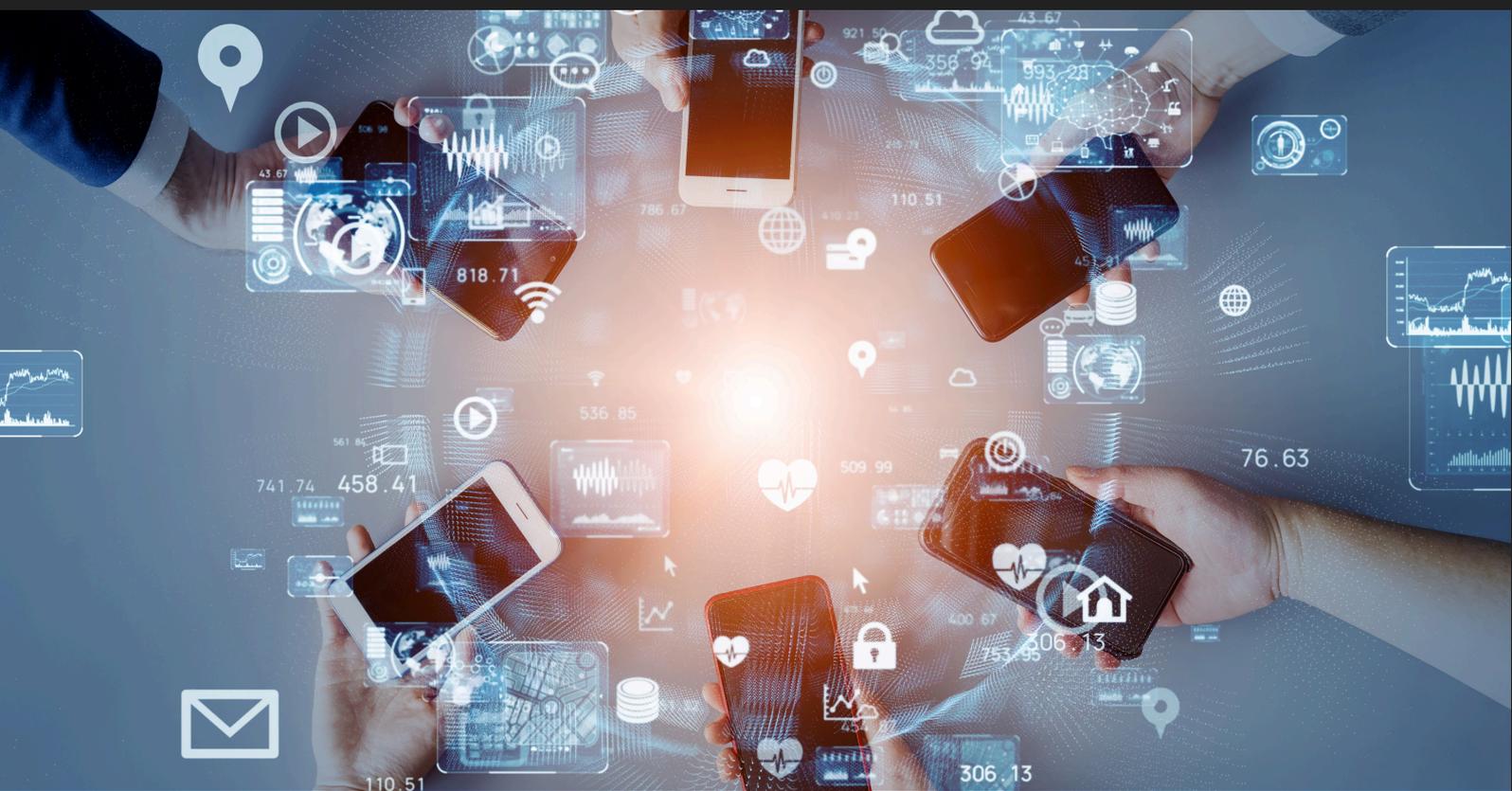
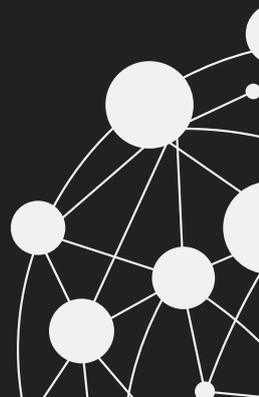


Communication in Cluster Based Mobile AD Hoc Network:

A Reliability Analysis



Dr. Parveen Kumari
Prof. Gaurav Aggarwal
Prof. Sugandha Singh



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Communication in Cluster Based Mobile AD Hoc Network: A Reliability Analysis

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Certificate of the Supervisor

This is to certify that the research work entitled "**Communication in Cluster Based Mobile Ad Hoc Network: A Reliability Analysis**" being submitted by Parveen Kumari, enrollment no. JNU/RS/2017/ET003 is the original research work and has been carried by the author under my supervision. In my opinion, the work addressed in this report has reached the standard of fulfilling the requirements of all regulations related to the degree. The results presented by this report have not been submitted to any other institute or university for the award of any degree or diploma.

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Certificate of Co-Supervisor

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Nagpur

Candidate's Declaration

I hereby certify that the presented work in this thesis "**Communication in Cluster Based Mobile Ad hoc Network: A Reliability Analysis**" in fulfillment of requirement for the award of degree of Doctor of Philosophy and submitted in Jagannath University, Bahadurgarh (HR) is a bonafied record of my work carried out during October 2017 to October 2020 under the supervision of Dr. Gaurav Aggarwal and Prof. Sugandha Singh.

I have not submitted this work presented in this thesis for the award of any other degree in this university or any other institute/university.

(Parveen Kumari)

Abstract

Mobile Ad hoc Networks (MANET) are supposed to provide good quality of services (QoS) under varying capacity of wireless channel with balanced energy consumption. But energy consumption also vary according to network formation. These varying conditions of channel and energy create difficulty in reliable and real time communication in MANETs. For these issues clustering has been taken into consideration where two techniques are used to attain reliable communication in MANET. These techniques are: Use of efficient energy and Quality of Services(QoS)

Mobile ad hoc networks consist the nodes which all are under energy constrained. Here, to reduce the consumption in energy is important. In this work, the main concentration is on the energy efficient communication in MANETs. A new strategy is being proposed for improving Weighted Clustering Algorithm (WCA) and clustering the wireless ad hoc networks. It has been shown that Node Quality based Weighted Clustering Algorithm (NQWCA) exceeds WCA. NQWCA has been proposed that computes the weight of each node within the cluster and node with lowest weight is elected as Cluster Head(CH). It outperforms in terms of network stability and cluster formation.

Mobile Ad hoc Network (MANET) are multi hop wireless networks that result from the cooperative engagement of a collection of mobile hosts without any centralized access point and infrastructure. The various nodes can directly communicate only when participating nodes are located within each other's radio range. The proposed work has enhanced the energy efficiency. Energy and queue length are QoS factors which provides the better performance in MANET. The combination of these factors are used for the process of route construction. Hence the basic routing protocol AODV is modified in the proposed protocol i.e EQ-AODV (Energy and Queue-AODV) which constructs the routes on the basis of 1) minimum length of nodes queue 2) maximum net energy of nodes.

Mobile ad hoc network is a wireless self organized network. The mobile nodes in the MANET dynamically establish routes among themselves to form their own network in an ad hoc fashion to make the communication between users more reliable. But still there are some challenges which effect the reliability of MANET. In this paper, the main focus is on the use of efficient energy and quality of services to make the reliable communication. Here the proposed solution works on the cluster based energy efficient ad hoc on-demand distance vector (EE-AODV) which gives the better result as compared to the previous proposed EQ-AODV and basic AODV.

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First of all I would like to bow my head in front of God, the most Beneficent and Merciful who has given me strength, persistence and knowledge to execute this research work.

This thesis contains research work conducted at Jagannath University, Jhajjar (HR) from October 2017 to October 2020 under the supervision of Dr. Gaurav Aggarwal and Prof. Sugandha Singh. I am highly grateful for their efforts, advice and encouragement. Their experience and expertise was a source of training during this period. I am motivated and inspired by them throughout the research activities.

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(Parveen Kumari)

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Abbreviations

MANET	Mobile Ad hoc Network
WLAN	Wireless Local Area Network
FH	Fixed Host
MH	Mobile Host
MSR	Mobility Support Router
AP	Access Point
MN	Mobile Node
IETF	Internet Engineering Task Force
QoS	Quality of Services
CH	Cluster Head
DSDV	Destination Sequenced Distance Vector
DV	Distance Vector
FSR	Fisheye State Routing
AODV	Ad hoc On Demand Distance Vector Routing
DSR	Dynamic Source Routing Protocol
TORA	Temporally Ordered Routing Algorithm
ASR	Associative Based Routing Protocol
HRP	Hybrid Routing Protocol
DVRP	Distance Vector Routing Protocol
LSRP	Link State Routing Protocol
ZRP	Zone Routing Protocol
P2P	Peer to Peer
OLSR	Optimizing Link State Routing
PLBR	Preferred Link Based Routing
CBRP	Cluster Based Routing Protocol

PBRP	Position Based Routing Protocol
GPS	Global Position System
WCA	Weighted Clustering Algorithm
CBR	Constant Bit Rate
NQWCA	Node Quality based Weighted Clustering Algorithm
EECP	Energy Efficient Cluster Based Routing Protocol
PSO	Particle Swarm Optimization
LEACH	Low Energy Adaptive Clustering Hierarchy
GACR	Genetic Algorithm based Clustering and Routing
CLACR	Core Location-Aided Cluster-based Routing protocol
CMDSR	Cluster-Based Multipath Dynamic Source Routing
NS	Network Simulator
TCL	Tool Command Language
UDP	User Datagram Protocol
TCP	Transmission Control Protocol
OTCL	Object Tool Command Language
RREQ	Route Request
RREP	Route Reply
RERR	Route Error
GUI	Graphical User Interface
MAC	Media Access Control
ECM	Energy Consumption Model
CHE	Cluster Head Election
EQ	Energy and Quality of Services
EE	Efficient Energy

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