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Durgesh Kumar Mishra · Amit Joshi
Shikha Maheshwari
Editors

Emerging Trends in Expert Applications and Security

Proceedings of ICETEAS 2018

Springer

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Preface

The *International Conference on Emerging Trends in Expert Applications and Security* (ICETEAS 2018) has been held at Jaipur, India, during February 17–18, 2018. ICETEAS 2018 has been organized and supported by the JECRC Foundation, Jaipur, India. The conference addressed innovative advancements in expert applications and security issues therein with specific reference to the area of computing.

Nowadays, globalization of academic and applied research is growing at great pace. Computer, communication, and computational sciences are hot areas with a lot of thrust. Keeping this ideology in preference, JECRC Foundation, Jaipur, India, has come up with the international event. ICETEAS 2018 is an international opportunistic forum and vibrant platform for researchers and industry practitioners to exchange of state-of-the-art knowledge gained from their original research work and practical development.

The expert application concept of the conference focused on current advances in the research and use of the expert system with particular focus on the role in maintaining academic level while sharing novel research and cutting-edge developments in the fields of computer system security using cryptographic algorithms and other security schemes for the system as well as the cloud. The outcome of the conference significantly contributes to the society by serving the expert community seeking to stimulate the development to improve lives throughout the world by providing innovative results.

ICETEAS 2018 has a foreseen objective of enhancing the research activities at a large scale. ICETEAS 2018, first of all, is an abbreviation of the full name of the conference, i.e., *International Conference on Emerging Trends in Expert Applications and Security*. Another meaning breaks it into ICE and TEAS, wherein ICE represents the hurdles, challenges, problems, and limitations being faced by the researchers in the pursuance of their research practices and implementation of innovations and TEAS is the knowledge dissemination and exchange of ideas to melt ICE. Through ICETEAS 2018, all the concerned people will be provided a genuine platform with all possible solutions and opportunities to find ways to come out of their research problems and limitations.

One more idea to keep this name ICETEAS 2018 is that this conference is conducted mostly in the winter season (here ICE denotes Cold), and this Cold ICE is melted during the various TEA sessions and TEA breaks (TEAS) wherein the participants find many opportunities to collect knowledge, explore more, and establish strong networking and platform for sharing each other's ICE melting ideas. In true sense, ICETEAS 2018 is an international ICE breaking and melting platform through TEAS of great knowledge, innovations, and networking opportunities. Technical Program Committee and Advisory Board of ICETEAS include eminent academicians, researchers, and practitioners from abroad as well as from all over the nation.

ICETEAS 2018 received around 367 submissions from around 639 authors of 10 different countries such as UK, USA, Netherlands, Italy, Japan, China, Korea, Thailand, Vietnam, Taiwan. Each submission has gone through the plagiarism check. On the basis of plagiarism report, each submission was rigorously reviewed by at least three reviewers with an average of 2.07 per reviewer. Even some submissions have more than three reviews. On the basis of these reviews and presentation during the conference, 86 high-quality papers were selected for publication in this proceedings volume, with an acceptance rate of 23%.

We are thankful to the speakers, delegates, and the authors for their participation and their interest in ICETEAS 2018 as a platform to share their ideas and innovation. We are also thankful to Mr. Aninda Bose, Senior Editor, Hard Sciences, Springer, for providing continuous guidance and support. Also, we extend our heartfelt gratitude and thanks to the Reviewers and Technical Program Committee Members for showing their concern and efforts in the review process. We are indeed thankful to everyone directly or indirectly associated with the conference organizing a team, leading it toward the success.

We hope you enjoy the conference proceedings and wish you all the best.

Jaipur, India

Vijay Singh Rathore
Marcel Worring
Durgesh Kumar Mishra
Amit Joshi
Shikha Maheshwari
ICETEAS 2018

Acknowledgements

The organization of a conference is always a stressful adventure because of all the very small things and all the very important issues that have to be planned and managed.

We are grateful for the extensive support of Shri O. P. Agrawal, Chief Patron; Shri Amit Agrawal, Patron and Director, JECRC Foundation; and Shri Arpit Agrawal, Director, JECRC, Jaipur, during the planning as well as implementation phase of this conference to make this conference possible. We take the opportunity to thank our Principal, Dr. Vinay Kumar Chandna, for his very friendly support and advice since the conception of this idea.

We are grateful to a number of people without whom we would not have been able to successfully organize this mega event and personally thankful to Prof. Marcel Worring, Director, Informatics Institute, University of Amsterdam, the Netherlands; Prof. Sheng Lung Peng, Professor, Computer Science and Information Engineering, National Dong Hwa University, Hualien, Taiwan; Dr. Kirti Seth, Associate Professor, SOCIE, Inha University, Tashkent Uzbekistan; Prof. Vincenzo Piuri, University of Milan, Italy; Prof. Rajeev Gupta, Pro Vice-Chancellor, Rajasthan Technical University, Kota; Prof. C. P. Gupta, Rajasthan Technical University, Kota; Dr. O. P. Rishi, Associate Professor, University of Kota, Kota; Dr. Durgesh Kumar Mishra, Chairman, CSI-(Div IV); Prof. Peter H. Kent, CEO, UKEI Ltd., London; Prof. David Wing, Director, UKEI Ltd., London; Prof. M. Hanumanthappa, Director, Department of Computer Science, Bangalore University, Bangalore; Prof. P. V. Virparia, Sardar Patel University, Gujarat; Prof. Atul Gonsai, Saurashtra University, Rajkot, India; Prof. C. K. Kumbharana, Saurashtra University, Rajkot; Prof. Bankim Patel, UT University, Baroda; Prof. Vibhakar Mansotra, Professor, University of Jammu; Dr. Pawanesh Abrol, Professor, University of Jammu, Jammu; Dr. Vinod Sharma, Professor, University of Jammu, Jammu; Dr. Jatinder Singh Manhas, Associate Professor, University of Jammu, Jammu; Dr. Vivek Tiwari, Assistant Professor; Dr. Shyama Prasad Mukherjee International Institute of Information Technology, Chhattisgarh; Dr. Paras Kothari, Principal, Samarth Group of Institutions, Himmat Nagar, Gujarat; Dr. K. Baskaran, Associate Professor and

Head of the Department, Department of Electronics and Instrumentation Engineering, Government College of Technology Coimbatore; Prof. P. K. Mishra, Professor, Banaras Hindu University; Dr. Tanupriya Choudhury, Associate Professor, Amity University, Noida; Dr. Praveen Kumar, Associate Professor, Amity School of Engineering and Technology, Amity University, Noida; Dr. Sumeet Gill, Associate Professor, Maharshi Dayanand University, Rohtak; Dr. S. S. Dalal, Associate Professor, SRM University, Haryana; Dr. Bhavna Arora, Assistant Professor, Central University, Jammu; Dr. Kusum Rajawat, Principal, Shree Karni College, Jaipur; Dr. M. Venkatesh Kumar, Chairman, IEEE Young Professionals, Tamil Nadu Circle; Dr. Bharat Singh Deora, Associate Professor, Computer Science, JRN Rajasthan Vidyapeeth University, Udaipur; Dr. M. N. Hoda, Director, BVICAM, New Delhi; Prof. Vipin Tyagi, JUET, India, and Vice President, Region 3, CSI; Dr. Nilanjan Dey, Editor, IGI Global Journal, and all other colleagues of the state of Rajasthan.

We would like to thank our esteemed authors for having shown confidence in us and considered ICETEAS 2018 a platform to showcase and share their original research work and came to Jaipur to present it as well.

We wish to express our sincere gratitude to the focused team of Chairs, Co-chairs, International Advisory Committee, and Technical Program Committee.

We will fail in our duty, if we do not thank our Publishing Co-partner Shri Amit Joshi, CEO, and Shri Mihir Chauhan, Director, GR Foundation, who worked constantly behind the scene and giving us all encouragement, support, and a path aimed to quality and excellence, comparable to the best in the world. We are also thankful to Shri Aninda Bose, Senior Editor, Hard Sciences, Springer, for providing continuous guidance and support.

Our heartfelt appreciation to Ms. Shikha Maheshwari for coming forward to undertake the challenge so actively, taking ownership and together making this conference a great success.

We would like to address a particular warm thank to the colleagues of the Department of Computer Science and Engineering, JECRC, Jaipur, for their participation and expertise in the preparation of the conference. We deeply acknowledge the support provided by the other department colleagues for management of conference properly.

Finally, we are thankful to one and all, who have contributed directly or indirectly in making this conference ICETEAS 2018 successful.

Thanks to Almighty for everything.

Jaipur, India
March 2018

Vijay Singh Rathore
Marcel Worring
Durgesh Kumar Mishra
Amit Joshi
Shikha Maheshwari

About This Book

This book includes high-quality and peer-reviewed papers from the *International Conference on Emerging Trends in Expert Applications and Security* (ICETEAS 2018), held at Jaipur Engineering College and Research Centre, Jaipur, India, on February 17–18, 2018, presenting the latest developments and technical solutions in expert applications and security. Expert applications and security is receiving increasing popularity and acceptance in the engineering community because of the existence of a close match between the capabilities of the current generation expert systems and the requirements of engineering practice. Keeping this ideology in mind, the book offers insights that reflect the advances in these fields from upcoming researchers and leading academicians across the globe. Covering a variety of topics, such as expert applications and artificial intelligence, information and application security, advanced computing, multimedia applications in forensics, security and intelligence, advances in web technologies, and implementation and security issues, it helps those in the computer industry and academia use the advances of next-generation communication and computational technology to shape real-world applications. The book is appropriate for the researcher and the professional. The researcher can save considerable time in searching the scattered technical information on expert applications and security. The professional can have a readily available rich set of guidelines and techniques that are applicable to a wide class of engineering domains.

Contents

About the Editors

Vijay Singh Rathore is Professor at JECRC, Jaipur. He has completed his Ph.D. in computer sciences at the University of Rajasthan. He is an active member of various academic committees, including IEEE, ACM, UGC, IGNOU, RTU, UOR, IISU, and JNU. He has published over 100 papers in high impact journals and conference proceedings and has written books on *Computer Science, Information Technology and Management*. He has also filed two patents for SMILE and FOBIA.

Marcel Worring is Professor at Data Science for Business Analytics (Amsterdam Business School) and Associate Professor at the Informatics Institute (IvI). He is also Associate Director of Amsterdam Data Science (www.amsterdamdatascience.nl). He has completed his Ph.D. in shape analysis of digital curves at the University of Amsterdam. His research interests are in multimedia analytics, with a focus on the integration of multimedia analysis, multimedia mining, information visualization, and multimedia interaction into a coherent framework that yields more than its constituent components.

Durgesh Kumar Mishra received his M.Tech. in computer science from DAVV, Indore, in 1994 and Ph.D. in computer engineering in 2008. He is currently working as Professor (CSE) and Director of the Microsoft Innovation Centre at SAIT, Indore, Madhya Pradesh, India. He is also Visiting Faculty at IIT-Indore, Madhya Pradesh, India. He has 24 years of teaching and 10 years of research experience and has published over 90 papers in refereed international/national journals and conferences, including IEEE and ACM conferences. He has also served as Chairman of Computer Society of India (CSI) , CSI Indore Chapter; State Student Coordinator—Region III MP; Member-Student Research Board; and Core Member-CSI IT Excellence Award Committee. He is currently Chairman of CSI Division IV Communication at National Level (2014–2016). He had been Chief Editor of the Journal of Technology and Engineering Sciences, consultant to industry and Government of Madhya Pradesh Organizations, and Member of BIS, for the Government of India for Information Security Domain.

Amit Joshi is a young entrepreneur and researcher with a B.Tech. in information technology and M.Tech. in computer science and engineering, and currently his research interests are in the areas of cloud computing and cryptography. He has 6 years' of academic and industry experience in prestigious organizations of Udaipur and Ahmedabad. He is an active member of ACM, CSI, AMIE, IACSIT-Singapore, IDES, ACEEE, NPA, and many other professional societies. He has presented and published more than 30 papers in national and international journals and IEEE and ACM conferences. He has also edited three books on diverse subjects and organized over 15 national and international conferences and workshops.

Shikha Maheshwari has dedicated over 10 years to educating the engineering students who will shape the country's future. She received her M.Tech. in CSE from Mody Institute of Technology and Science, Laxmangarh, in 2008. She is currently working as Assistant Professor (CSE) at JECRC, Jaipur, India. She was also recognized as a Microsoft Innovative Educator-Expert (MIE-E) in 2017. She is also a member of the editorial boards and program committees and a reviewer for numerous national and international refereed journals and conferences.

Performance Comparison of LANMAR and AODV in Heterogenous Wireless Ad-hoc Network

Madhavi Dhingra, S. C. Jain and Rakesh Singh Jadon

Abstract Wireless ad-hoc network is a self-configuring network which works without the help of centralised devices. Dynamic nature of network topology is a major concern in this kind of network and thus it requires efficient routing protocols. There are various routing protocols which are working in this area for specific objectives. The performance of each routing protocol varies with network configuration and tits specific working. This paper has focused on the LANMAR and the AODV routing protocol and compared their performance on various parameters in heterogenous networks.

Keywords We LANMAR · AODV · Routing protocols · MANET

1 Introduction

This instruction file Wireless ad-hoc network is infrastructure less network where no routers are fixed. All nodes are mobile and capable of moving in the network. Nodes act as routers, identify and maintain the routing inside the network. These networks are inexpensive in comparison to infrastructure-based network. There are various MANET routing protocols having distinct characteristics. These protocols are classified on the basis of several points that include

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- Communication model
- Structure
- State Information
- Cast Property
- Scheduling

One of the important classifications of routing protocols is casting property, based on which it is divided into two types: Unicast and Multicast Routing Protocol. Unicast protocol sends the messages to a single node or host in the network while multicast protocol sends the messages to a group of hosts of the network.

There are various unicasting routing protocols LANMAR and AODV are the unicast routing protocols which are discussed in this paper for performance comparison. The main work of this paper is to assess these protocols in the simulated environment. The results are evaluated on Qualnet Simulator.

2 Working Principle of AODV and LANMAR

2.1 AODV Routing Protocol

The Ad-hoc On-Demand Distance Vector algorithm allows dynamic multiple node routing. This protocol can work small as well as large sized networks [1]. The AODV protocol can be used in only those cases where two nodes do not have a specific path between each other. A precursor list is maintained to keep track of the IP addresses of the neighbouring nodes. This information is used in the routing table. This algorithm does not maintain routes of inactive nodes. This protocol enables the mobile nodes to inform the other nodes that are to be affected by link breakages and change in topology. To perform the above functions, this protocol defines three types of messages. First, Route Requests (RREQs) messages initiate the route finding process. Second, Route Replies (RREP) messages finalise the path and third, Route Errors (RERRs) message a inform the nodes of the network about the breakage of the link used in an active route.

3 LANMAR Routing Protocol

LANMAR is basically designed for scalable networks. Landmark routing was first discovered in wired networks [2]. This method requires multiple levels of hierarchical addressing that has to be predefined. The hierarchical address specifies the location of the node and helps in determining its path. Each node has complete knowledge about the path of all other nodes in the network and the landmarks at different levels in the hierarchy. All the paths are defined in top-down manner.

LANMAR uses the concept of landmark and scoped routing. Its wired use is extended in the wireless ad-hoc network. This scheme does not need the predefined addresses of the hierarchy. Instead, it makes use of the specified landmarks to have knowledge about the different networks. Landmarks are basically a group of nodes having same characteristics and goal. The information about the landmark routes is sent all over the network by using distance vector procedure. The route to a landmark is sent throughout the network by following the process of distance vector algorithm.

All the landmarks store the routing information in the summarised form, thereby reducing the size of the routing table. These landmarks are also aware of the change of routing in case of traffic overhead. Thus, this protocol provides an efficient and scalable environment for ad-hoc networks. This algorithm provides more advantages in terms of reducing the routing packet size and updating the correct routes to mobile nodes. It achieves high data packet delivery ratio.

4 Proposed Methodology and Simulation Setup

The methodology [3] used in simulator is divided into following parts

1. The scenarios is set up to create the heterogenous network of 14 nodes. The wired and wireless network both are set up using the nodes and the wired and wireless links. CBR is given between nodes.
2. The source to destination links are made through the heterogenous network.
3. In the third step, routing protocol is specified at the MAC layer and simulation is run.
4. The analysis reports are seen and compared for evaluating the performance.

5 Node Placement Scenario

The heterogenous network is created by creating two hierarchies of wired nodes and one of wireless system (Fig. 1).

5.1 Simulation Setup

The simulation of the heterogenous mobile ad-hoc network is done on Qualnet [4]. The performance of wireless network is evaluated by applying routing protocols on hierarchical network [5–8]. Wired and wireless hierarchy are set up and Constant Bit Rate (CBR) [9, 10] is applied between different nodes. The scenario size is set as 1000 * 1000 sq with 14 nodes. Packet size of 512 bytes is used. Wired link is given from {2} to {9} and from {8} to {14} (Table 1).

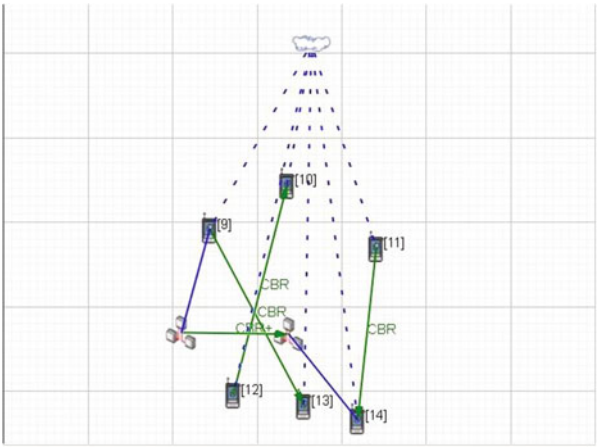

Fig. 1 Node placement scenario of heterogenous wireless MANET

Table 1 Simulation parameters

Parameters	Values
Number of nodes	14
Simulation area	1000 * 1000
Routing protocols	AODV/LANMAR
Packet size	512 bytes
Traffic Type	Constant Bit Rate (CBR)
Hierarchy 1	{2, 9}
Hierarchy 2	{8, 14}
Wireless subnet	(9 through 14}
Wired subnet	{1 through 4}, {5 through 8}
Simulation time	200 s

6 Discussion and Simulation Result

The performance of AODV and LANMAR protocols is evaluated based on the following parameters:

1. Average unicast end to end delay (Figs. 2 and 3)
2. Average unicast jitter (Figs. 4 and 5)
3. Unicast Received Throughput (Figs. 6 and 7)
4. Unicast packets sent to and received from channel 802.11 MAC (Figs. 8, 9, 10 and 11 and Table 2)

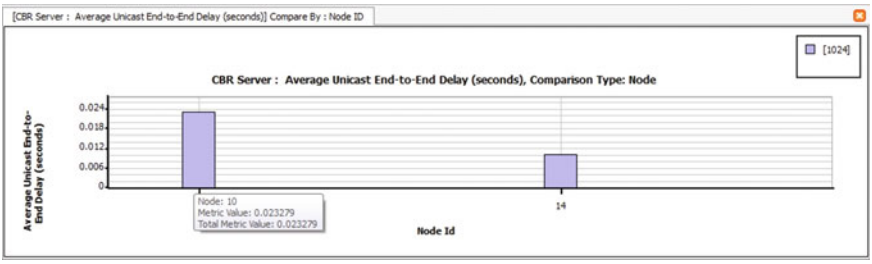

Fig. 2 AODV: CBR Server

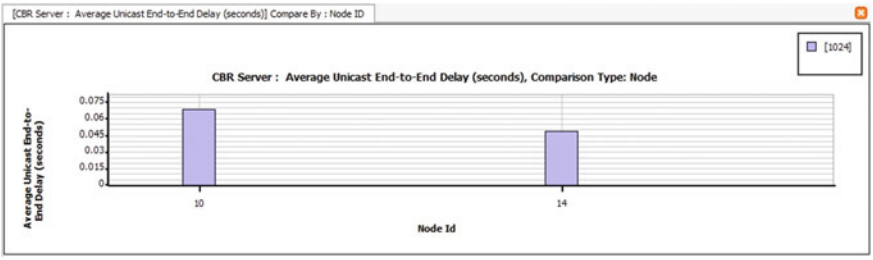

Fig. 3 LANMAR: CBR Server

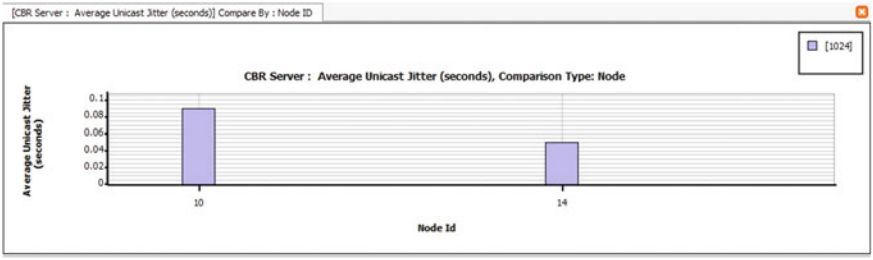

Fig. 4 AODV: CBR Server

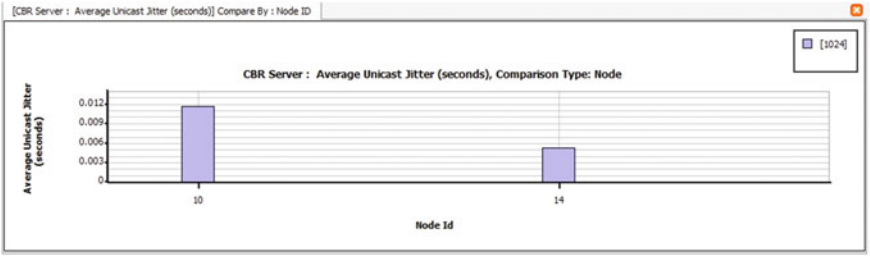

Fig. 5 LANMAR: CBR Server

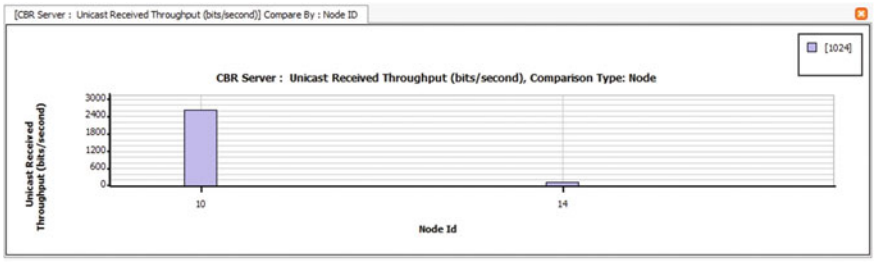

Fig. 6 AODV: CBR Server

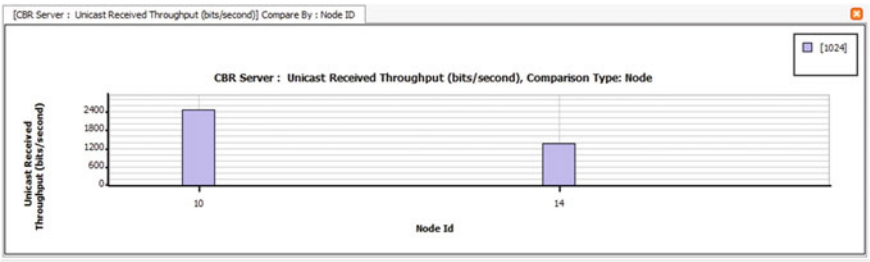

Fig. 7 LANMAR: CBR Server

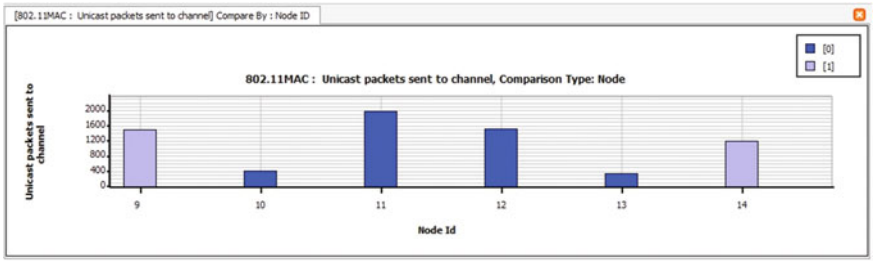

Fig. 8 AODV 802.11 MAC unicast packets sent

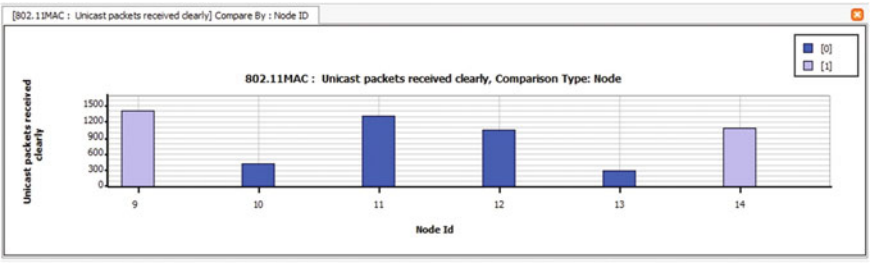

Fig. 9 AODV 802.11 MAC unicast packets received

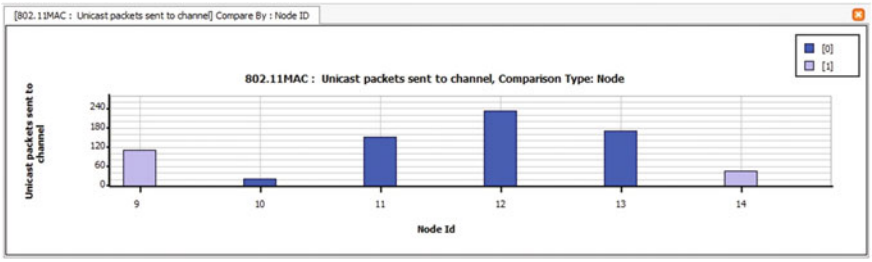

Fig. 10 LANMAR: 802.11 MAC unicast packets sent

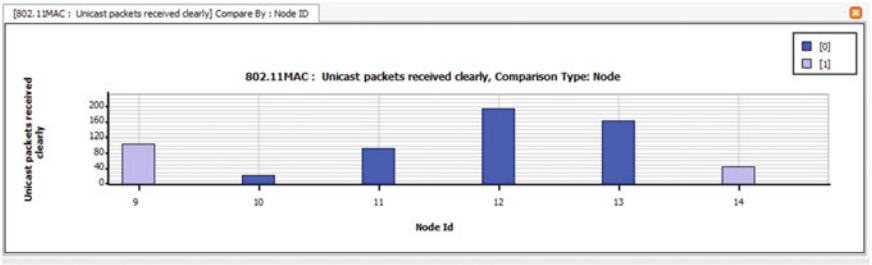

Fig. 11 LANMAR: 802.11 MAC unicast packets received

Table 2 Simulation results

Parameters	AODV values	LANMAR values
Average unicast end to end delay (in seconds)	0.065 at node {10}, 0.047 at {14}	0.023 at {10}, 0.010 at {10}
Average jitter	0.082 at {10}, 0.05 at {14}	0.012 at {10}, 0.005 at {14}
Unicast received throughput (bits/sec)	2400 at {10}, 1400 at {14}	2600 at {10}, 100 at {14}

7 Conclusion

This paper has analysed the performance of AODV and LANMAR routing protocol based on some parameters by using Qualnet simulation tool. In heterogenous wireless networks, LANMAR routing protocol is best in case of unicast end to end delay, average jitter. AODV and LANMAR both protocols give the optimal throughput. Packet Dropping ratio of LANMAR is very minimal. Overall, LANMAR is best suited for large-scale mobile ad-hoc wireless heterogenous network.

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