提供單節點故障保護之多播傳輸樹建構

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摘 要

近年來由於網路的普及化，網路傳輸的品質與可靠性日漸重要。在網路拓樸上，為了減少網路節點發生壞損所造成的影響，並在網路通信及資訊安全方面實現較高的可靠性，因此網路節點的保護研究是必需的。針對多播傳輸時的節點壞損保護問題，Wang [1]提出了一個在建構傳輸樹時同時建構冗餘樹(Redundant Tree)的方法RT-SNP，以便在單節點壞損時能迅速修復傳輸樹，但是RT-SNP在建構傳輸樹及冗餘樹時，所建構的樹都使用了網路拓樸上所有的節點，完全不考慮多播傳輸來源節點與目的節點的位置，這會造成傳輸時間上的延遲和網路資源的浪費。因此，本篇論文中我們提出了部份冗餘樹結合單點保護的演算法PRT-SNP，在指定資料發送的來源端後，建構的傳輸樹及冗餘樹僅需要連結到所有的目的端即可，不需將樹建滿整個網路拓樸；當單節點壞損狀況發生時，再適當地從冗餘樹擷取部分路徑修復傳輸樹以達成保護的功能。模擬結果顯示，在發生壞點前與發生壞點後，PRT-SNP的傳輸樹皆有較低的傳輸延遲及較佳的網路資源使用率。

關鍵詞 : 多播傳輸、冗餘樹、單一節點壞損保護

目錄

參考文獻

[1] S. Wang, C. He, Y. Zhang, and G. Feng,“ Construction of Multicast Protection Tree Based on Single Node Failure, ” International Conference on Communications and Mobile Computing, vol. 2, pp.202-206, 2010。

[2] S.Gangxiang and W. D. Grover,“ Extending the p-cycle concept to path segment protection for span and node failure recovery ”, IEEE Journal on Selected Areas in Communications, vol. 21, no. 8, pp. 1306- 1319, 2003.

[3] M. Medard, S. G. Finn, R. A. Barry, and R. G. Gallager,“ Redundant Trees for Preplanned Recovery in Arbitrary Vertex Redundant or Edge Redundant Graphs, ” IEEE/ACM Transactions on Networking, vol.7, no. 5, pp. 641 – 652, Oct. 1999.

[4] G. Xue, L. Chen, and K. Thulasiraman,“ Quality-of-Service and Quality-of-Protection Issues in Preplanned Recovery Schemes Using Redundant Trees, ” IEEE Journal on Selected Areas in Communications, vol. 21,no. 8, pp. 1332 – 1345, Oct. 2003.

[5] W. Zhang, G. Xue, J. Tang, and K. Thulasiraman,“ Faster Algorithms for Construction of Recovery Trees Enhancing QoP and QoS ”, IEEE/ACM Transactions on Networking, vol. 16, no. 3, pp. 642-655, June 2008.

[6] G. Jayavelu, S.Ramasubramanian, and O. Younis,“ Maintaining Colored Trees for Disjoint Multipath Routing Under Node Failures ”, IEEE/ACM Transactions on Networking, vol. 17, no. 1, pp.346-359, Feb. 2009.

[7] T. Cicic, A. F. Hansenand, and O. K. Apeland,“ Redundant Trees for Fast IP Recovery ”, Fourth International Conference on Broadband Communications, Networks and Systems, pp. 152-159, 2007.

[8] A. Haider and R. Harris,“ Recovery Techniques in Next Generation Networks, ” IEEE Communications Surveys & Tutorials, vol. 9, no. 3, pp. 2-17, 2007.

[9] K. Bharath-Kumar and J. Jaffe,“ Routing to multiple destinations in computer networks, ” IEEE Transactions on Communications, vol. 31, no. 3, pp. 343 – 351, 1983.

[10]A. Banerjea, C. J. Parris, and D. Ferrari,“ Recovering guaranteed performance service connections from single and multiple faults, ” IEEE Global Telecommunications Conference: Communications, The Global Bridge, vol. 1, pp. 162 – 166, 1994.

[11]Y. Bejerano and P. V. Koppol,“ Optimal Construction of redundant Multicast Trees in Directed Graphs, ” IEEE International Conference on Computer Communications, pp. 2696-2700, 2009.

[12]W. Chen, D. Jin, and L. Zeng,“ Distributed switching mechanism for improving QoS in single link recovery trees ”, Journal of Tsinghua University (Science and Technology), vol. 47, no. 10, pp.1646-1649, 2007.

[13]A. Fei, J.-H. Cui, M. Gerla, and D. Cavendish.“ A Dual-Tree Scheme for Fault-Tolerant Multicast ”, IEEE International Conference on

Communications, vol. 3, pp. 690-694, 2001.