Effective timer count scheduling with spectator routing using stifle restriction algorithm in MANET

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Abstract: Mobile nodes are provides unstable communication among mobile nodes, since nodes energy levels are abnormally changed. So, difficult to manage those node activities, packets are missed to collect by target node. Multi packet is broadcasted by sender node is not easy to manage frequently, since it does not have high capacity nodes. It reduces packet integrity rate, and network lifetime. In proposed algorithm is Timer count scheduling with spectator routing (TCSSR) scheme. Spectator monitors the packet transmission use of timer count. Clustering method is used to main stability for all mobile nodes available in coverage area. Stifle restriction algorithm is used to maintaining information about communication nodes, continuous sequence used to limiting sharing of the residence state of a communicate shields. Effective path selects for communication with the support of timer count report is analyzed. It enhances packet integrity rate, and network lifetime.

Keywords: Timer count scheduling with spectator routing, Stifle restriction algorithm.

I. Introduction

Beside with the existing expansion of wireless methods, self-sufficient disseminated networks else MANET-mobile ad hoc networks that does not need sink node, should be achievement notice. Mobile networks are ordinary to worn in different sectors, such as for ranges where it is not easy to use links, throughout calamity, also to protect packet transmission in ITS-Internet technology services [1]. Though, because the topology of the mobile network alters the coverage level, those networks are updatable, so it minimizes the packet delivery ratio. Because the wireless mobile workstation node the stage functions of equally intermediate nodes with finish communication, a huge quantity of energy is used for communication. It must be a difficulty, while wireless mobile workstation relies on energy level [2].

Mobile network investigate has consequently prioritized the aim of stabilize the network and conserve energy level. Efforts to keep energy in communication by applying the increasing Ring investigate technique [3]. Increasing Ring investigate is applied to avoid the raise of request packer from overflow from the initial node while penetrating for a path in ad hoc network environment. While ad hoc routing is Time to Live use the quantity of hop as a situation, which cause traffic for each node and residual energy level as the situation ranges by the increasing Ring investigate to minimize traffic for communication also manage energy consumption. Though, while the nodes are congested, a huge amount of packets are created, also it is not easy to contract with remaining nodes by the communication scheme unaided [4]. Consequently, to preserve energy also tries to manage energy consumption of each node that is known as the topology manage scheme. While mobile nodes are stuffed, all nodes minimize the communication energy to decrease the quantity of neighbouring nodes. Thus the direction-finding in the network is steady and all nodes’ energy usage is minimized [5]. While managing message energy, event known as individually connected nodes
take place. In final unknown workstation are improved and packet drop made further regularly, disturbing packet transmission. A communication scheme is considered, which use individually connected nodes is presented [6]. While pointed for packet transmission path, Packet losing region is managed adaptively uses individually connected nodes to improve connectivity ratio. Though, because to managing packets are dropping while towards the back analyzing, the Entire network traffic occurrence of the path finding is maximum compared with previous communication technique while each node contain similar energy level with double side connection [7]. Communication technique is used to designing a path reject individually connected nodes to minimize packet drop. It also presents communication technique that estimates the individually connected nodes by deduction the nodes travelling from to any area of network, by means of the request packet and position details [8] to keep away from network. Though, it is uncertain while moreover of these technique is efficient at power management.

An optional method, snooze nodes which execute separately by means of casual likelihood management in an asynchronous network is launched [9]. Individually connected node issues are not generated, because the nodes inactive. Energy saving is important. Though, since of the likelihood managing, it is a danger which an node will not be bright to accept information while node is inactive [10].

Rest of the paper is designed as given below. Part II denotes a related works. In part III, to give the details of proposed Incentive Sorted Path selection Scheme (ISPS) to obtain efficient communication in wireless sensor network also identify and remove selfish nodes in cluster. Part IV provides simulation performance results examination obtained under various parameters. Last part V concludes the paper includes future work.

II. Related Works

Liu, Jia, et al., [11] presents method merge the fixed-point with quasi-birth-and-death operation, also surrounded Markov chain to method the restrictive sharing of the tenancy state of a communicable shield. It relates the engrossing Markov chain assumption to distinguish the packet delivery procedure, for a total hypothetical structure is launched for end to end Delay investigation. Through the support of this structure, to obtain a common and accurate appearance for end to end delay depends on the modelling to packet queue latency, and receiving latency. Then reveal the request of our structure, investigate various scheme with different MAC rules to indicate minimum packet latency compared with existing method in experimental result.

Njilla, Laurent Yamen, et al., [12] proposed a packet-forwarding Issuing scheme with a negotiation game, where an authority works as group head and starts a bargain diversion subsequently, judge the option of having some cluster of nodes indicates misbehaviour and join together to undermine the mobile network. Survey the issues by result the best NE-Nash Equilibrium techniques of the arbitration diversion. Simulate the consequence of the combination of misbehaviour node in a mobile environment is easily identified by proposed distinguish with existing scheme.

Alocious, et al., [13] proposed the MAC layer misbehaving nodes on routing scheme. For those intrusions is cause by misbehaving nodes by violating their back off counters connected with MAC routing scheme. Consequently, these attacks are simulated analyse and estimate the collision on the network presentation and steadiness in mobile network. Experimental output indicates intrusion at MAC layer could considerably involve the network transmission rate, and packet loss rate. It achieves higher throughput by reject misbehaved nodes, also intrusion with the mean of whole damage that allow only minimum transmission rate for misbehaved nodes which finally led to minimize delay of the network.

Chen, Haiming, et al., [14] proposed DS-MMAC-Delay responsive Multi path MAC procedure used for Each network that obtain high packet Transmission rate and jump minimum delay for data delivered to the intermediate nodes in network. The uniqueness of the routing is that a well-organized disseminated time allocation preparation and path project scheme is used to merge with the process of path organization that take the route allocation cost into description and minimize packet latency to gather the necessary latency bound of all data transmission. Experimental output shows minimum delay, higher data reliability and packet delivery ratio.

Ravi, G., et al., [15] present OHQS-Optimized Hyper Quorum method arrangement of signal period is modified to reduce in importance the energy used by all node in the network environment. Additional OHQS is improved to create the latest encouragement organization effort successfully. It performs the nodes with various RPI- Repetition Pattern Interval transmits well with improving transmission rate. It obtains better traffic reduction among the delay and lesser energy usage. This present scheme obtains the nodes a higher probability to determine some remaining nodes that create the packet sharing perfectly. Experimental output indicates higher energy reduction, transmission rate.

Chandavale, Anjali A., et al., [16] proposed Modified Iterative scheme for identifying misbehaving node for Delay Tolerant Networks is depends on grouping of Rates as per their ratings to process contributor. The Rates are characterized as minimum probability, centre probability, and maximum probability depends on score given to process contributor. Simulation output shows the quantity of negative true rate and enhancement in process
standing accurateness. It identifies malicious node better than existing ITRM method. It also obtains accurateness of identifying misbehaving nodes.

Kaur, Satinder, Ret al., [17] present mobile network based on life span of network which additional based on several merits like, energy, speed, thickness protection of the network. Because mobile network is motorized with battery energy that is forever incomplete, constructing an energy maintenance network is forever a main mission. A power based energy efficient technique should estimate the energy of the node and the separate the process accordingly, it reduce energy usage of each node and improve network lifetime.

Sharma, Anupam Kumar, et al., [18] present the nodes are used in mobile network should stable else movable is only a network in that are acts as a host or transmitter. Communicating scheme is used in MANET is broadly separated in three group practical, Thoughtless, and combined routing scheme. Experimental output of present method is better compared with previous methods, such higher connectivity, and minimum delay. Dissimilar count of communicating nodes is reduced.

Amouri, Amar, et al., [19] present scheme provides an hierarchical arrangement which rejects using grouping scheme and, as an alternative, successively operates the capability to snuffle each message broadcasted by sender for particular coverage area of the node depends on position in the network environment. For that condition works as a PCH-pseudo cluster head organize data packets from its intermediate nodes in all Area or group. Present scheme obtains lesser overhead, and higher detection efficiency compared with existing method in experimental result.

Hayashi, et al., [20] Present latest scheme manages that Maintain the doubly connected nodes by selfish not only the Transmission energy but also the limitation of energy discovery depends on the amount of intermediate relay node. Sequence to reduce electric wave intrusion and the time need to manage the technique, the present scheme organize the standard amount to within a area, quite than to a individual place. Experimental output shows the present scheme enhances the packet delivery ratio and reduces energy usage.

III. Overview of Proposed Scheme

In proposed method use a Timer count scheduling with spectator, reduce the time delay. Spectator closely monitors node resource utilization in different stage. The updated node resource utilization then applies probability method. In clustering some nodes cause some changes in network is an attacker. After detected attacks, all nodes go to communication and provide effective communication in MANET. To construct the Stifle restriction algorithm is applied to collect details about packet sharing nodes, uninterrupted sequence is made to restricting the sharing of data residence state of a communicate shields.

Figure 1 shows the block diagram of Timer count scheduling with spectator routing. Multi packets are broadcasted by source node using clustering scheme. Cluster head node organizes data packets from various routes. Timer count scheduling with spectator routing scheme, timer count is initiated to measure the time taken to broadcast particular data packets. Stifle restriction algorithm is designed in mobile network environment, it restrict the unwanted nodes behavior. Finally improves network lifetime and packet delivery ratio.

![Block Diagram of Timer count scheduling with spectator routing](image_url)
Timer count measurement is one of the best communication methods, as it analyzes packet transmission time slots. It has a stifled restriction algorithm applied to detect interrupted nodes available in routing paths. This makes it possible to obtain the efficient routing path. It reduces end-to-end packet latency when timer count produces extract output for communication, which achieves a higher transmission rate for that particular attack-free route.

3.1. Multi packet transmitted by clustering nodes

In multi-packet transmission, clustering nodes analyze more areas that are separated into four reasonable clusters depending on the position of mobile nodes. A single cluster with non-grouped areas has mobile nodes that are placed next to an inaccessible Base Station. These mobile nodes use straight packet transmission to the Base Station because the distance among these nodes and the Base Station is small. Correspondingly, many ungrouped areas have mobile nodes that are placed next to the rechargeable base station. Multi packet, single packet, and timer count.

\[ (1) \]

Those mobile nodes use perfect packet exchange to the base station that organizes data packets, and transmit them to the Sink node. Some of the mobile nodes are placed away from the out cluster, those nodes are ungrouped nodes that are identified and re-cluster those nodes efficiently. Each mobile node in a group area categorizes itself into little clusters. In addition, all group nodes should choose a group header node, since routing table contains entire information about communication. Furthermore, mobile nodes in these grouping areas use multi-hop connections for packet broadcast to group header nodes.

\[ \sqrt{2} \] - (2)

The Base Station is starting a stage that separates monitoring regions called as clusters with a Cluster Head. This is arbitrarily chosen, and all nodes in a group have a similar possibility to be a cluster head. The Cluster Head is restructured in all communication tasks that are known as cycle of operation. The count of routine that neighbor nodes perform communication, in a particular cluster head nodes in mobile network. Related to low energy consumption, cluster heads that all nodes in a group choose itself to be cluster head, all routing routine. Whether a mobile node chooses to be a cluster head in routine, but does not choose a cluster head in the routine.

\[ \sqrt{3} \] - (3)

\[ \sqrt{4} \] - (4)

\[ \sqrt{5} \] = - (5)

The possibility that the residual nodes develop into cluster head should improve in all routine, because there is a smaller amount of mobile nodes that are qualified to particular clusters to perform multi-packet transmission. On the initialization of the primary routine, each cluster member node contains the same energy level, also contains the similar possibility to cluster head multi-packet organization. Subsequent to the clustering choice, it depends on dual important metrics that are the available energy of a mobile node and the minimum remoteness among the mobile node and the rechargeable base node that is placed at the middle of the monitoring area. In initial routine, a neighbor node selects a chance quantity among minimum and maximum value. Whether the choose chance quantity for neighbor node is minimum than a before constructed limited value, then the mobile node turns into cluster head in the present routine.

3.2. Timer count scheduling with spectator routing scheme

Formerly groups are created also cluster head are choose, mobile node residue in an inactive condition and exit its two-way radio coverage analyzer. Mobile node starts the radio coverage transmitter simply while it contains packet should be transmitted also to the Base Station node that node in particular group. Control the radio coverage among start and stop conditions for mobile node have huge collision on the entire energy reduction of mobile network. For that nodes in all groups use present TCSSR method, sequence to aggregate the right of entry to the packet transmission path. It is very easy to monitor time usage that rejects broadcasting data packets based time division scheme, else overriding more energy for packet broadcasting medium as the condition in mobile network.
In again grouping the out of range nodes that are depends on Timer count routing scheme, many nodes are need to distance the similar time allocation and broadcast its data packets as more distance with various conditions. By using best quantity of regularity band and packet loss is minimized that are translated to an important decrease of the packet broadcasting energy usage. Each cluster member nodes of a group broadcast its data packets to the equivalent cluster head that organize the data packets and broadcast them to the middle base station node. The middle base station node arriving message from cluster head nodes placed in that position, it organizes each data packets and broadcast them to the Base Station node. The Base Station node accepts packets from middle base station node, and the nodes that are placed in its area.

Base station node collects the request message from base station node. Request packet is accepted by base station node, offers an acknowledgement packet, it retrieve the RSSI of all node to guess the connection superiority. Present routing method intend to execute data collecting with individual mobile node or base station node, there can be Dissimilar loss situation like unexpected disruption made due to blockage among the base station node and remaining inactive nodes else break down node. Such interruption may guide latency of acknowledgement else broadcast request packet from sender. To ensure undisrupted data organization, the present scheme performs communication to recognize available neighbor node to carry on packet broadcasting. The timer is planned depends on the packet generation and transmission rate for sender node.

Then execute packet aggregation, base station node is want to react node among the acknowledgement packet. The response is broadcasted by acknowledgement packet sometimes delayed, then it direct data transmission and packet loss that strength to perform communication. For this scheme, the mobile base station node organizes data packets about amount of data packets with packet size from all mobile nodes. To keep away from any intrusion, to calculate the acknowledgement time with support of timer count in all packet transmission provides constant time gap. To permit Traffic responsive packet organization and broadcasting, the acknowledgement time is chooses effectively consider current packet coming time.

**Algorithm for Timer count scheduling with spectator routing**

Step 1: For each nodes analyze paths
Step 2:
Step 3: sender forward multi packet to neighbor node
Step 4: Monitors time duration of particular path using timer count
Step 5: Find another path for packet transmission
Step 6: else
Step 7: if {sender!= }
Step 8: Single packet transmitted with minimum capacity nodes
Step 9: Group header aggregate data packets from members.
Step10: end if
Step 11: End for

**3.3. Stifle restriction algorithm**

Stifle restriction guarantee rearward outing scheme in network with mobile nodes, for control packets. Those packets are ensuring that the nodes available and can achieve packet exchange across mobile network environment. In universal, the broadcasting of control packets is done at convinced distinct time gap; though realize they want to hold up traffic, and Susceptible packet organizing, in present scheme when performing route choosing should launch convinced conditions to broadcast data packets. Throughout data aggregation purpose, a single cast control packet is
broadcasted from the base station node through the stable link connection. The inactive nodes request for data broadcasting reply with acknowledgement packet. To recognize the request packet also known as dual broadcast packet and acknowledgement packet, a flag taking out calculate is launched which indicates the position of all nodes in mobile network. While performing route identification, the base station node collect multi packet data from all nodes in the network, these nodes subsequently broadcast single cast acknowledgement packet to the mobile node.

\[ \text{(9)} \]

Packet aggregation method performs sender node classification. When guarantee that the base station node is under coverage area of the sender to guarantee trustworthy packet broadcasting else Packet aggregation at base station node. In packet size is measured based on byte flag is launched to differentiate speed based data transmission and straight message packet transmitted. The flag one indicates the single packet transmission, when zero indicates multi packet broadcasting.

**Stifle restriction algorithm**

Step 1: for each path verify  
Step 2:  
Step 3: Node timer count exceed for transmission.  
Step 4: Remove interrupted node  
Step 5: reduce energy consumption  
Step 6: else  
Step 7:  
Step 8: Node timer count not exceed for transmission.  
Step 9: perform packet broadcasting on that path.  
Step 10: Improve network Lifetime  
Step 11: End for  
Step 12: End if.

This scheme supports to find interrupted nodes which are present in routing path, they are separated from routing. So, it easy to obtain efficient routing path and it improves network lifetime, packet delivery ratio. It also minimizes packet latency, and communication overhead.

**Packet ID:** Packet ID has an entire cluster based mobile node details, also cluster head placed position are mentioned.

| Source ID | Destination ID | Multi packet transmitted by clustering nodes | Timer count scheduling with spectator routing scheme | Stifle restriction algorithm | Improving network lifetime |
|-----------|----------------|--------------------------------------------|-----------------------------------------------|-----------------------------|---------------------------|
| 4         | 4              | 6                                          | 5                                            | 4                           | 5                         |

**Figure 2.** Proposed TCSSR Packet format

In figure 2: the present packet format is exposed. Now the source node ID field consumes 4 bytes and destination node ID field consumes 4 bytes. Third one is Multi packet transmitted by clustering nodes carries 6 bytes, clustering mobile nodes are provide multi packet transmission from sender to target node. In fourth field occupies 5 bytes. Timer count scheduling with spectator routing scheme is used to measure time taken to complete packet transmissions using timer count. In fifth have 4 bytes; Stifle restriction algorithm is launched to identify interrupted nodes in routing path. Final field is Improve network lifetime, it carries 5 bytes and it only chooses perfect nodes to perform packet transmission.
IV. PERFORMANCE EVALUATION

a. Simulation Model and Parameters
The proposed TCSSR is simulated with Network Simulator tool (NS 2.34). In our simulation, 100 sensor nodes deployed in 1050 meter x 920 meter square region for 32 milliseconds simulation time. All sensor nodes deployed in random manner among the network. All nodes have the same transmission range of 250 meters. CBR Constant Bit Rate provides a constant speed of packet transmission in network to limit the traffic rate. DSR Dynamic source routing protocol used to provide effective communication path for packet transmission in clustering also identify selfish nodes in routing path. Indicate Table 1 network simulator initialization.

Table 1: Simulation Setup

| No. of Nodes | 100 |
|--------------|-----|
| Area Size    | 1050 X 920 |
| Mac          | 802.11g |
| Radio Range  | 250m |
| Simulation Time | 32ms |
| Traffic Source | CBR |
| Packet Size  | 150 bytes |
| Mobility Model | Random Way Point |
| Protocol     | DSR |

Simulation Output:

Figure 3: Proposed TCSSR Result

Simulation Result: Figure 3 show that the proposed TCSSR scheme performs packet transmission based on timer count, to analyze each packet transmission time slot, and achieve effective data aggregation compared with existing EDM [11] and GTA [12]. Present TCSSR contains Stifle restriction algorithm is used to separate the interrupted nodes from clustering to improve lifetime of network, and packet delivery ratio.

Performance Analysis
In simulation to analyzing the following performance parameters are using X graph in ns2.34.
End to End Delay: Figure 4 shows end to end delay is calculated by slot of time used for communication between sender and cluster head node, Stifle restriction algorithm to split the interrupted nodes in network environment. In proposed TCSSR method end to end delay is minimized compared to Existing method EDM, and GTA.

![Figure 4: Graph for Nodes vs. End to End Delay](image)

Communication overhead: Figure 5 shows communication overhead is minimized that cluster head node organize the data packet with efficient connection, the mobile node contain timer count measure every packet transmission time effectively. In proposed TCSSR scheme communication overhead is decreased compared to Existing method EDM, and GTA.

![Figure 5: Graph for Pause Time vs. Communication overhead](image)

Packet Delivery Ratio: Figure 6 shows packet delivery ratio is measured by amount of data packet received from amount of data packet sent with certain rate, Stifle restriction algorithm supports to remove interrupted nodes which are available in routing path. Generally transmission rate is set as 100, Present TCSSR method packet delivery ratio is improved compared to existing method EDM, and GTA.
Network Lifetime: Figure 9 shows that the lifetime of the network is calculated by whole network performance, amount of energy and time taken to complete the transmission. Timer counts easy to achieve effective packet broadcasting, minimum time usage nodes are only choose to perform packet transmission. In proposed TCSSR method Network Lifetime is maximized compared to existing method EDM, and GTA.

Energy Consumption: Figure 8 shows energy consumption; amount of energy spend for starting node to ending node communication. In proposed TCSSR method analyze node frequency updates using Stille restriction algorithm, energy consumption is reduced compared to existing method EDM, and GTA.
Packet drop rate: Figure 9 shows that data Packet loss is minimum it rejects the communication link among sensor nodes in cluster, also has Stifle restriction algorithm to remove interrupted nodes from routing path. In Proposed TCSSR scheme Packet drop rate is reduced compared to existing method EDM, and GTA.

![Graph for Node vs. Packet drop rate](image)

Figure 9: Graph for Node vs. Packet drop rate

V. Conclusion

Mobile nodes are unstable position node, they are updated its location from one end to another end in any place of network. For certain situation the nodes are go to out of coverage range that nodes are node joined to cluster. The unwanted nodes cause interruption, more time taken to broadcast single data packet, so minimized network lifetime. In proposed TCSSR scheme contain timer count to measure the time duration of each packet transmission from sender to neighbor node in routing path. Stifle restriction algorithm is constructed to separate the interrupted nodes from routing path, it also reduce packet latency. It improves network lifetime, and packet delivery ratio. In future work missed connection based re-clustering method to analyze several parameters.

References

[1] Yoshitugu Kawamura et.al 2007 Application of expanding ring search method on cost based routing protocol for MANET DTCOMO Symposium pp 238-244
[2] AODV RFC3561 www.ietf.org/rfc/rfc3561.txt
[3] Barbeau M Kranakis E 2007 Principles of AD HOC NETWORKING pp.113-143 WILEY
[4] Kouji Yamada 2013 A study on topology control-aware MANET routing protocol Master Thesis, Graduate School of Engineering Gifu University Gifu Japan
[5] Fabian Fuchs Markus Volker Dorothea Wagner 2012 Simulation-based Analysis of Topology Control Algorithms for Wireless Ad Hoc Networks Design and Analysis of Algorithms pp 188-202
[6] Hiroaki MORINO Takumi MIYOSHI and Masakatsu OGAWA 2004 An efficient ad hoc routing protocol based on the relay control of route requests for handling unidirectional links IPSJSIG Technical Report 2004-M BL vol 30 pp 47-54
[7] Takumi MIYOSHI Shinsuke TERADA Koji HISAMITSU and Hiroaki MORINO Ad Hoc 2004 Routing Protocol with Area-Controlled Flooding Considering Unidirectional Links," IEICE Technical Report NS2004 vol 26 pp 5-8
[8] Yusuke FUKUI Masaki BANDAI and Takashi WATANABE 2007 Proposal and Investigation of Ad Hoc Network Routing Protocol Considering Unidirectional Links IPSJSIG Technical Report 2007-MBL vol 40 pp 113-120
[9] Yasuhiro TSUTSUI and Iwao SASASE 2005 A Stable Multicast Routing Protocol in Ad-hoc Networks with Unidirectional Links IEICE Technical Report CS2005-49 pp 73-78
[10] Yukinari HAYASHI and Michiko HARA Y AMA 2013 Electric power saving of Mobile Ad hoc Network's relay nodes by the transmission power control : Electric power saving that include reception available power IEICE Technical Report NS2013-40 pp 152-158
[11] Liu Jia et al End-to-end delay modeling in buffer-limited MANETs A general theoretical framework IEEE Transactions on Wireless Communications vol 15 pp 498-511
[12] Njilla Laurent and Yamen et al 2016 A game-theoretic approach on resource allocation with colluding nodes in MANET's Systems Conference (SysCon), 2016 Annual IEEE IEEE

[13] Alocious Chaminda Hannan Xiao and Bruce Christianson 2015 Analysis of dos attacks at mac layer in mobile adhoc networks Wireless Communications and Mobile Computing Conference (IWCMC) 2015 International IEEE

[14] Chen Haiming and Li Cui DS-MMAC 2016 A delay-sensitive multi-channel MAC protocol for Ambient Assistant Living systems China Communications vol 13 pp 38-46

[15] Ravi G and A Sakthi Saranya 2015 Optimized power management for multi hop mobile adhoc networks Communications and Signal Processing (ICCSSP) 2015 International Conference on IEEE

[16] Chandavale Anjali A and Tejaswini P Chaure 2015 An approach to detect malicious node for Delay Tolerant Networks TENCON 2015-2015 IEEE Region 10 Conference IEEE

[17] Kaur Satinder RC Gangwar and Ranjit Singh 2015 A strength based energy efficient algorithmic approach in MANET Soft Computing Techniques and Implementations (ICSCTI), 2015 International Conference on IEEE

[18] Sharma, Anupam Kumar and Munesh Chandra Trivedi Performance 2016 Comparison of AODV ZRP and AODVDR Routing Protocols in MANET Computational Intelligence & Communication Technology (CICT) 2016 Second International Conference on IEEE

[19] Amouri Amar et al 2015 A simple scheme for pseudo clustering algorithm for cross layer intrusion detection in MANET Communications (LATINCOM) 2015 7th IEEE Latin-American Conference on IEEE

[20] Hayashi Yukinari and Michiko Harayama 2015 MANET topology control based on the node degree and energy detection threshold Internet Technologies and Applications (ITA) 2015 IEEE

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