International Journal of Contemporary Research in Computer Science and Technology (IJCRCST) e-ISSN: 2395-5325
Volume2, Issue 5 (May '2016)

PERFORMANCE ANALYSIS OF ROUTING PROTOCOLS USING ADMISSION CONTROL SCHEME FOR CLUSTERED AD HOC NETWORKS

T.Parameswaran,
Teaching Fellow,
Department of CSE,
Anna University Regional Centre,
Coimbatore, India.

Dr. C. Palanisamy,
Professor and Head,
Department of IT,
Bannari Amman Institute Of Technology,
Sathyamangalam, Erode, India.

P.Bhagya devi,
PG Scholar,
Department of CSE,
Anna University Regional Centre,
Coimbatore, India.

Abstract: Mobile Ad hoc network is dynamic network because it has moving nodes and also do not have any fixed infrastructure to operate. In MANET routing protocol used to provide a path from source node to destination node. Mobile Ad hoc have some security problems and also network congestion, Packet loss and packet delay. To avoid these difficulties using clustering framework in Mobile ad hoc network and also to avoid packet transmission delay, network congestion and packet loss. Packet based admission control scheme provides Quality of service and evaluate the address of the new arrival packet. To analyze the performance of routing protocols in clustered ad hoc networks, the proposed approach introduces the new Mobility Identity Connectivity based clustering algorithm for cluster formation and comparative study has been made on the routing protocols through simulation thus finding the efficient protocol in clustered ad hoc networks.

Keywords: MANET, Clustering, Routing Protocol, Packet based Admission Control Scheme, Quality of Service, Clustering algorithms.

I. INTRODUCTION

Ad hoc network consists of versatile a flat form that is unengaged to move efficiently**.** An ad hoc network is a multi-hop network for data transmission in wireless communication that with none fastened infrastructure [6]. The network is a type and deforms on-the-fly while not the necessity for any system**.** Ad hoc structure doesn't need an access point, it's straightforward to setup, particularly in a very little or temporary network**.** Every node within the network forwards the packet while not the necessity of central administration. In ad hoc network, node acts as a router to send and receive the information. An advantage of the system is lustiness, flexibility and quality.

Ad hoc network is capable for analyzing radio propagation atmosphere to optimize the performance. This generally needs that the network node has positioning capability additionally as memory to recall geographical native condition. An ad hoc network generally refers to any set of network whenever all devices have equal standing on a network and unengaged to go together with the other ad hoc network device in link range [6].

A "mobile ad hoc network" (MANET) is a self-determining system of mobile routers (and associated hosts) connected by wireless links – the union of that kind of an arbitrary graph. The router is unengaged to alter at random and organize them arbitrarily; that the network's wireless topology could modify quickly and unpredictably. Such a network could be operating in an independent mode, or could also be connected to the larger web."

The routing protocol ought to be specified it will give up with the changes within the network topology [9]. So, by dividing the network into clusters, currently the paths are recorded between clusters rather than between nodes and this increase the routes lifetime, so it decreases the amount of routing control overhead. Clustering also increases the network capability and reduces the routing overhead that brings more efficient and effective routing in MANET. Each cluster algorithmic program consists of two mechanisms, cluster formation and cluster maintenance. In cluster formation, cluster heads are chosen among the nodes to create the hierarchical network [20].

Routing is the process of exchange of information from source node to destination node. By doing this process routing protocol will be used to discover the path. Such protocols will be used to deals the routing problems and typical limitations.

II. MANET

The MANET is enduring to attract the concentration for their potential use in several fields [15]. A mobile ad hoc network (MANET) is a grouping of wireless mobile nodes that are communicating with each other using multi-hop wireless links without a centralized network infrastructure. Mobility and absence of any fixed infrastructure make used

in taxi service operation. MANET is very attract for mobility and liberate operations and time critical applications and military network environments in the battle fields, disaster operations, search and liberate operations, and conference rooms and also in feasible applications like vehicle ad hoc networks used [19]. Due to host mobility, network topology often changes and finding and maintaining the routes is very important problem.

Features of MANET

Despite of these applications, mobile nodes in MANET have their own metrics such as, small storage requirements, utilization of low bandwidth, low error rate in data transmission, limited battery power usage, easy and quick deployment, no planning required (created at time it is needed), no need of infrastructure, no need of central controlling. These are many network actions performed by the mobile nodes in MANET. They are authentication, routing, packet delivery, data transmission, packet forwarding, network management process, discovering topology and delivery of the packets.

III. CLUSTERING

Clustering is defined as grouping of nodes. Each group should contain the cluster head, it control all other in the cluster. Each node communicates through using of cluster, by the purpose of security purpose [1]. There are many type of cluster formation algorithm will be there each should focuses on some factors such as Mobility, Connectivity and Security, etc. Simple network compared with clustered network, its efficiency is high because using clustering framework to avoid network congestion because in a simple network that have number of nodes in packet transmission some confusion will occurred. Using clustering to avoid these congestions because of cluster have CH it control all other nodes no congestion will occurred. Cluster formation algorithm should classify as many types [2]. Each should focus on some factors such as connection, id, security, etc. [15].

- Low cost maintenance cluster formation algorithm
- Security based cluster formation algorithm
- Mobility based cluster formation algorithm
- Connectivity based cluster formation algorithm
- Identity based cluster formation algorithm

IV. ROUTING PROTOCOL

Routing is the important task for data transmission it will be done on routing protocols. Routing protocols are used for discovery of paths from source node to the destination node [10]. Routing protocols will be classified as proactive and reactive. In proactive means when the routes are needed that time the path will be discovered by the routing protocols. Reactive protocols store the paths in table manner which means it will store all paths about the network. To compare AODV, DSR, OLSR and DYMO, the comparative study will be done by using network Simulator [18].

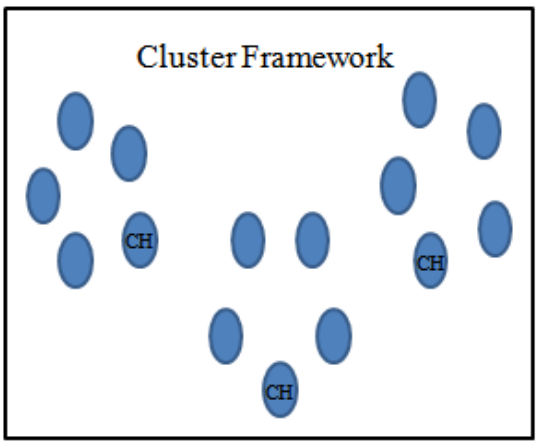


Figure 1: Cluster

AODV

Ad hoc on demand distance vector routing protocol is a distance vector routing protocol. It is a reactive protocol [3]. When the routes will be need at that time to discover the path. AODV uses sequence number to avoid the technical problems also it discover the path by the use of expanding ring search mechanism [4]. It also supports high mobility factor compared with other routing protocols. It also uses Time-To-Live path discovery technique.

DSR

Dynamic Source Routing protocol is an on demand routing protocol otherwise called as reactive routing protocol. DSR find multiple paths in a single discovery cycle. It is very suitable for dense mobile networks it also supports more than 200 nodes in a network. It is very efficient for large network but it support less mobility factor compared with other routing protocols [6].

DYMO

Dynamic MANET On demand is a reactive or on demand routing protocol when the routes are needs at that time to discover the routes. It is similar to AODV routing protocol. But the main difference is features of AODV. It is suitable for sparse traffic networks. It also supports mobility [9]. It also use sequence number used for determining the path.

OLSR

Optimized Link State Routing is a proactive routing protocol. In this routing protocol routes are always available when needed. The paths will be maintained in a table format. Each node have multiple paths all path will be stored on the table [9]. This protocol used to reduce the message overhead produced by traditional link state protocol. This protocol is suitable for large and dense network [11].

V. RELATED WORKS

MOBILITY PROPERTIES IN MOBILE AD HOC NETWORKS

The context-awareness routing algorithm the DDV (Dynamic Direction Vector) hop algorithm in mobile ad hoc networks is discussed. Both the algorithm performs cluster formation for the base station using the range of direction

and threshold of velocity and calculated the exchange of the cluster head node probability using the direction and velocity for maintaining cluster formation .The DDV-hop algorithm is a probabilistic routing protocol for several networks. The simulations are conducted on a number of clusters, network areas, transmission ranges and velocity of nodes in mobile networks. Thus results suggest the DDV-hop algorithm demonstrates efficiency of eventual delivery and maintains the proper number of clusters and cluster members regardless of topology changes with a lower communication overhead in several interesting environment. The DDV-hop algorithm succeeded in maintaining communication with a lower communication overhead and overall shows a better performance.

MOBILITY-BASED CLUSTER FORMATION ALGORITHM

The algorithms for clustering the wireless mobile ad-hoc networks (MANET) considering the network mobility characteristics is automata based weighted cluster formation algorithm called MCFA in which the mobility parameters of the hosts are assumed to be random variables with unknown distributions. The expected relative mobility of each host with respect to all its neighbors is estimated by sampling its mobility parameters in various epochs. MCFA is a fully distributed algorithm in which each mobile independently chooses the neighboring host with the minimum expected relative mobility as its cluster-head. The expected relative mobility of each host with respect to all its neighbors is estimated by sampling its mobility parameters in various epochs. This is done based on the local information each host receives from its neighbors and the hosts need not to be synchronized [8].

ROUTING PROTOCOL FOR CLUSTERED WIRELESS SENSOR NETWORK

Energy consumption is a major issue in designing wireless sensor networks. To achieve the energy efficiency, LEACH is used. LEACH utilizes randomize rotation of the cluster heads to evenly distribute energy load among all nodes. A new application specific low power routing protocol named ASLPR is introduced that takes into account some concepts from sensor nodes (e.g., distance from base station, residual energy, distance between cluster heads) to elect the optimal cluster heads. As the proposed routing protocol is complex and has some controllable parameters, tuning of its parameters is an important problem to achieve the best performance based on the application. A hybrid algorithm based on genetic algorithm and simulated annealing is applied to optimize ASLPR in order to prolong the network lifetime, based on the application specifications [17].

CLUSTERING ROUTING PROTOCOLS IN WIRELESS SENSOR NETWORKS

The last few years have witnessed increased interest in the potential use of wireless sensor networks (WSNs) in a wide range of applications and it has become a hot research area based on network structure. The routing protocols can be divided into two categories are given flat routing and clustering routing. The clustering is becoming an active branch of routing technology in WSNs. This survey present a comprehensive and fine grained survey on clustering routing protocols proposed in the literature for WSNs. The outline the advantages and objectives of clustering for WSNs, and develop a novel taxonomy of WSN clustering routing methods based on complete and detailed clustering attributes. In particular, we systematically analyze a few prominent WSN clustering routing protocols and compare these different approaches according to our taxonomy and several significant metrics [9].

VI. SYSTEM ANALYSIS

The MANET is continuing to attract the attention for their potential use in several fields. A mobile ad hoc network (MANET) is a collection of wireless mobile nodes that are communicating with each other using multi-hop wireless links without a centralized network infrastructure. In Ad hoc network packet losses, end-to-end delay occurred. So using Routing protocols for Wireless network are responsible for maintaining the routes in the network and also deals with link failures or speed of the route discovery process impact the admission control process. Impact of routing protocol choice of Envelope based admission control scheme for ad hoc network; analyze the performance of routing protocols combined with Envelope based admission control scheme. EBAC scheme used to evaluate the envelope of the new incoming node. Envelope contains the information like service and arrival details of the new node. The data sends from one node to another node by the use of routing protocols. Compare the performance of the routing protocols like AODV, DSR, DYMO and OLSR. EBAC with Dynamic Source Routing protocol supported only 10% of mobility factor.

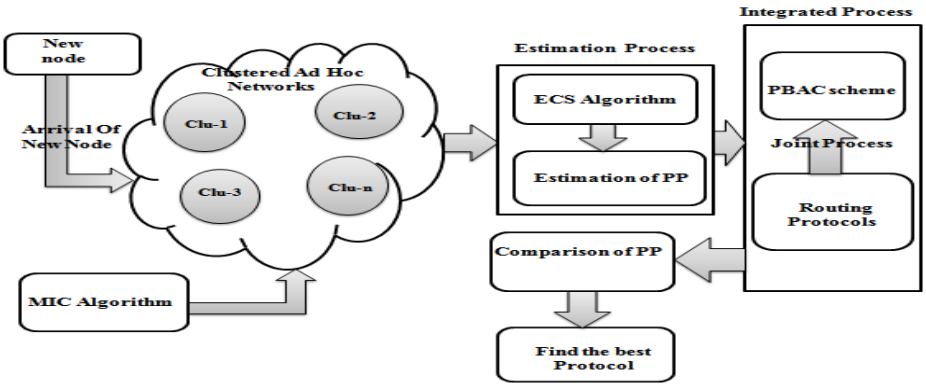


Figure 2: System Architecture Diagram

OLSR protocol is a protocol designed for only large and dense network. AODV and DYMO protocols allowed the EBAC to support mobility factor up to 40% and 50%. Nevertheless DYMO protocol accepted only half as many as voice flows, due to long packet delays. Considering the average end-to-end delay, packet losses and percentage of accepted flows, the use of the AODV protocol joined with EBAC achieved the best performance for ad networks.

Drawbacks

- Packet loss
- Packet delay
- Data collision
- Network congestion

Clustering gives the best solution for network congestion, packet losses and data collision. The cluster formation is completed using the proposed MIC cluster formation algorithm. The cluster formation is based on certain predefined conditions. Then the probing packet is transferred from source to destination using the routing protocols like AODV, DSR, DYMO and OLSR.

The proposed clustering algorithm deals with network congestion and data collision of the ad hoc network. The destination node evaluates the probing packet of the new packet flow to check the bandwidth and the address of the packet using Emergence control scheme. If the address and range present in the specified level, further packet flow process will be progress otherwise packet flow rejected. To provide Qos to the packet flow, admission control scheme will be used. In clustered ad hoc network Packet based admission control scheme used to provide Qos to the packet flow. As a final point the protocol performance will be analyzed joint with PBAC scheme, to analyze which routing protocol gives the efficient performance for clustered ad hoc networks.

Advantages

- Time taken for packet transmission is reduced.
- Improve the performance network.
- Network congestion is reduced using clustering.
- Packet loss and packet delay is reduced.

VII. SYSTEM ARCHITECTURE

The Architecture figure describes the architectural design of the system. It deals with deployment of nodes, followed cluster formation using MIC algorithm.Clustering gives the best solution for network congestion, packet losses and data collision. After the cluster formation the probing packets transferred from source to destination by the use of routing protocols like AODV, DSR, DYMO and OLSR. The destination node evaluates the probing packet of the new incoming packet using emergence control scheme. Further the packet flow process will be progress. Finally to analyze the performance of the routing protocol find which routing protocol gives the efficient performance for clustered ad hoc networks.

Network Deployment

The simulation work has been done with the Network Simulator ns-2. In the simulation 100 nodes are randomly distributed within the network field of size 1000m*1000m.

Cluster Formation Using MIC Algorithm

Clustering gives the best solution for network congestion, packet losses and data collision. The cluster formation is completed using the proposed MIC cluster formation algorithm. The cluster formation is based on certain predefined conditions. Then the probing packet is transferred from source to destination using the routing protocols like AODV, DSR, DYMO and OLSR.

ECS Packet Evaluation

The destination node evaluates the probing packet of the new packet flow, to check the bandwidth and the address of the packet using Emergence control scheme. If the address and range present in the specified level, further packet flow process will be progress otherwise packet flow rejected.

PBAC Scheme

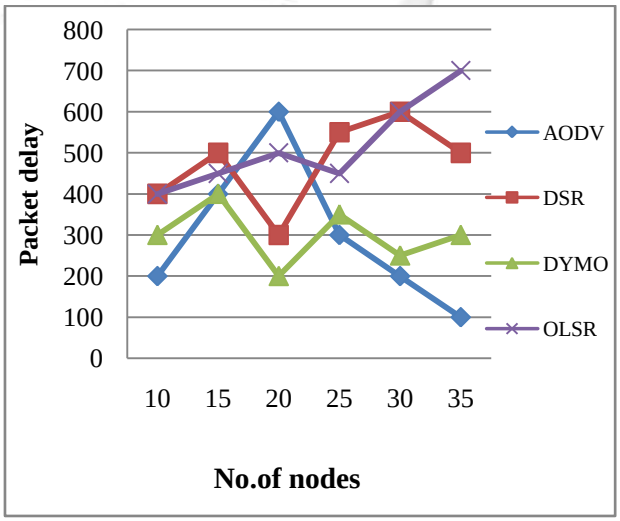
To provide Qos to the packet flow, admission control scheme will be used [20]. In clustered ad hoc network Packet based admission control scheme used to provide Qos to the packet flow.

PP Assessment

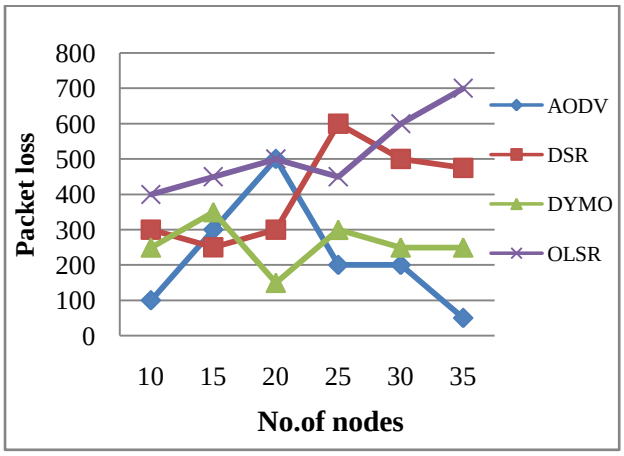
Protocol performance will be analyzed joint with PBAC scheme, to analyze which routing protocol gives the efficient performance for clustered ad hoc networks.

VIII. RESULT AND DISCUSSIONS

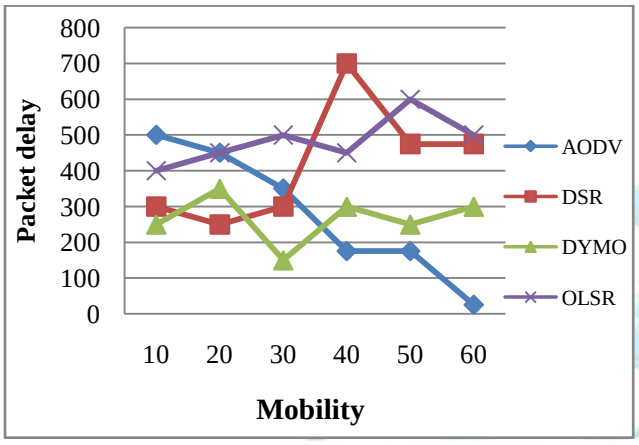
In this section presents the results and simulation of the routing protocols. The simulation will be done by the use of Network Simulator.



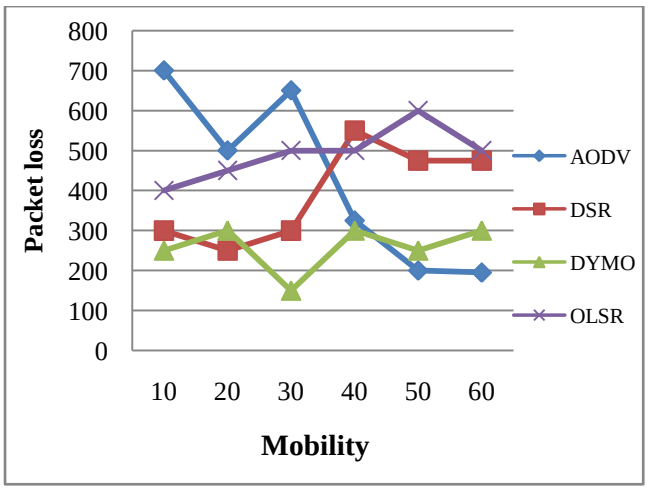
(a) No. of nodes versus packet delay for packet transmission using AODV, DSR, DYMO and OLSR routing protocols.



(b) Packet loss versus no. of nodes for packet transmission using AODV, DSR, DYMO and OLSR routing protocols.



(c) Packet delay versus mobility for packet transmission using AODV, DSR, DYMO and OLSR routing protocols.



(d) Packet loss versus mobility for packet transmission using AODV, DSR, DYMO and OLSR routing protocols.

IX. CONCLUSION AND FUTURE WORK

The major issue of the ad hoc network is network congestion, data collision and packet delay. This project focuses on enhancing the performance of the network, using MIC clustering algorithm. It maintains the node in a certain predefined conditions and hence it prevents the network congestion and packet delay. It also increases the efficiency of the network by using clustering algorithm. This algorithm allows the packet transmission without network congestion and delay. The simulation is done using NS2 and the results are analyzed.As a future work, routing can be done using the routing protocols like AODV, DSR, DYMO and OLSR. Analyze the performance of the routing protocol in clustered ad hoc network, which routing protocol efficient for clustered ad hoc network. So, that protocol improves the efficiency of the network.

X. REFERENCES

[1] Ameer Ahmed Abasi, Mohamed Younnis, 21 June 2007, 'A survey on clustering for wireless sensor networks',Elsevier.

[2] 'Clustering with evolution strategies', Pattern Recognit., vol. 27, no. 2, pp. 321–329, 1994.

[3] C. Perkins, E. Belding-Royer, S. Das, Ad hoc On-Demand Distance Vector (AODV) Routing, RFC 3561, July 2003.

[4] C. Perkins, E. Royer, 'Ad-hoc on-demand distance vector routing', in: Proceedings of Second IEEE Workshop on Mobile Computing Systems and Applications, WMCSA, 1999.

[5] D. Johnson, Y. Hu, D. Maltz, 'The Dynamic Source Routing Protocol (DSR) for Mobile Ad Hoc Networks for Iv4', RFC 4728, February 2007.

[6] Frodigh, M., Jhansson, P, Larsson P, (2000), 'Wireless ad hoc networking: The art of networking without a network', Ericsson Rev. 4: 248-263.

[7] Gwo-Jong Yu, Chih-Yung Chang, (2007), 'An efficient cluster-based multi-channel management protocol for wireless ad-hoc networks',Elsevier.

[8] Ira Nath, Soumitra Das, December 2014, **'**Mobility Based Clustering Algorithm for Ad Hoc Network: MBCA', International Journal, Volume 4.

[9] J. Kumar, 2012, "Comparative Performance Analysis of AODV, DSR,DYMO,OLSR and ZRP Routing Protocols in MANET Using Varying Pause Time," International Journal of Computer Communications and Networks (IJCCN),2(3), pp 43–51.

[10] Mohammad Shokouhifa, Ali Jalali, (2014) , 'A new evolutionary based application specific routing protocol for clustered wireless sensor networks', AEUE - International Journal of Electronics and Communications.

[11] P. Jacquet, P. Muhlethaler, T. Clausen, A. Laouiti, A. Qayyum, L. Viennot, 'Optimized Link State Routing protocol for Ad Hoc networks', in: IEEE International Multi Topic Conference – INMIC, 2001.

[12] Papadimitratos P, Haas Z.J., (2002), 'Secure routing for mobile ad hoc networks', In SCS Communication Networks and Distributed Systems Modeling and Simulation Conf. (CNDS 2002), San Antonio, TX.

[13] Salamanca.P, Pena N.M., Da Fonseca, May 2013, 'A Distributed Envelope-Based Admission Control For multi-hop IEEE 802.11 Ad-hoc Networks',IEEE Latin America Transactions, Vol.11, No.3.

[14] Stephen L, Chiu, (1994), 'Fuzzy model identification based cluster estimation', Journal of Intelligent and fuzzy systems, Vol.2, 267-278(1992).

[15] Young-jun oh, Kang-whan Lee, 3 April 2015, 'A Clustering Algorithm Based on Mobility Properties in Mobile Ad-hoc Networks', International Journal of Distributed Sensor Networks, Vol. 2015.

[16] P. Kumarawadu, D.J.Dechene, 2008, 'Algorithms for Node Clustering in Wireless Sensor Networks: A Survey', IEEE.

[17] J. Kumar,2012, 'Comparative Performance Analysis of AODV, DSR,DYMO,OLSR and ZRP Routing Protocols in MANET Using Varying Pause Time', International Journal of Computer Communications and Networks (IJCCN).

[18] Shrawan Kumar Kushwaha, Asim Kumar and Nitin Kumar, 2014, 'Routing Protocols and Challenges Faced in Ad hoc Wireless Networks', Advance in Electronic and Electric Engineering. ISSN 2231-1297, Volume 4, Number 2, pp. 207-212.

[19] Harshavardhan Kayarkar, 'A Survey on Security Issues in Ad Hoc Routing Protocols and their Mitigation Techniques'.

[20] S. Chakrabarti, 2001, 'QoS issues in ad hoc wireless networks,' IEEE Commun. Mag., vol. 39, no. 2, pp. 142–148.

AUTHORS BIOGRAPHY

Parameswaran.T has received his B.E degree in Electronics and Communication Engineering from Velalar College of Engineering and Technology, Erode, and M.E degree in Software Engineering from College of Engineering Guindy, Anna University Chennai in 2005 and 2008 respectively. He is currently pursuing his Ph.D Anna University Chennai. He is currently working as Teaching Fellow in the Department of Computer Science and Engineering, Anna University Regional Campus, Coimbatore, Tamilnadu, India.

Palanisamy.C has received his B.E degree in Electronics and Communication Engineering from University of Madras, Chennai and M.E degree (Gold Medalist) in Communication Systems from Thiagarajar College of Engineering, Madurai, and Madurai Kamaraj University in 1998 and 2000 respectively. He has received his Ph.D from the faculty of Information and Communication Engineering, Anna University, Chennai in 2009. He has more than 15 years of academic and research experience and currently he holds the post of Professor and Head of the Department of Information Technology, Bannari Amman Institute of Technology, Sathyamangalam, Tamilnadu, India. He has published more than 40 research papers in various journals and conferences. He has organized more than 15 workshops and holds 2 funded projects. He is a lifetime member of ISTE. He Won Best M.E Thesis Award at Thiagarajar College of Engineering, Madurai and best paper award titled, "A Neural Network Based Classification Model Using Fourier and Wavelet Features," Proceedings of the 2nd Int. Conf. on Cognition and Recognition 2008, (ICCR 2008), Organized by P.E.S. College of Engineering, Mandaya, Karnataka, India, pp. 664-670, 2008. His research interests include Data mining, image processing, and mobile networks.

Bhagya devi.P received the Bachelor Degree in Information Technology from Anna University of Technology; Thiruchirappalli in 2014.She is currently pursuing her Master Degree in Software Engineering from Anna University Regional Campus, Coimbatore, Tamilnadu, India. Her area of interest is networking.