Tai, and Lin-Fon Chjan, "The System performance of Modified CSMA Communication Protocol without Capture Effect", The fifth symposium on computer and communication technology, pp. 3C.14-17, October 6, 2000.
- [17]. J.W. Dai, and C.C. Tai, "Capture effect on modified CSMA protocol (MCSMA)", Journal of Communications and Networks, Vol. 1, No. 1, pp. 31-41, March 1999.
- [18]. Giuseppe Bianchi, Luigi Fratta, Matteo Oliveri, "Performance Evaluation and Enhancement of the CSMA/CA MAC Protocol for 802.11 Wireless LANs", Proceeding IEEE, pp. 392-396, 1996.