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ACQoS: ANT COLONY OPTIMIZATION AND QUALITY OF SERVICE BASED PROTOCOL FOR ADHOC NETWORKS

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ABSTRACT: - The fast development in network multimedia tools have let extra real-time digital companies such as for instance as an example video-conferencing, online games and distance knowledge to cultivate to be the standard internet tasks. To have the ability to overcome the restrictions of the sooner methods a brand new improved strategy is planned in this paper. In the proposed strategy, the problem of multi-cast tree has been eliminated through the use of clustering based technique. To begin with multi-radio and multichannel centred nodes in addition has been deployed and these nodes are accountable for the multicasting. It has diminished the general energy usage of nodes and difficulty of smart algorithms. The path has been considered in relation to the ant colony optimization. Therefore improved the general performance of the QoS parameters of Ad-hoc networks. The planned strategy has been designed and implemented in MATLAB tool by using the data analysis toolbox. The experiments have shown proficient improvement of the planned strategy over the existing one.

I. INTRODUCTION

In MANET [1] the collection of wireless mobile nodes connected together to obtain temporary network in that your nodes are communicating with one another without any centralized control. The nodes are free to maneuver randomly and systematize themselves arbitrarily. Hence the network's topology may change quickly and unpredictably. The nodes which can be inside each other's radio range can communicate directly, whereas remote nodes rely on the neighbouring nodes to forward packets as a router. Routing is really a core difficulty in networks for sending data from node to another. Routing protocols works fine in wired a network does not display the similar performance in mobile ad hoc networks due to the fast change of topology. A MANET includes many challenges and issues such as Dynamic topologies, Frequency of updates or network overhead, energy, speed, routing and security. The routing protocol is needed whenever the foundation must send and receive the packets to the target. Many routing protocols have already been proposed for the mobile ad hoc network and classified as Proactive or Table Driven routing Protocol, Reactive or On Demand Routing Protocol.

Mobile means moving and adhoc means temporary without any infrastructure [8]. So, mobile adhoc network is an accumulation of wireless mobile nodes which have the capacity to communicate with one another with no fixed network infrastructure or any central base station [2]. The nodes themselves are accountable for creation, operation and maintenance of the network. Each node in the MANET is built with an instant transmitter and receiver, with the assistance of which it communicates with one other nodes in its wireless vicinity. The nodes which are not in wireless vicinity, communicate with one another hop by hop following a set of rules (routing protocol) for the hopping sequence to be followed [5].

Mobile ad-hoc networks can operate in a standalone fashion or may be attached to a larger network like the Internet. Mobile ad-hoc networks can turn the dream to getting connected "anywhere and at any time" into reality. Typical application examples add a problem recovery or even a military operation. Not bound to specific situations, these networks may equally show better performance in other places.

As an example, we would ever guess several peoples with laptops, in a business meeting at a location where no network services is present. They have the ability to easily network their machines by forming an ad-hoc network. That's one of many numerous examples where these networks may possibly be used.

II. LITERATURE SURVEY

Yen, Yun-Sheng et al. [1] proposed an energy-efficient genetic algorithm mechanism to solve these problems. Furthermore, they designed a source-tree-based routing algorithm and build the shortest-path multicast tree to minimize delay time using with small population size in the genetic algorithm. Just a few nodes are active in the route computation. In addition they improved the genetic sequence and topology encoding and prolong the duration of mobile nodes that calculate the rest of the battery energy most of nodes in a multicast tree. The simulation results show that their proposal method can be efficient and robust algorithm for multicast route selection. Masoudifar, Mina [2] discussed that nowadays supporting real-time and multimedia applications have become much more be essential required and needed for the users of mobile ad-hoc networks. QoS multicast routing protocols supply a mechanism to begin and set up a multicast session. Considering the fact a number of numerous different parameters affect on the caliber of service, each of the all the existing protocols has managed with a specific type of those parameters. In this paper, breakdown of QoS multicast protocols that have been proposed previously literatures are presented. In Additionally, the performances of those protocols are compared regarding performance metrics. Mukherjee, Tridib et al. [3] minimized the vitality overhead because of the high control traffic due to the periodic route and link maintenance operations in the proactive routing protocols for MANETs. This paper categorizes the proactive protocols on the basis of the maintenance operations performed; derives analytical estimates of the optimum route and link update periods for the various different protocol classes by considering the information traffic intensity link dynamics target reliability, measured when it comes to Packet Delivery Ratio (PDR), and the network size; and proposes a network layer dynamic Optimization of Periodic Timers (OPT) method based on the basis of the analytical estimates to locally vary the update periods in the distributed nodes. Simulation results reveal that DSDV-Opt, an alternative of DSDV protocol using OPT, — (i) achieves the goal PDR with 98.7% accuracy while minimizing the overhead energy; (ii) improves the protocol scalability; and (iii) reduces the control traffic for low data traffic intensity. Kim, Jihye, and Gene Tsudik [4] centered on securing the route discovery process in DSR. Their goal is always to explore a variety of suitable cryptographic techniques with varying flavors of security, efficiency and robustness. The Ariadne approach (with TESLA), while very efficient, assumes loose time synchronization among MANET nodes and doesn't offer non-repudiation. If the former is extremely difficult or the latter is desired, an alternative solution approach is necessary. To the end, they constructed safe and protected route discovery protocol (SRDP) allowing the foundation to securely discover an authenticated route to the destination using either aggregated message authentication codes (MACs) or multi-signatures. Several concrete techniques are presented and their efficiency and security are compared and evaluated. Nejad, Keyvan Kashkouli et al. [5] introduced this kind of routing scheme for MANETs, which is effective and useful under a wide variety of network topologies, nodes-density, coverage area size and nodes-mobility. The proposed scheme is founded on a story enhancement of the hint-based probabilistic protocol. Rather than broadcasting extensive control packets for network topology information retrieval as that of conventional routing schemes, the proposed scheme carefully reuses the feedback information carried in unicast packets for this specific purpose without introducing any extra overhead. The efficiency of the proposed scheme is demonstrated through both mathematical analysis and depends upon comprehensive thorough simulations study. Wang, Haiquan et al. [6] proposed a scalable Tree-Like Locator Distance Vector routing protocol for MANETs, which will be inspired by DART. This protocol splits node's ID and locator in network layer. Each node has one unique permanent ID and a temporary dynamic 2^b-ary

tree locator. Node's locator describes the node's relative position in the network's topology, and should change whenever the topology changes. Seno, Seyed Amin Hosseini et al. [7] proposed a hierarchical service discovery and advertisement protocol (HSDAP) implemented in the routing layer. HSDAP queries services by piggybacking service request (SREQ) packets on routing packets to cut back overhead and energy consumption. They extended the cluster-based routing protocol (CBRP) to enhance service management hierarchy. Simulation results reveal that adding service discovery and advertisement (SDA) functions to CBRP doesn't significantly affect overhead. SDA overhead, routing overhead, energy consumption, and SDA delay are less than the extended zone routing protocol. Furthermore, SDA hit ratio of the proposed protocol is higher than 86% for various quantities of mobility. The proposed HSDAP is robust and scalable. Mazhar, N., and M. Farooq [8] developed an attacker framework in ns-2 that's the ability to launch several Byzantine attacks on *Bee AdHoc* .The out-comes of these experiments show that their proposed framework meets all its requirements: (1) the adaptive learning due to changing *self/non-self*, (2) high detection accuracy and low false positive rate, (3) lightweight when it comes to processing and communication overheads, and (4) better or comparable performance weighed against non-secure versions of existing state-of-the-art MANET routing protocols – *DSR* and *AODV*. They've also compared their hybrid AIS model with *self/non-self*, *danger theory* and a main-stream anomaly detection system showing its merits over these schemes. Finally, they proposed an expansion of the framework for securing *DSR*. Li, Jun et al. [9] investigated the impact of the swarming behaviour of mobile nodes on the performance of MANET routing protocols, analytically and through simulation. They proposed a Markov swarm mobility model to characterize time-dependent changes in the network topology, based which a quantized collaboration degree is obtained. The proposed Markov swarm mobility model is validated through statistical hypothesis testing of simulation data. Then a performance of MANET routing protocols is studied when it comes to hop count, routing overhead, and average end-to-end delay of a data packet. They derived a defined probability distribution function of the hop count, and analytic expressions for approximating the routing overhead and the typical end-to-end delay. Numerical and simulation results are accustomed to demonstrate the validity of the theoretical derivations. Trends of those performance metrics are discussed and centered on numerical results. An essential observation is that, each time a swarm of mobile nodes moves in a far more collaborative manner, both the routing overhead and the typical end-to-end delay of data packets are significantly reduced. The analysis developed in this paper will help gain insight in to the effectation of group mobility on the performance of MANET proactive routing, and provide guidelines for designing appropriate routing procedures for MANETs with swarm mobility patterns. Sagar, S. et al. [10] contributed the performance comparison of just one Proactive Routing Protocol; Destination Sequenced Distance vector (DSDV) and two reactive protocols; DYnamic Source Routing (DSR) and DYnamic MANET On-Demand (DYMO). A story contribution with this work is enhancements in default versions of selected routing protocols. Three performance parameters; PDR, E2ED and NRO with varying scalabilities are measured to analyze the performance of selected routing protocols by using their original and enhanced versions. From extensive simulations, we observed that DSR outperforms among all three protocols at the price of the expense of the delay. NS-2 simulator is useful for simulation with Two Ray Ground propagation model to judge and to gauge analytical results. Abida, Mohamed Amine et al. [11] proposed a brand new mechanism that keeps sensing the network mobility level to properly adjust the routing period size. It depends on a distributed algorithm that collects the network cartography which can be then used to self-regulate the routing period size. Simulation results reveal that their proposed scheme correctly tracks changes and properly adjusts the existing routing period size ultimately causing far better performances. Jamali, Shahram et al. [12] employed the Binary Particle Swarm Optimization algorithm (BPSO) to include the energy-awareness feature to the TORA routing protocol. The proposed protocol considers routes length in its route selection process and also

incorporates routes and degree of energy in its calculations. It formulates the routing issue being an optimization problem and then employs BPSO to select a route that maximizes a heavy function of the route length and the route energy level. Extensive simulations in ns-2 simulator environment reveal that the proposed routing protocol, called BPSO-TORA, prolongs the network lifetime remarkably and outperforms TORA when it comes to network whole lifetime, system entire life and total delivered data. Ravilla, Dilli et al. [13] proposed Secured ZRP predicated on efficient key management, secure neighbour discovery, secure routing packets, detection of malicious nodes, and preventing these nodes from destroying the network. They proposed a brand new technique to cope with malicious nodes, and prevent them from further destroying the network. They demonstrated the performance of SZRP using NS2 Simulator. Furthermore, they compared the performance of SZRP and ZRP by considering performance metrics like Packet Delivery Fraction, Routing Overhead and End-to-End Delay. In additionally they simulated the performed the detection of malicious nodes utilizing the trust value and alarm packets and observed that the packet delivery fraction of SZRP is considerably high even the amount of malicious nodes is 35% of the Network size. Safa, Haidar et al. [14] proposed an electrical aware routing protocol for a MANET formed of heterogeneous nodes. The proposed approach takes into account and under consideration the battery status of nodes when building the routing table; additionally, in case there is the existence of multiple routes between two nodes, the route that consumes least power is selected and the nodes falling with this route will soon be included with the routing table. Also, the proposed approach ensures fair distribution of routing load amoung the nodes and avoids exhausting nodes which can be falling on optimal routes throughout the network, thus providing better connectivity and extending the network lifetime. They implemented the protocol as an expansion to JiST/SWANS network simulator, and compared its performance to other heterogeneous and power aware routing protocols present within the literature. Singh, Gurpreet et al. [15] proposed an Innovative ACO based Routing Algorithm (ANTALG) by considering a random collection of source and destination nodes and exchanges the Ants (agents) between them. Throughout the movement of ants, the pheromone tables and data structures are produced to record the trip time of the nodes. Extensive simulations are performed by varying different parameters to check the effectiveness of the proposed algorithm. The outcome obtained are in contrast against two well-known Ant based algorithms namely as ADSR and HOPNET and with one traditional, AODV algorithm regarding various performance metrics such as for instance quantity of data packets sent, Throughput, End-to-End delay, Jitter and Window Size. The outcome obtained reveal that throughput in the proposed ANTALG algorithm is more significantly more than in AODV, ADSR and HOPNET. Packet drop has additionally reduced in ANTALG when compared with AODV and ADSR. Average End-to-End delay can also be decreased in comparison with AODV, ADSR and HOPNET. Average Jitter in the proposed scheme is reduced in comparison with AODV, ADSR and HOPNET. It is already been observed that while transmitting the TCP packets using ANTALG, the proposed algorithm has better window size. Kaur, Kanwalpreet et al. [16] surveyed of existing network layer multicast routing protocol is performed.The various routing mechanisms and the application/services will also be discussed. The classification of protocols on the foundation of these types of routing mechanism and form of application/services, give you the comprehensive information regarding the protocols. Thus this paper aims in presenting a definite view to the MANET researchers and application developers so they could choose the multicast protocol accordingly due to their work. Bhuvaneswari, M., and Dinesh Naik [17] discussed MANET includes the amount of mobile nodes that form wireless as an instant communication. MANETs are self configuring network where in actuality nodes can move freely and randomly. It could be dynamically join the network and leave the network at any time. It has widely utilized in industrial and commercial applications like vehicular communication, agricultural needs and disaster management, etc. There You can find studies predicated on routing protocols in MANETs to

enhance their quality and efficiency of the protocols. However, there might be large amount of research about routing protocols, always it lacks in security. The proposed algorithm uses public key cryptographic technique to produce the protocol more secure. Cryptography provides safer and better and optimal transactions. Amraoui, Hicham et al. [18] proposed a new fresh profile is used to measure the effect on the performance of MANETs: energy, end-to-end delay, routing packets and the packets rate. The Link between simulations using OLSR and AODV protocols has demonstrate that energy-based selfishness is a serious a real problem and could affect the performance in MANETS with respect to the mobility of nodes, size and density of the network. They tried to prove that the selfish behaviour can be utilized to impact quality of service (QoS) and security in MANETS. Therefore, they require an extensive mechanism to deal with this specific behaviour to isolate selfishness nodes and they've planned to publish it in as time goes on future work are act as a brand new fresh strategy that is centered on game theory to encourage nodes to cooperate. Sumathi, K., and A. Priyadharshini [19] discussed limited electric batteries power that is certainly one of the most at crucial issues in mobile ad hoc network because the mobile nodes operate in limited battery power. Also there occurs a challenge of broken links because of the as a result of insufficient energy which cause disorder in network system. Such problem occurs because of the unawareness of energy of mobile neighbour nodes. This paper presents the implementation of Adaptive HELLO messaging scheme to find out and to ascertain the neighbourhood area in link connectivity information for monitoring the hyperlink status between nodes that are combined with the incorporation of Dynamic On Demand Routing Protocol to cut back the power and the vitality usage of mobile nodes to certain extent. Abid, Mohamed Amine et al. [20] proposed a brand new mechanism that keeps sensing the mobility-level to properly-adjust the routing period size. It depends on a distributed algorithm collecting the network cartography to self-regulate the routing period size. Simulation results reveal that their proposal (SARP) correctly tracks topology changes and properly adjusts the existing period size leading to higher raised performances.

III. PROPOSED ALGORITHM

Following are the various steps required to successfully simulate the proposed algorithm.

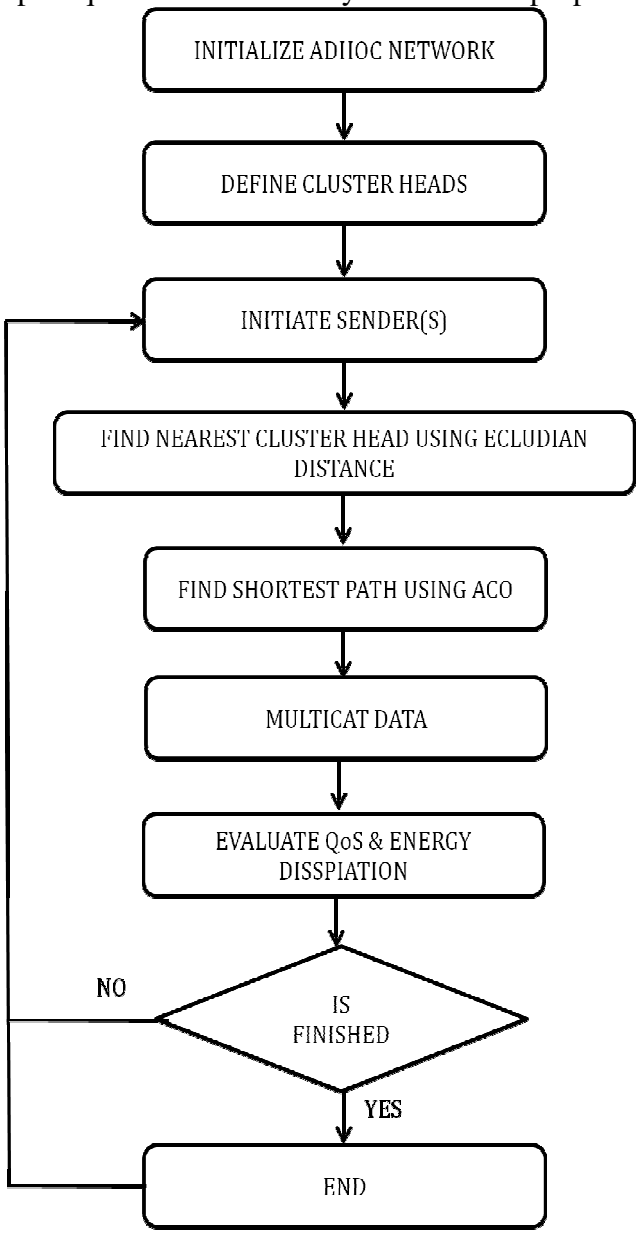

Figure 1: Flowchart of the proposed technique

Step 1: First of all initialize ad-hoc network with their respective characteristics like moving range, maximum dimensions, number of nodes etc.
Step 2: Define cluster heads having multi-radio and multi-channel facility.
Step 3: Sender(s) will be initiated to multicast its data to defined nodes.
Step 4: Sender will hand over its data to nearest cluster head using Euclidian distance.
Step 5: Cluster head will multicast data to available cluster heads depends upon the ACO based shortest path.
Step 6: Evaluate energy dissipation as well as other QoS features, and move to step 3

IV. RESULTS AND DISCUSSIONS

Multicast Tree Cost: The total cost of the tree is defined as sum of the cost of all links in that tree. Table represents the execution time evaluation of proposed technique as compared to existing technique.

Table 1: Multicast Tree Cost Evaluation

No. of nodes	Existing	Proposed
10	20.8902	1.0110
20	23.4039	1.0650
30	23.7386	1.0266
40	29.5823	1.0098
50	36.1398	1.0152
60	43.0107	1.0907
70	48.3242	1.0364
80	49.1708	1.0531
90	86.9694	1.1833
100	91.7542	1.1396

Fig 6 represents that tree cost of proposed technique is less as compared to existing technique. Therefore, proposed work outperforms the existing technique.

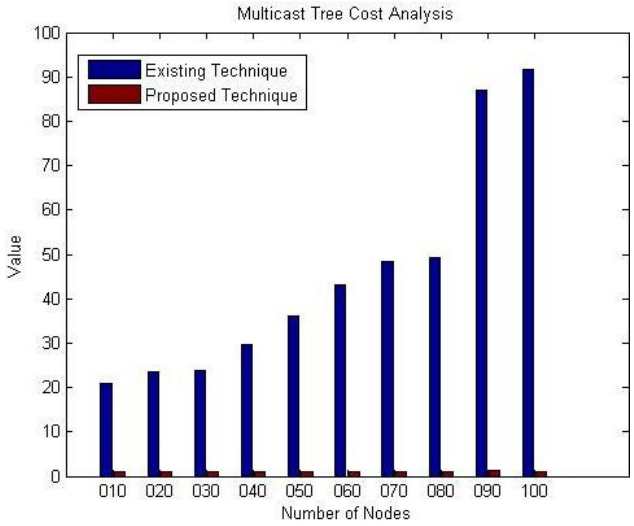

Fig 6: Tree Cost Analysis

Multicast Tree Delay Jitter: The term jitter is often used as a measure of the variability over time of the packet latency across a network. A network with constant latency has no variation (or jitter). Packet jitter is expressed as an average of the deviation from the network mean latency. However, for this use, the term is imprecise. Or in other word jitter is the variation of the packet arrival time. In jitter calculation the variation in the packet arrival time is expected to minimum. The delays between the different packets need to be low if we want better performance in Mobile Ad-hoc Networks .

Table represents the execution time evaluation of proposed technique as compared to existing technique.

Table 1: Tree Delay Jitter Evaluation

No. of nodes	Existing	Proposed
10	58.3000	26.0088
20	29.3500	2.2138

30	19.4333	3.5621
40	14.5250	0.9846
50	11.8200	1.2195
60	9.8667	6.0579
70	8.4143	2.0848
80	7.2500	2.6615
90	6.4778	8.1547
100	5.9700	5.5873

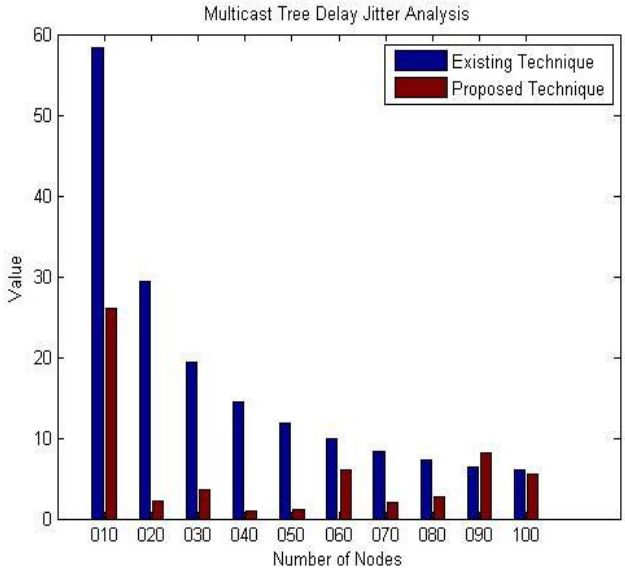

Fig 4: Delay Jitter Analysis

Fig 4 represents that delay jitter of proposed technique is less as compared to existing technique. Therefore, proposed work outperforms the existing technique.

Multicast Tree Delay: The delay of data packets is the interval between the data packet generation time and the time when the last bit arrives at the destination. Table represents the execution time evaluation of proposed technique as compared to existing technique.

Table 1: Multicast tree delay Evaluation

No. of nodes	Existing	Proposed
10	20.9000	1.5000
20	10.4000	2
30	6.7333	3.5000
40	5.2500	2
50	4.0200	2.5000
60	3.2000	6
70	2.9286	4
80	2.2625	4.5000
90	2.3444	8
100	2.0800	7

Fig 5 represents that delay of proposed technique is less as compared to existing technique. Therefore, proposed work outperforms the existing technique.

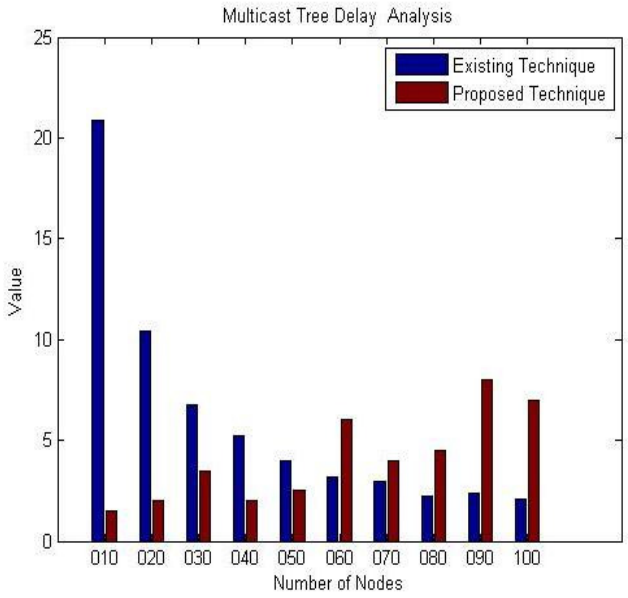

Fig 5: Delay Analysis

Execution Time: In Mobile ad hoc network (MANET) consist of mobile hosts without any infrastructure. Here the Execution time is the essential parameter in performance analysis for the research peoples. Execution time is the time for executing a particular scenario.
Table represents the execution time evaluation of proposed technique as compared to existing technique.

Table 1: Execution Time Evaluation

No. of nodes	Existing	Proposed
10	0.0999	0.000096
20	0.1125	0.000187
30	0.1175	0.000823
40	0.1409	0.000375
50	0.1798	0.000339
60	0.2240	0.0039
70	0.2357	0.0013
80	0.2717	0.0018
90	0.4122	0.0093
100	0.4411	0.0066

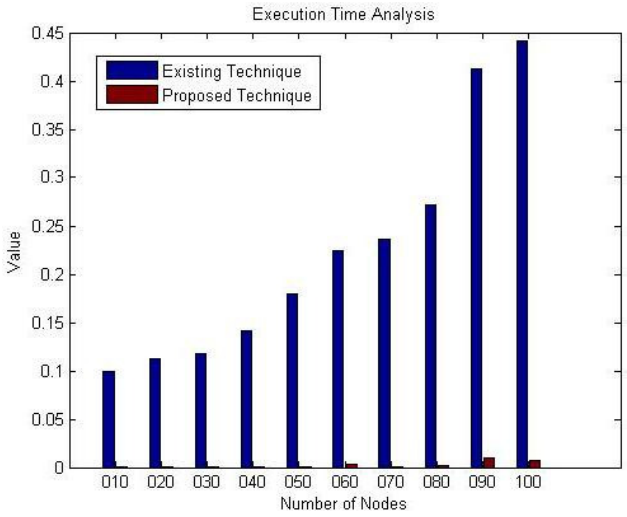

Fig 3 : Execution Time Analysis

Fig 3 represents that execution time of proposed technique is less as compared to existing technique. Therefore, proposed work outperforms the existing technique.

V. CONCLUSION AND FUTURE SCOPE

In this paper, a new clustering and ACO based routing algorithm has been proposed for Ad-hoc networks. Moreover the effect of network range on the proposed and Hybrid technique has been evaluated. The comparison has also been drawn among the hybrid and the proposed technique based on the parameters like Multicast tree cost, Multicast tree delay jitter, Multicast tree delay and execution time which proves the efficiency of the proposed algorithm.

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