

# 以路由器網路介面為基準的Anycast路由協定

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## 摘要

Anycast是在IPv6環境中新定義的一種傳輸模式。利用這種傳輸模式可以讓使用者在多個提供相同服務的伺服器中尋找“最佳”或“最適合”的伺服器變成是一件容易的事情。由於傳輸anycast封包是依據路由器中的路徑表內容將封包送達目的地，因此anycast傳輸模式的優劣取決於路徑表的建置與維護。目前所提出的anycast路由協定。雖有達到anycast傳輸模式中尋找最佳伺服器的要求，但由於路由器儲存anycast路由所需記憶體空間卻過於龐大，故在路由器記憶體空間有限的情況下，容易造成路由器無法負荷進而影響到所有通訊位址服務效能。為了減輕路由器所需記憶體空間的負荷，且達到不影響所有通訊位址服務效能的目的，本論文針對anycast提出"Interface-Based Anycast Routing Information Protocol" (IBARIP)，主要希望能在減少anycast路由器所需記憶體空間的情況下，仍然能達到anycast傳輸模式中尋找“最適合”伺服器的要求。由模擬的結果顯示IBARIP達到了尋找“最適合”伺服器的要求，並且減輕anycast路由器所需記憶體空間。 關鍵詞：Anycast、Anycast路由協定。

關鍵詞：Anycast路由協定；Anycast

## 目錄

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## 參考文獻

- [1] C. Partridge, T. Mendez, and W. Milliken, "RFC 1546 - Host Anycasting Service," RFC1546, Nov. 1993.
- [2] K. Miller, "Deploying IP Anycast," NAONG 29, Chicago, Oct. 2003. Available at <http://www.net.cmu.edu/pres/anycast/>.
- [3] S. Deering and R. Hinden, "RFC 1883 - Internet Protocol, Version 6 (IPv6) Specification," RFC1883, Dec. 1995.
- [4] R. Hinden and S. Deering, "RFC 3513 - Internet Protocol Version 6 (IPv6) Addressing Architecture," RFC3513, Apr. 2003.
- [5] H. Doi, "An Analysis of IPv6 Anycast," Internet draft, draft-ietf-ipngwg-ipv6-anycast-analysis-02.txt, IETF, Jun. 2003.
- [6] B. Haberman, and D. Thaler, "Host-based Anycast using MLD," Internet draft, draft-haberman-ipngwg-host-anycast-01.txt, IETF, May 2002.
- [7] E.K. Karuppiah, R. Abdullah, and V. Ponnusamy, "Anycast Group Membership Management Protocol," Proc. of the 9th APCC 2003, pp. 1052-1056, Sep. 2003.
- [8] M. Ammar, and P. Judge, "Gothic: A Group Access Control Architecture for Secure Multicast and Anycast," Proc. of IEEE INFOCOM 2002, pp. 1547-1556, Jun. 2002.
- [9] Y. Wang, L. Wang, and W. Yan, "Research on IP Anycast Secure Group Management," Proc. of 16th APAN Meetings / network research workshop, Korea, pp. 49-55, Aug. 2003.
- [10] D. Katabi and J. Wroclawski, "A Framework for Scalable Global IP-Anycast(GIA)," Proc. of ACM SIGCOMM, pp. 3-15, Sep. 2000.

- [11] C. Castrillucia and G. Montenegro, "Securing Group Management in IPv6 with Cryptographically Generated addresses," Proc. of ISCC 2003, pp. 588-593, Jul. 2003.
- [12] R. Engel, V. Peris, and E. Basturk, "Using IP Anycast for Load Distribution and Server Location," Proc. of IEEE Globecom, pp. 27-35, Nov. 1998.
- [13] M. Oe and S. Yamamoto, "Implementation and Evaluation of IPv6 Anycast," Proc. of 10th Annual Internet Society Conference, pp. 323-330, Jul. 2000.
- [14] S. Doi, S. Ata, H. Doi and M. Murata "Design, Implementation and Evaluation of Routing Protocols for IPv6 Anycast Communication," Proc. of AINA2005, pp. 833-838, Mar. 2005.
- [15] Y. Wang, L. Zhang, Z. Han, and W. Yan, "Anycast Extensions to OSPFv3," Proc. of Parallel and Distributed Systems, pp. 223-229, Jul. 2005.
- [16] S. Matsunaga, S. Ata, H. Kitmura, and M. Murata, "Design and Implementation of IPv6 Anycast Routing Protocol: PIA-SM," Proc. of AINA2005, pp. 839-844, Mar. 2005.
- [17] S. Doi, S. Ata, H. Kitamura, and M. Murata, "IPv6 Anycast for Simple and Effective Service-Oriented Communications," IEEE Communications Magazine, Vol. 42, pp. 163-171, May 2004.
- [18] D. Xuan, W. Jia, and W. Zhao, "Routing Algorithm Using Distributed Computation," Proc. of ICPP '98, pp. 28-31, Aug. 1998.
- [19] D. Xuan, W. Jia, W. Zhao, and H. Zhu, "A Routing Protocol for Anycast Messages," IEEE Trans. Parallel and Distributed Systems, Vol.11, pp. 571-588, Jun. 2000.
- [20] C. Peng, and Y. Zhou, "Anycast Routing Algorithms on the Internet," Proc. of ICCNMC '2001, pp. 362-367, Oct. 2001.
- [21] D.G. Thaler and C.V. Ravishankar, "Distributed Center-Location Algorithms," IEEE Trans. Selected Areas in Communications, Vol.15, pp. 291-303, Apr. 1997.
- [22] C.P. Shan, E.K. Karuppiah, and R. Abdullah, "Dynamic Routing Protocols for Anycast Packet Forwarding," Proc. of the 9th APCC 2003, pp. 66-70, Sep. 2003.
- [23] T. Narayanan, E.K. Karuppiah, and R. Abdullah, "Semi-Dynamic Routing Protocols for Anycast Packet Forwarding," Proc. of The 9th APCC 2003, pp. 978-982, Sep.2003.
- [24] G.S. Malkin, "RIPng for IPv6" RFC2080, Jan 1997.
- [25] E.W. Zegura, K. Calvert and S. Bhattacharjee, "How to Model an Internetwork," Proc. of IEEE Infocom '96, pp. 594-602, Mar. 1996.
- [26] NAM, Available at. <http://www.isi.edu/nsnam/nam/index.html>.
- [27] K. Ishiguro and Y. Toshikawa, "GNU Zebra: Free Routing Software Distributed under FNU General public License," 2003. Available at. <http://www.zebra.org/>.