



## Survey of Various Trust Based QoS Aware Routing Protocol in MANET

**Vijay Kumar Singh**

Department of Computer Science and Engineering, Bansal College of Engineering, Mandideep, Bhopal, Madhya Pradesh, India

**Dr. Piyush Kumar Shukla**

Department of Computer Science and Engineering, University Institute of Technology, Bhopal, Madhya Pradesh, India

**Dr. Sachin Goyal**

Department of Information Technology, University Institute of Technology, Bhopal, Madhya Pradesh, India

**ABSTRACT**

(MANETs) Mobile Ad-hoc Networks is a group of mobile nodes that are connected dynamically, in which each node acts as a router to all other nodes. Due to the absence of centralized administration and dynamic nature, MANETs are vulnerable to various kinds of attacks from malicious nodes. Several secure routing protocols like AODV, DSR, TSR, and OLSR have been used in MANET for transmission of data. In MANET, we are using trust based QoS aware routing protocol for identifying the malicious nodes in the network. Trust is mandatory in routing for transmission of data securely. Hence trust models, trust computation is implemented in the routing protocols. In this paper, survey of several trusts based and QoS aware routing protocol is performed. In this review paper, the study of different trust based and QoS aware protocols that are using trusted infrastructure and trust models is performed for preventing the attacks and misbehavior from malicious nodes in the network. The performance of trust based routing protocol has been analyzed that helps to work efficiently and can be used in various applications of MANETs for improving the security performance of the network.

**KEYWORDS : QoS Constraints, Trust prophecy, malicious nodes, and Trust based QoS routing.**

**1. Survey of various Trust based QoS aware Routing Protocol in MANET**

**Table 1. Comparison of various Research works and trust models**

S.No	Features	Asad Amir Pirzada et al [22]	Gulati Man-deep Kaur et al [26]	Dr.K.Thirunadana et al [19]	Radha krishna bar et al.[13]
1.	Routing Protocol Used	DSR	DSR		AODV
2.	Technology Used	Watchdog and Pathrater	-	Public Crypto System	-
3.	Complexity	No	Yes	Yes	No
4.	Trust model used	Yes	Yes	Yes	Yes
5.	Trust Table Maintained	No	Yes	Yes	Yes
6.	Update trust value	No	No	Yes	Yes
7.	Hello packets	No	No	No	No
8.	Route Metric	Shortest path	Shortest path	Shortest path+ Authentication	Route with trusted nodes
9.	Unidirectional link	Yes	Yes	No	No
10.	Multiple Routes	No	No	No	No
11.	Packet loss ratio	High	High	Low	Low
12.	Packet Forwarding Ratio	Low	Low	Good	Good
13.	Detection of malicious nodes	Low	Low	Good	Low
14.	Throughput	Low	Good	Good	Good

15.	Routing Packet overhead	High	Low	Low	Low
16.	Routing maintenance	No	Low	Low	No

**Table 2. Comparison of various Research works and trust models**

S.No	Features	Chintan Kanani et al [12]	(Marti et al) [78]	Kannan Govindan et al [25]	Chenxi Zhu et al.[74]
1.	Routing Protocol Used	AODV	DSR	DSR	AODV
2.	Technology Used	Ant Colony Optimization	Watchdog Mechanism	Fuzzy Prediction Theory	NP Completeness problem
3.	Complexity	Yes	Yes	Yes	No
4.	Trust model used	No	Yes	Yes	Yes
5.	Trust Table Maintained	No	No	Yes	Yes
6.	Update trust value	No	No	Yes	No
7.	Hello packets	No	No	No	No
8.	Route Metric	Best route	Shortest path	Shortest path	Shortest Path
10.	Unidirectional link	No	Yes	No	No
11.	Multiple Routes	Yes	No	Yes	No
12.	Packet loss ratio	Low	High	Low	High
13.	Packet Forwarding Ratio	Good	Low	Better	Low
14.	Detection of malicious nodes	Low	Low	Good	Low

15.	Through-put	Low	Low	Good	Low
16.	Routing Packet overhead	High	High	Low	High
17.	Routing maintenance	low	Low	Good	No

**Table 3. Comparison of various Research works and trust models**

S.No	Features	R. Menaka et al [18]	Johnson et al [82]	Zae-Kwun Lee et al [30]	Songbai Lu et al.[13]
1.	Routing Protocol Used	ZRP	DSR	AODV	AODV
2.	Technology Used	Hybrid protocol	-	802.11b	Digital Signatures and Hash Chains
3.	Complexity	No	No	Yes	Yes
4.	Trust model used	No	No	No	Yes
5.	Trust Table Maintained	No	No	No	Yes
6.	Update trust value	No	No	No	No
7.	Hello packets	No	No	Yes	No
8.	Route Metric	Shortest path	Shortest path	Route with best bandwidth	Route with authentication
9.	Unidirectional link	Yes	Yes	No	No
10.	Multiple Routes	No	No	No	No
11.	Packet loss ratio	Low	High	Low	Low
12.	Packet Forwarding Ratio	Good	Low	Good	Good
13.	Detection of malicious nodes	-	-	Low	Good
14.	Through-put	Good	Low	Good	Good
15.	Routing Packet overhead	Low	Low	Low	Low
16.	Routing maintenance	Low	Low	Good	No

**Table 4. Comparison of various Research works and trust models**

S.No	Features	Yogendra Jain et al [13]	Lei Chen, et al [68]	Bo Wang et al [1]	Hui Xia et al [36]	Priya et al [4]
1.	Routing Protocol Used	AODV	AODV	AODV	DSR	DSR
2.	Technology Used	RSA Signature	NP Completeness	NP Completeness with QoS constraints	Fuzzy Prediction Theory	SVM (Support Vector Machine)
3.	Complexity	Yes	Yes	No	No	No
4.	Trust model used	Yes	Yes	Yes	Yes	Yes
5.	Trust Table Maintained	Yes	Yes	Yes	Yes	Yes
6.	Update trust value	Yes	Yes	Yes	Yes	No

7	Hello packets	No	Yes	Yes	Yes	No
8.	Route Metric	Route with authentication	Trusted path	Trusted path with QoS Constraints	Route with trusted nodes	Route with Trusted nodes
9.	Unidirectional link	No	No	No	No	No
10.	Multiple Routes	Yes	No	Yes	Yes	Yes
11.	Packet loss ratio	Low	Low	Low	Low	Low
12.	Packet Forwarding Ratio	Good	Good	Better	Good	Good
13.	Detection of malicious nodes	Good	Low	Good	Good	Better
14.	Through-put	Good	Good	Best	Good	Better
15.	Routing Packet overhead	Low	Low	Lowest	Low	Low
16.	Routing maintenance	Yes	Yes	Yes	Yes	Yes

**2. CONCLUSION**

In this paper, survey of various trust based routing protocol were studied and analyzed. Among these protocol models, most of the routing protocols use the QoS service in the algorithm. Hence the performance of the routing protocols can be enhanced using trust models, QoS metrics and trusted models in the algorithm for MANET. Various types of attacks can be controlled through this trust based models. DSR and AODV protocol is used mainly for the route discovery when the link fails, hence is mostly used in the routing protocols.

**REFERENCES**

1. B Wang, X Chen, W Chang, " A Light- Weight Trust-Based QoS Routing Algorithm for Ad Hoc Networks", *Published in Pervasive and Mobile Computing 13*, pages 164-180, 2014
2. Suparna, Tanumoy, Sarmistha, " Trust Based energy Efficient Detection and Avoidance of Black Hole attack to ensure routing in MANET", *published in applications and Innovations in Mobile Computing*, pages 157-164, 2014
3. P kautoo, Dr. Piyush Shukla, Dr. Sanjay Silakari, "Inclusive survey of various trust based dynamic source routing protocol for Mobile Ad-hoc network", *published in IJCA*, volume 93, pages 7-12, 2014
4. P Kautoo, Dr. Piyush Shukla, Dr. Sanjay Silakari, " Trust formulation in Dynamic Source Routing Protocol using SVM", *IJITCS, MECS*, pages 43-50, 2014
5. C. Kanani, A. Sinhal, " Ant Colony Optimization based modified AODMV for multipath routing in MANET", *IJCA*, Volume 82, Pages 14-19, Nov 2013
6. R. Menaka, Dr. V. Ranganathan, "A survey of trust related protocols for mobile Ad Hoc networks", *IJETAR journal*, volume 3Pages 903-910, April 2013
7. Dr. K. Thirunadana, Sikamani, D. Santhosh Kumar, " Efficient and secure trust based ad hoc routing in MANET", *ICCTET*, Pages 255-258, 2013
8. Radha Krishna Bara, Jyotsna Kumar Mandala and Moirangthem Marjit Singh, "QoS of MANET Through Trust Based AODV Routing Protocol by Exclusion of Black Hole Attack", *ICIMTA*, *published in Procedia Technology 10*, Pages 530 – 537, 2013
9. K. Govindan, P. Mohapatra, "Trust computations and trust dynamics in Mobile ad hoc networks: a survey", *published in IEEE communications surveys and Tutorials 14*, Pages 279-298, 2012
10. G.M. Kaur, K. Kumar, "QoS routing protocols for Mobile Ad Hoc Networks: a survey", *IJWMC-5*, Pages 107-118, 2012
11. Z.K.Lee, G. Lee, H. Rai oh, H. Song, "QoS aware routing and power control algorithm for multimedia service over multipath mobile ad hoc network", *Published in Wireless Communications and Mobile Computing-12*, pages 567-579, 2012
12. P. V Krishna, V.Saritha, et al, "Quality of service enabled ant colony-based Multipath Routing for Mobile Ad hoc networks", *Published in IET communications- 6*, Pages 76-83, 2012
13. Hui Zia, Z. Jia, Xin Li, Lei Ju, Edmin H., "Trust prediction and trust based source routing in mobile ad hoc networks", *Published in Elsevier, ad hoc networks*, page 2096-2114, 2012
14. Yogendra Jain, Pankaj Sharma, "Trust based ad hoc on-demand distance vector for MANET", *published in NCSI*, Page 1-11, 2012
15. Rutvij H. Jhaveri, Sankita Patel, Devesh Jinwala, " DoS attacks in Mobile Ad-hoc Networks: A survey", *page 535-541*, 2012
16. Jin Hee Cho, Ananthram Swami, Ray Chen, " A survey on Trust Management for Mo-

- mobile Ad Hoc Networks", *Published in IEEE Communication Surveys and tutorials 13*, page 562-583, 2011
17. Sudhir Agrawal, Sanjeev jain, Sanjeev Sharma, " A survey of Routing attacks and security measures in Mobile ad hoc networks", *Published in Journal of computing*, Vol 3, page 41-48, 2011
  18. T. Eissa, S. A. Razak, Rashid H. Khokhar, N. Samian, "Trust- based routing mechanism in MANET: Design and implementation", *Published in Springer*, Page 666-677, 2011
  19. Pedro B. Velloso, Rafael P. Lafer, Daniel de O.Cunha , "Trust management in mobile ad hoc networks using a scalable maturity-based model", *Published in IEEE transactions on network-7*, Page 172-185, 2010
  20. A Menaka Pushpa, "Trust based Secure routing in AODV routing protocol", *Published in IEEE*, Page 1-6, 2009
  21. S. Lu, L. Li, and K. Yan Lam, L. Jia, "SAODV: A MANET routing protocol that can withstand Black Hole attack", *Published in IEEE ICCIS*, page 421-425, 2009
  22. A. Khokhar, L.Abusalah, M Guizani, "A survey of secure mobile ad hoc routing protocols", *Published in IEEE Communication in surveys and tutorials- 19*, page 78-93, 2008
  23. Johnson et al, D. Maltz, Microsoft Research, <https://www.ietf.org/rfc/rfc4728.txt>, Page 1-99, 2007
  24. A A Pirzada, A Datta, C McDonald, " Incorporating trust and reputation in the DSR protocol for dependable routing", *Published in Science Direct, Computer Communications -29*, and SCSE, 2005, Page 2806-2821,2006
  25. C Liu, J. Kaiser, " A survey of Mobile ad hoc network routing protocols", *University of Magdeburg*, Page 1-36, 2005
  26. L Khelladi, D Djenouri , N Badache, " A survey of security issues in mobile ad hoc and sensor networks", *Published in IEEE Communication Surveys and Tutorials*, Page 2-28, 2005
  27. Wendi, L Chen, B Heinzelman, " QoS-aware routing based on bandwidth estimation for mobile ad hoc networks", *Published in IEEE Communication*, Page 561-572, 2005
  28. A Perrig, Y hu, " A Survey of secure wireless ad hoc routing", *Published in IEEE Computer Society-2* , page 28-39, 2004
  29. R Kravets, S Vi, "Moca: Mobile Certificate Authority for wireless ad hoc networks", *II Annual PKI'03*, 2003
  30. Y C Hu, A Perrig, and D B Johnson, " Ariadne: A secure on-demand routing protocol for ad hoc networks", *8th Annual IICMCN Mobicom*, page 12-23, 2002
  31. C Zhu, M Scott Corson, "QoS routing for mobile ad hoc networks", *Flarion Technologies*, Page 1-10, 2002
  32. K Lai, S Marti, M Baker, " Mitigating routing misbehavior in mobile ad hoc network", *published in Proceedings of 6<sup>th</sup> annual ACM and IEEE*, Page 255-265, 2000
  33. Rinzboorg, N. Asokan, " Key Agreement in ad hoc networks", *Published in computer Communication*, Volume 23, Page 1627-1637, 2000
  34. B Praveen Kumar, B Bharath Bhushan, P Chandra Sekhar, N Papanna, " A survey on MANET Security Challenges and routing protocols", *IJCTA*, Volume 4, page 248-256
  35. P. Zimmermann, the official PGP Users Guide, *MIT Press*, 1995
  36. N. Bhalaji, A. Shanmugam, "Dynamic Trust based method to mitigate Greyhole Attack in Mobile Adhoc Networks", *Publised in Procedia Engineering*, Page 881-888, 2012