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QOS CENTRIC MINIMAL RESOURCE TOLERANT routing strategy for multihop adhoc networks

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Abstract:

The use of on demand techniques in routing protocols for multi-hop wireless ad hoc networks has been shown to have significant advantages in terms of reducing the routing protocol's overhead and improving its ability to react quickly to topology changes in the network. A number of on demand multicast routing protocols have been proposed, but each also relies on significant periodic behavior within portions of the protocol. we propose a model-based quality-of-service (QoS) routing scheme for IEEE 802.11 ad hoc networks. Unlike most of QoS routing schemes in the literature, the proposed scheme provides stochastic end-to-end delay guarantees, instead of average delay guarantees, to delay-sensitive dense traffic sources. Via a cross-layer design approach, the scheme selects the routes based on a geographical on-demand ad hoc routing protocol and checks the availability of network resources by using traffic source and link-layer channel modeling, taking into consideration the IEEE 802.11 characteristics and node interactions. Our scheme extends the well developed effective bandwidth theory and its dual effective capacity concept to multi-hop IEEE 802.11 ad hoc networks. Extensive computer simulations demonstrate that the proposed scheme is effective in satisfying the end-to-end delay bound to a probabilistic limit.

Key words: Ad hoc network, end-to-end delay, IEEE 802.11 MAC, Qos routing protocals.

Introduction:

Multimedia applications such as digital audio and video have much more stringent QoS requirements than traditional datagram applications. For a network to deliver QoS guarantees, it must reserve and control resources. A major challenge n multi hop, multimedia networks is the ability to account for resources so that bandwidth reservations can be placed on them. We note that in cellular (single hop) networks, such accountability is made easily by the fact that all stations learn of each other's requirements, either directly or through a control station . However, this solution cannot be extended to the multi hop environment. To support QoS for real-time applications, we need to know not only the minimal delay path to the destination, but also the available bandwidth on it. We consider the end-to-end delay as a QoS measure in this paper. We present a statistical (model-based) QoS routing scheme that provides stochastic delay guarantee, such as *Pr*(*D* > *Dmax*) ≤ _ (where *D* represents the end-to-end packet delay, *Dmax* is the delay bound, and _ is the delay violation probability upper bound) for IEEE 802.11 DCFmultihop ad hoc wireless networks

2.Existing system for Multihop ad hoc networks

The attractive infrastructure-less nature of wireless ad hoc networks draws significant attention from researchers in both academia and industry. Recently, the increasing demand on multimedia applications in wire-line networks makes QoS provisioning for wireless ad hoc networks a very desirable objective. However, some unique characteristics of wireless ad hoc networks make QoS provisioning technically challenging, such as shared wireless medium, mobility, and distributed multi-hop communications.

3. Proposed model:

We propose a location-based on demand ad hoc routing protocol to discover a route to the destination of a new flow and that routing protocols are characterized by their scalability and efficient bandwidth utilization as they do not flood the network to find the path for destination. We only consider "bandwidth" as the QoS (thus omitting signal-to-interference ratio (SIR), packet loss rate, etc.). This is because bandwidth guarantee is one of the most critical requirements for real-time applications. "Bandwidth" in time slotted network systems is measured in terms of the amount of "free" slots. The goal of the QoS routing algorithm is to find a shortest path such that the available bandwidth on the path is above the minimal requirement.

3.1 Code Division Multiple Access (CDMA) over TDMA

Consider the example of the wireless network ,that uses TDMA for data transmission. The mobile host intends to transfer data to the mobile host . All slots in the TDMA frame are assumed to be free. Because and are hidden from each other, may want to send packets to by using slots 1 and 2. Thus, there will exist a collision at (because may receive packets from and simultaneously).

CDMA can be used to solve this problem (all spreading codes are assumed to be orthogonal to each other). . That is, we use a transmitter based code assignment to assign a code to each transmitter for data transmission. A spreading code can be reused if two nodes have a hop distance greater than two.. In this paper, we assume TDMA within our network. CDMA can also be overlaid on top of the TDMA infrastructure; namely, multiple sessions can share the same TDMA slot via CDMA.In this case, the near–far problem and related power control algorithm become critical to the efficiency of the channel access. A code assignment scheme is assumed to be running in the lower layer of our system. Thus, the hidden terminal problem can be avoided.

3.2 CROSS-LAYER DESIGN FOR QOS ROUTING

In this section, we discuss three different cross-layer design aspects, which are related to the characteristics of multihop IEEE 802.11 DCF connections and strongly affect the design of our model-based QoS routing scheme. First, we address the complexity of the QoS routing problem and our heuristic approach to solve it. Second, we obtain a general formula for the capacity process of a multihop connection on a shared wireless channel, calculate the effective capacity of that connection, and estimate the capacity variation of an IEEE 802.11 DCF multihop connection. Third, we discuss how the IEEE 802.11 contention-based access affects the network resource allocation.

4. SSCH: slotted seeded channel hopping for capacity iprovement in IEEE 802.11 ad hoc wireless networks

We present a new protocol that increases the capacity of IEEE 802.11 ad-hoc networks by exploiting frequency diversity. This extends the benefits of channelization to ad-hoc networks. The protocol is suitable for a multi-hop environment, does not require changes to the IEEE 802.11 standard, and does not require multiple radios.This technique allows control traffic to be distributed across all channels, and thus avoids control channel saturation, a bottleneck identified in prior work on exploiting frequency diversity.We introduce a second novel technique to achieve good performance for multi-hop communication flows. The partial synchronization technique allows a forwarding node to partially synchronize with a source node and partially synchronize with a destination node. This synchronization pattern allows the load for a single multi-hop flow to be distributed across multiple channels

switches each radio across multiple channels so that multiple flows within interfering range of each other can simultaneously occur on orthogonal channels. This results insignificantly increased network capacity when the network traffic pattern consists of such flows SSCH is a distributed protocol, suitable for deployment in multi-hop wireless network. It does not require synchronization or leader election. Nodes do attempt to synchronize, but lack of synchronization results in at most a mild reduction in throughput.SSCH defines a slot to be the time spent on a single channel.We develop the SSCH protocol by first describing its assumptions about the underlying hardware and Medium Access Control (MAC) protocol

5. QOS routing strategy for multihop adhoc networks

The proposed statistical QoS routing scheme contains a route discovery and maintenance procedure and a resource allocation procedure (for admission control and resource reservation). The two procedures are described in the following subsections.

A.Route Discovery and Maintenance

The procedure consists of two phases. The first phase is the discovery part, which is responsible for discovering possible routes to be tested for admission by the resource allocation process. The second phase is the route maintenance, which is invoked either during the resource allocation process or when the route is broken.

B. Resource Allocation

The procedure consists of a fully distributed statistical CAC procedure and a resource reservation procedure. The resource reservation proceeds side by side with the CAC procedure in order to resolve the competition among flows that want to join the network simultaneously. Note that the resource reservation for any node is temporary, it lasts until the node cancels it.

TABLE I
IEEE 802.11 SYSTEM PARAMETERS [25]

System Parameter	Value
Packet payload	256 Bytes
PHY header	128 bits
ACK	112 + PHY header
RTS	160 + PHY header
CTS	112 + PHY header
Slot Time	50 μs
SIFS	28 μs
DIFS	128 μs
Basic Rate	1 Mbps
Data Rate	2 Mbps
CW_{min}	16
Backoff Stages (m_b)	5
Transmission Range	$250m$
Carrier Sense Range	$550m$

6.Results

1.Admission region with two classes traffic and success ful packet delievary percentage.

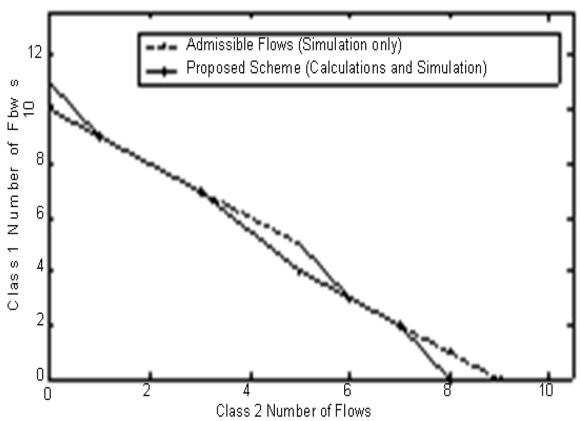

Fig:1 the admission region with two classes traffic

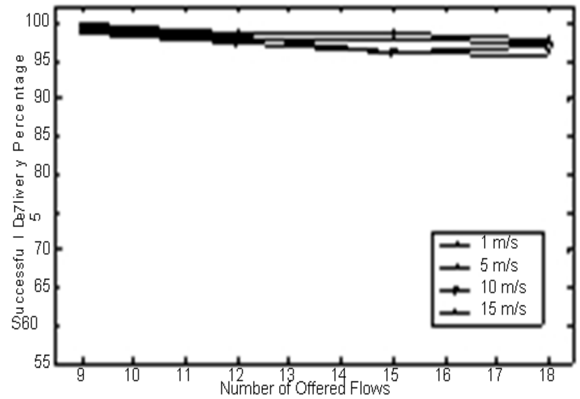

Fig 2: successful packet delievary percentage

7.CONCLUSION

We should propose a model-based QoS routing scheme for IEEE 802.11-based ad hoc networks that are dense and delay-sensitive traffic. Following a cross-layer design approach, our proposed scheme should offer a stochastic end-to- end delay guarantees. The scheme should relie on a location-based ad hoc on-demand routing protocol to discover routes to the destination of a new traffic flow.

REFERENCES

[1]M. Schwartz, *Broadband Integrated Networks*. Prentice Hall, 1998.

[2]A.Abdrabou and W.Zhuang, "Service time approximation in IEEE 802.11 single-hop ad hoc networks," *IEEE Trans. Wireless Commun.*, vol. 7, no. 1, Jan. 2008, pp. 305-313.

[3] N. Bulusu, J. Heidemann, and D. Estrin, "GPS-less low cost outdoor localization for very small devices," *IEEE Personal Commun. Mag.*, vol. 7, no. 5, Oct. 2000, pp. 28-34.

[4] B. Karp and H. Kung, "Greedy perimeter stateless routing for wireless networks," in *Proc. 6th Annual*

ACM/IEEE Int'l. Conf. Mobile Comp. Net., Boston, MA, Aug. 2000, pp. 243-54.

[5] M. Mauve, J. Widmer, and H. Hartenstein, "A survey on position-based routing in mobile ad hoc networks," *IEEE Network*, Dec. 2001, pp. 30-39.

[6] A. Abdrabou and W. Zhuang, "Stochastic delay guarantees and statistical call admission control for IEEE 802.11 single-hop ad hoc networks," *IEEE Trans. Wireless Commun.*, vol. 7, no. 10, Oct. 2008, pp. 3972-3981.

[7] D. Wu and R. Negi, "Effective capacity-based quality of service measures for wireless networks," *ACM Mob. Nets. App. (MONET)*, vol. 11, Feb. 2006, pp. 91-99.

[8] I. Gerasimov and R. Simon, "Performance analysis for ad hoc QoS routing protocols," in *Proc. IEEE MobiWac'02*, 2002, pp. 87-94.

[9] I. Gerasimov and R. Simon, "A bandwidth-reservation mechanism for on-demand ad hoc path finding," in *Proc. 35th IEEE Annual Simulation Symposium*, 2002, pp. 27-34.

[10] F. Cuomo, A. Baiocchi, and R. Cautelier, "A MAC protocol for a wireless LAN based on OFDM-CDMA," *IEEE Commun. Mag.*, vol. 38, no. 9, pp. 152-159, Sept. 2000.

[11] S. Wu, C. Lin, Y. Tseng, and J. Sheu, "A new multichannel MAC protocol with on-demand channel assignment for multi-hop mobile ad hoc networks," in *Proc. Parallel Arch., Alg. Nets. I-SPAN 2000*, pp. 232-237, 2000.

[12] J. So and N. Vaidya, "Multi-channel mac for ad hoc networks: handling multi-channel hidden terminals using a single transceiver," in *Proc. ACM MobiHoc'04*, pp. 222-233, 2004.

[13] P. Bahl, R. Chandra, and J. Dunagan,"SSCH:slotted seeded channel hopping for capacity improvement in IEEE 802.11 ad hoc wireless networks," in *Proc. ACM MobiCom*, pp. 216-230, 2004.

[14] C. R. Lin and J.-S. Liu, "QoS routing in ad hoc wireless networks," *IEEE J. Select. Areas Commun.*, vol. 17, no. 8, Dec. 1999, pp. 1426- 1438.

[15] L. Hanzo II and R. Tafazolli, "A survey of QoS routing solutions for mobile adhoc networks," *IEEE Commun. Surv. Tutor.*, vol. 9, no. 2, pp. 50-70, 2nd Quarter 2007.

[16] L. Chen and W. Heinzelman, "QoS-aware routing based on bandwidth estimation for mobile ad hoc networks," *IEEE J. Select. Areas Commun.*, vol. 23, no. 3, Mar. 2005, pp. 561-572.

[17] L. Luo, M. Gruteser, H. Liu, D. Raychaudhuri, K. Huang, and S. Chen, "A QoS routing and admission control scheme for 802.11 ad hoc networks," in *Proc. ACM DIWANS'06*, Sept. 2006, pp. 19-28.

[18] Y. Yang and R. Kravets, "Contention-aware admission control for ad hoc networks," Technical Report, Department ofComputer Science, University of Illinois, Urbana-Champaign, UIUCDCS-R-2003-2337, Dec. 2003.

[19] Y. Xiao and H. Li, "Local data control and admission control for QoS support in wireless ad hoc networks," *IEEE Trans. Veh. Technol.*, vol. 53, Sept. 2004, pp. 1558-1572.

[20] Q. Xue and A. Ganz, "Ad hoc QoS on-demand routing (AQOR) immobile ad hoc networks," *J. Parallel Distributed Computing*, Oct. 2002, pp. 154-165.

[21] H. Badis, "An efficient bandwidth

guaranteed routing for ad hoc networks using IEEE 802.11 with interference consideration," in Proc. ACM MSWIM'07, Oct. 2007, pp. 252-260.

[22] S. Yin, Y. Xiong, Q. Zhang, and X. Lin, "Traffic-aware routing for real-time communications in wireless multi-hop networks," *Wiley Wireless Commun. Mob. Comp.*, vol. 6, no. 6, Aug. 2006, pp. 825-843.

[23] P. Jacquet, A. Naimi, and G. Rodolakis, "Asymptotic delay analysis for cross-layer delay-based routing in ad hoc networks," *Advances Multimedia*, vol. 2007, ID 90879, May 2007.

[24] G. Bianchi, "Performance analysis of the IEEE 802.11 distributed coordination function," IEEE J. Select. Areas Commun., vol. 18, no. 3, Mar. 2000, pp. 535-547.

[25] IEEE Standard for Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications, ISO/IE 8802-11: 1999(E), Aug. 1999.

[26] K. Xu, M. Gerla, and S. Bae, "How effective is the IEEE 802.11 RTS/CTS handshake in ad hoc networks?" in *Proc. IEEE GLOBE-*COM'02, vol. 1, Nov. 2002, pp. 72-76.

[27] S. Basagni, I. Chlamtac, V. Syrotiuk, and B. Woodward, "A distance routing effect algorithm for mobility (DREAM)," in *Proc.* ACM Mobicom*'98*, 1998, pp. 76-84.

[28] L. Blazevic, J. Boudec, and S. Giordano, "A location-based routing method for mobile ad hoc networks," IEEE *Trans. Mob. Comp.*, vol. 4, no. 2, Apr. 2005, pp. 97-110.

[29] S.Gezici, "A survey on wireless position estimation," *Springer Wireless* Pers. Commun., vol. 44, no. 3, Feb. 2008, pp. 263-282.

[30] S. Gezici, Z. Tian, G. Giannakis, H. Kobayashi, A. Molisch, V. Poor, and Z. Sahinoglu, "Localization via ultra-wideband radios: a look at positioning aspects for future sensor networks," IEEE Signal Processing Mag., vol. 22, no. 4, July 2005, pp. 70-84.

[31] D. Wu and R.Negi,"Effective capacity: a wireless link model for support of quality of service," IEEE Trans. Wireless Commun., vol. 2, no. 4, July 2003, pp. 630-643.