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Ran-Dtvossp Routing Algorithm for Mobile Adhoc Networks

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Abstract: In MANET (Mobile Ad Hoc Network), the network topology is changed habitually on account of the wireless connection and thus the nodes can unreservedly move and self-arranged. There is no settled focal controller in the MANET. The network execution ought to be supported up by protecting collaboration among various nodes and it is performed by essential mechanisms. Most proficient routing protocols are utilized to route the packets to the destination from the source by the efficient routing process. The different measurements like hops, traffic and security so forth are utilized to quantify the path/route effectiveness. This paper proposes an enhanced attacks free on-demand RAN-DTVOSSP (Ravi ANnandhi - Dynamic Triangular Vision Optimized Slant Selection Protocol) with the sharing of bandwidth. The model of this protocol is shown here. The function of the enhanced RAN-DTVOSSP is evaluated through other conventional routing protocols like DSR, AODV.

Key words: Reporting Cell Point (RCP) · Multi-hop · Attacks · DoS · RAN-DTVOSSP · DSR · AODV

INTRODUCTION

The Routing Protocols [1] illustrate an arrangement of tenets which administer the exploration of communication packets from source to destination in a network. In MANET, there are various kinds of routing protocols and every one of them is associated by system circumstances.

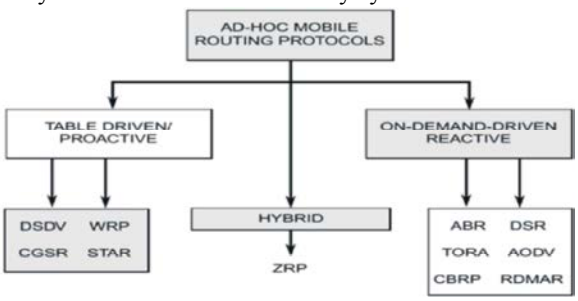

Fig. 1: Classification of the traditional routing protocols in MANET

Proactive Routing Protocol: Proactive routing protocols are also known as table driven routing protocols. Every nodes keep up routing table which restrains information in relation to the network topology yet without entailing it [1] [2]. This component albeit valuable for datagram movement, acquires generous signaling traffic and power utilization [3]. The routing tables are advanced sporadically at whatsoever points the network topology modifications. Proactive protocols are inappropriate for enormous structures because they have to maintain the node divisions particularly for every node in the routing table of each node. These protocols preserve different statistics of routing tables which fluctuates from protocols to protocols. There is different value for proactive routing protocol.

Reactive Routing Protocol: In this protocol the route is initiated at any point based on demand. In addition, the source node perceives its route for the available route from source to destination and if the route is not reachable then it institutes route revelation method. There are two remarkable elements of on-demand routing protocol [4]:

- Route Maintenance: Reactive protocols have affirmation instrument because of which route upkeep is conceivable.
- Route Discovery: In this stage source node starts route disclosure on demand premise. In general, if the route is not available it creates route disclosure. The source node, in the packet, integrates the location of the destination whereas the node also reveals the location of the intermediary nodes to the destination.

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Hybrid Routing Protocol: There is a switch over in midway of reactive and proactive protocols. Proactive protocols contain huge transparency and less dormancy while protocols of reactive have not so much transparency but relatively more redundant. As a result, a Hybrid protocol [5] is launched to overcome the flaws of both proactive and reactive protocol [6]. It is the mixture of both protocols (reactive and proactive). It exploits the route disclosure factors of reactive protocol and the table props up system of proactive to facilitate preserve a tactical distance from idleness and transparency problems in the network.

Review of Literature: This segment explores the epigrammatic depiction about the routing protocols of proactive, reactive and hybrid protocols, over and above the possible routing attacks against MANET.

Dynamic Destination Sequenced Distance Vector Routing Protocol (DSDV): DSDV [7, 8] is formed on the principle of Bellman–Ford routing [9] algorithm with some adjustments. And also the routing protocol, each flexible node in the system continues a routing table. Every routing table restrains the dilapidation of every single available destination and the amount of bounds to all routes.

Wireless Routing Protocol (WRP): WRP [9] has a place with the general class of path discovering calculations [7], exemplified as the display of dispersed mainly the short path computations that determine the behaviors in exploiting the data to facilitate the duration and penultimate leap of the straight way to every destination. WRP weakens the amount of cases wherein a short routing circle can happen. With the end goal of routing, every node keeps up four things: 1. A routing Table 2. MRL (Message Retransmission List) 3. A distance Table 4. A connection cost table

Cluster Gateway Switch Routing Protocol (CGSR): CGSR [10] considers a clustered versatile remote network rather than a flat network. For organizing the network into partitioned yet interrelated gatherings, group heads are chosen utilizing a cluster head determination calculation. By framing a few groups, this protocol accomplishes a mechanism of distributed processing in the network.

Dynamic Source Routing (DSR): Dynamic Source Routing (DSR) is a reactive protocol in consideration of the source route method [10] [11]. In Dynamic Source Routing (DSR), the protocol depends on the link situation to estimate where source establishes route disclosure on demand premise.

Ad-hoc On-Demand Distance Vector Routing (AODV): AODV [11] is fundamentally in modification of DSDV. That exist as it may, AODV [12] is a reactive routing protocol slightly than proactive. It curtails the amount of broadcasts by building the routes taking into appeal for report, which is not the situation for DSDV.

Associative – Based Routing (ABR): ABR [13] protocol characterizes another sort of routing metric "level of affiliation strength" for mobile ad hoc network. Through the routing protocol, a route is selected captivating into account the point of association stability of mobile node.

Signal Stability based Adaptive Routing Protocol (SSA): SSA [13] protocol contemplates on obtaining mainly the constant routes all the way through a specifically selected network. The protocol performs [14] on demand route disclosure taking into account signal quality and stability of location. Taking into account the signal quality, SSA distinguishes frail and stability diverts in the network.

Temporarily Ordered Routing Algorithm (TORA): TORA [12] is a reactive routing protocol through a number of proactive upgrades wherever an association between the nodes is developed to make a Directed Acyclic Graph (DAG) of the route from the source node to the destination. This protocol utilizes a connection inversion model as a part of route disclosure.

Zone Routing Protocol (ZRP): ZRP [5] is suitable for wide assortment of MANETs, particularly for the systems with expansive range and different portability designs. Through the protocol, each node proactively sustains the routes inside of close quarters, which is phrased as directing zone. Therefore, the route formation is prepared by exploiting as interactive system. For creating the various zones in the network, primarily a node needs to identify who its neighbors are.

Dynamic Triangular Vision and Optimized Slant Selection Protocol (DTVOSSP) [15]: The triangular vision model is proposed. The angles of the vision may be changed based on the variations in the source and destination. This model is used to create a routing structure for mobile ad hoc network environment. On the direction of the motion of user, a shape of the virtual

triangle communication zone similar to the position of the right angle triangle. The communication SAPs (Service Access Pointer) is chosen by means of the SAPs of the node or cell that is coincided with the zone. This process assists to make an enhanced way to send the packets. It reduces a load versus energy oriented routing issues and data loss.

Problem Statement: In the structure of the system the routing is profoundly concerned. With scalable and robustness structure model is not yet decided for DSR and AODV. In the routing effectiveness, even the protocols like AODV and DSR are needed and by considering the different sink node which embraces its portability. The above aspiring issues are considered in this paper by focusing on the supplementary parts:

- The node synchronization is required by the strong mobility for the dynamically changing topology.
- Expecting the maximization of lifetime and adaptability of the MANET.
- Considering the node behavior of the network to avoid attacks.

Methodologies

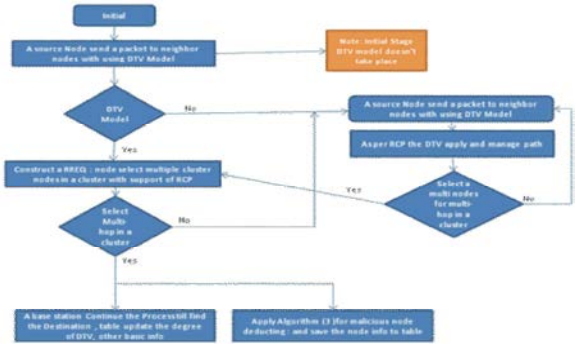

Fig. 2: Node Selection using DTV model, Clustered based Multi-hop and Attacks detection Mechanisms

Algorithm 1: DTV Model: The idea of dynamic triangular vision view point is simple and efficient. The DTV (Dynamic Triangular Vision) algorithm is used to identify the convey point (Reporting Cell Point) and the practical clear up to determine the look ahead window for each reporting cell point. It is solid and easy to compute the route. It is flexible and dynamically adjustable. It is able to exploit the amount and range of the triangular analysis to manage the assortment of communication. It is majorly deployed for direct and high-speed moving customers (example Vehicle on the freeway and passenger on a train) consequently it is also able to perform slight modifications in degree and longer radius. For leisurely moving users, that persuades through phenomenon longer central degree and smaller radius permit other neighboring RCP [16]. These steps represent an Enhanced DTVOSSP (Dynamic Triangular Vision Optimized Slant Selection Protocol) [15] which is represented by RAN-DTVOSSP.

Step 1: According to the vitality, conduct of the node and throughput, the source and three conceivable nodes are picked

Step 2: Once the directing way is picked, the productivity of the routing is expanded by the assets of the dynamic triangular vision model. In triangular representation, once the three conceivable nodes are favored for routing, it becomes progressively, i.e. in the occasion that the source node is spoken to by X, subsequently the three nodes are accessible by technique for X1, X2, X3. In the midst of the three nodes we might want to take one node which is plausible to attain the destination as viably by managing time and attack free. In the event that the node X1 has picked, it consists of three nodes and that is indicated as X1Y1, X1Y2, X1Y3 and so on.

Step 3: In this step, if any of the three nodes fizzles, it will go for the following node and checks the node conduct for routing. What's more, it encourages the multicast directing; due to affirmation limit it averts information misfortune and affirmation of transmission of the packets. It portrays the dynamic triangular vision for the entire correspondence of the packets to the destination node from the source node.

Step 4: Firstly, the source node passes the information to neighboring node specifically route utilizing DTV model.

Step 5: DTV model have 3 sides of degrees, they are powerfully changing upon the diverse entities.

Case 1: Slow Moving Entity
Larger Central Degree and Smaller Radius
(It allows more neighboring RCP selection)
Case 2: Fast Moving Entity
Smaller Central Degree and Larger Radius
Case 3: Unexpected Sharp Turn
DTV shifting technique to new directory according to RCP

Step 6: It efficiently reuse the same routing to avoid repeated work for efficient route/path.

Step 7: Repeat the above steps for all packet in the network.

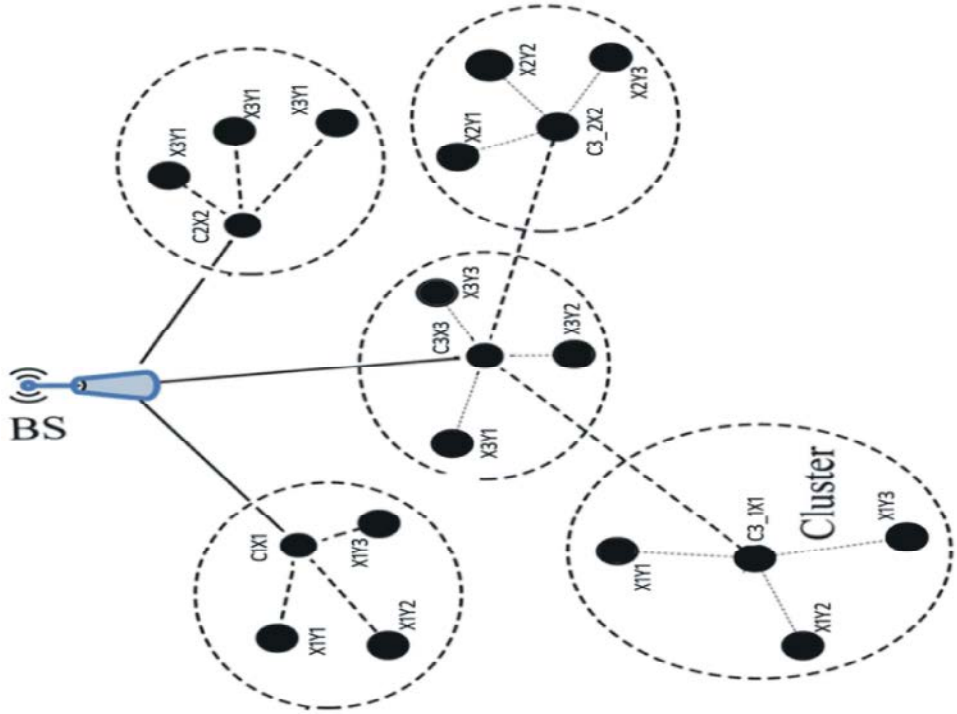

Fig. 3: Sample Node Selection of DTV Model

Algorithm 2: Clustered based Multi-hop Algorithm: The subsequent algorithm is named as Cluster based Multi-hop Routing algorithm as mentioned below:

Step 1: From DTV model, the nodes are selected for routing in the ratio of 1:3.
Step 2: Minimum 1 node from the 3 is consider as the cluster head which is deployed for routing the packets.
Step 3: The routing table is used to store the multi hop information.
Step 4: Finally, the multi hop routing is constructed and the above steps are repeated in anticipation of the packet reaches the destination.

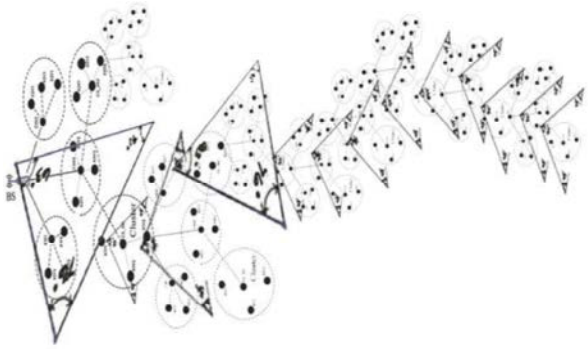

Fig. 4: A Sample of DTV model with Multi-hop Algorithm

Algorithm 3: Incorporating Detection Mechanism: The next algorithm is exploited to sense the malicious node and to drop the attackers node from the routing.

Step 1: RREQ message is broadcasted by source S
Step 2: If the RREP is received by S then it is verified by S. If the verification is successful then the trust count is incremented else decremented.
Step 3: The special RERR message is passed to its neighbors when trust count is less than the threshold value. (RERR message is used to disseminate the information that a route is not available for one or more particular addresses).
Step 4: From the list, the malicious node is removed and its routing table is updated.
Step 5: Route discovery of RAN-DTVOSSP is started.
Step 6: When the RREP is within the limit of hop count and time, Packets forwarding is started and every node is starts observing its next node.
Step 9: If the packet is forwarded, then the forward count is added by 1 and that packet will be removed from the buffer list.
Step 10: Otherwise the packets is resend and the drop count is added by 1.
Step 11: The above steps are repeated until when the forward count divided by drop count is greater than the threshold.

Step 12: If the value is not greater than threshold, the RREQ will be send again.

Operation of the Proposed Routing Protocol: Dynamic Triangular Vision Optimized Slant Selection Routing Protocol is able to forward the packets either in unicast or multicast, since it is a reactive protocol, therefore the route for the destination is established only on demand. Using the model of DTV, the Route Request (Route Request) is generated by source using RAN-DTVOSSP model. The packets in this model contains Destination IP address, Source IP address, Current node Sequence number, DTV degree and Last known destination.

MATERIALS AND METHODS

Simulation Parameters and Model: With the network simulator, DTV model is employed for simulation with 80 mobile nodes in the 1000m × 1000m for the simulation time of 600 seconds. In the network, the node transmission will be 250 meters for all nodes with two malicious nodes. For traffic source, the CBR (Constant Bit Rate) is used.

Table 1: Experimental Parameters and Setup

Parameters	Range/Value
Simulator	Network Simulator (NS2)
Number of Nodes	80
Simulation Time	600 seconds
Routing Protocol	RAN-DTVOSSP
Traffic Source	CBR
Packet Size	512
Maximum Speed	20
Simulation Area	1000m *1000m
Pause Time	1
Number of Malicious Node	2

Performance Metrics: The implementation of the projected computation can be calculated by measuring the accompanying measurements.

- The Number of data packets transmitted: Over the aggregate system, the tally of each and every transmission of information by each node is called as "Information packet transmitted".
- Packet delivery ratio: Ratio of aggregate number of packets sent by the sender and the multicast information packets got by the destinations. The quality of the protocol is exhibited by this proportion.
- Average Throughput: Throughput is characterized as the aggregate sum of information a receiver really gets from the sender S isolated when it takes for R to get the last packet.

RESULTS AND DISCUSSIONS

The following figure represents the results of the implemented Enhanced Dynamic Triangular Vision Optimized Slant Selection Protocol (RAN-DTVOSSP).

Simulation Result and Discussion: The below figures represents the packet delivery ratio and throughput for the cases of the DTV model when it is subjected to non-malicious nodes as well as malicious nodes. Case 1 gives Slow moving Entity; case 2 gives Fast Moving Entity whereas case 3 represents unexpected sharp turn entities.

The Figure 5 represents the packet delivery ratio for the cases of DTV model without any malicious nodes in the network. Most probably the packet delivery ratio for all cases may vary in small difference.

In the Figure 6, comparison of packet delivery ration for different cases of the DTV model is given. From the above Figures 5 and 6, there might be little difference in the packet delivery ratio, i.e. our proposed model gives the better performance.

From the above Figures 7a, 7b and 7c, the proposed DTV model generates the better performance on the network with malicious nodes similar to network without malicious node. Because of the integration of the malicious node detection algorithm, the packet delivery ratio is comparatively same to the network without malicious node.

The Figure 8 and Figure 9 represent the throughput for the Cases of proposed DTV model network without malicious node and the network with malicious node.

From the Figures 10a, 10b and 10c, the throughput for cases of DTV model network without malicious node is slightly higher than the throughput with malicious nodes. From the above result, it can be concluded that the performance of the DTV model is analyzed by means of the malicious nodes and non-malicious nodes of the network.

Fig. 5: Packet Delivery Ratio for Cases of DTV model without any malicious nodes

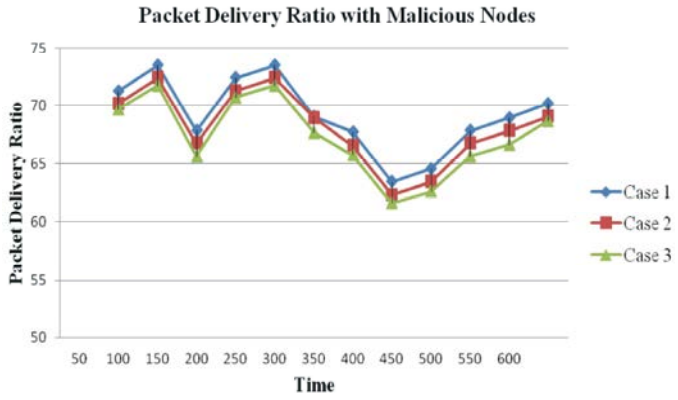

Fig. 6: Packet Delivery Ratio for Cases of DTV model with malicious nodes

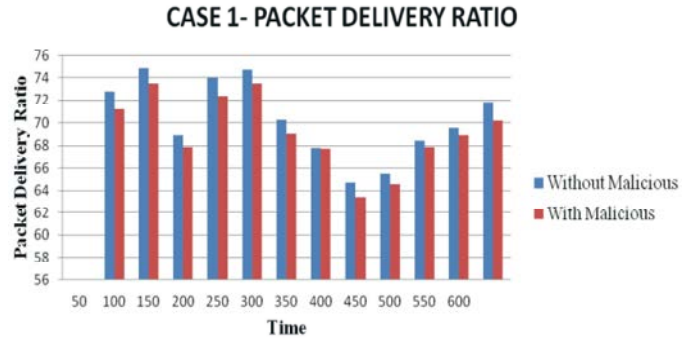

Fig. 7a: Packet Delivery Ratio for CASE-1 of DTV model

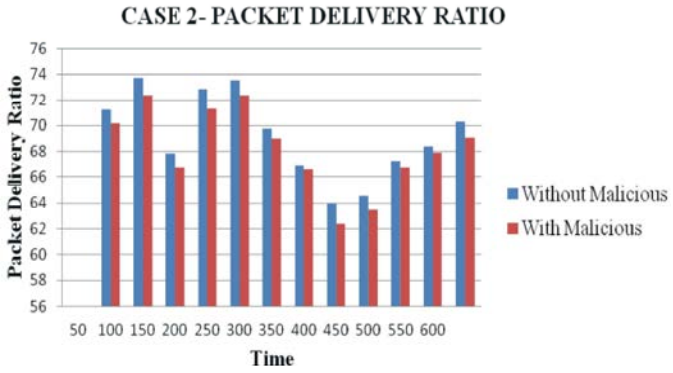

Fig. 7b: Packet Delivery Ratio for CASE-2 of DTV model

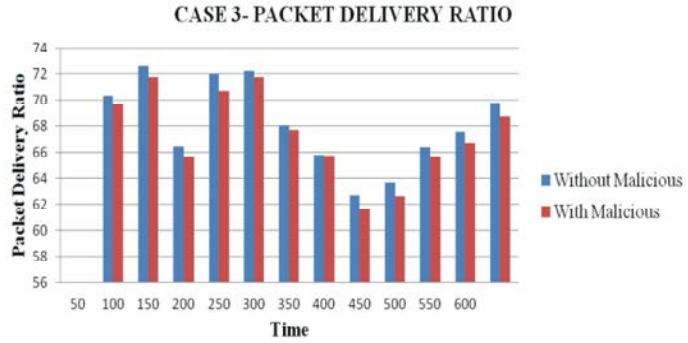

Fig. 7c: Packet Delivery Ratio for CASE-3 of DTV model

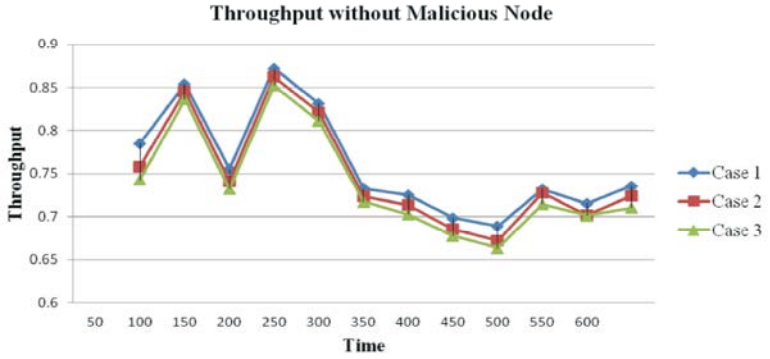

Fig. 8: Throughput for the cases of DTV model without malicious node

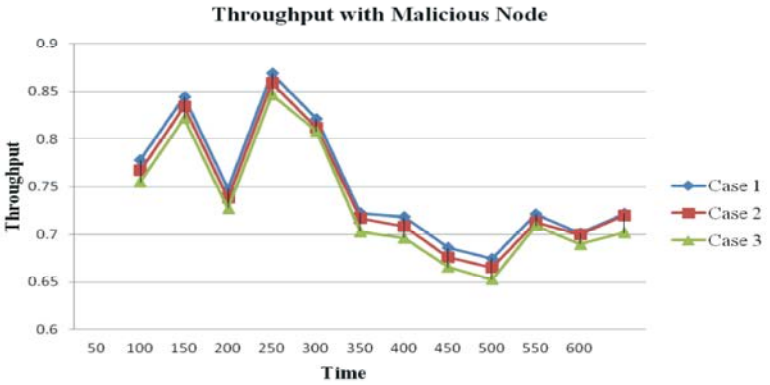

Fig. 9: Throughput for the cases of DTV model with malicious nodes

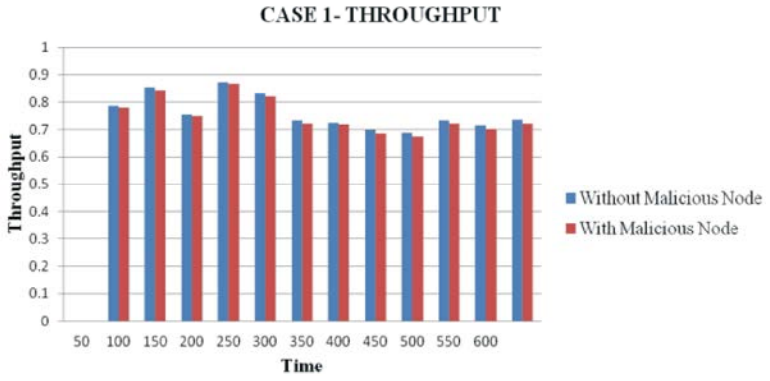

Fig. 10a: Throughput for Case 1 of DTV model

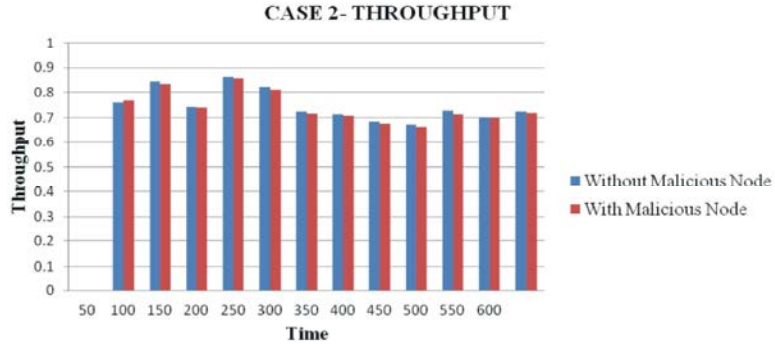

Fig. 10b: Throughput for Case 2 of DTV model

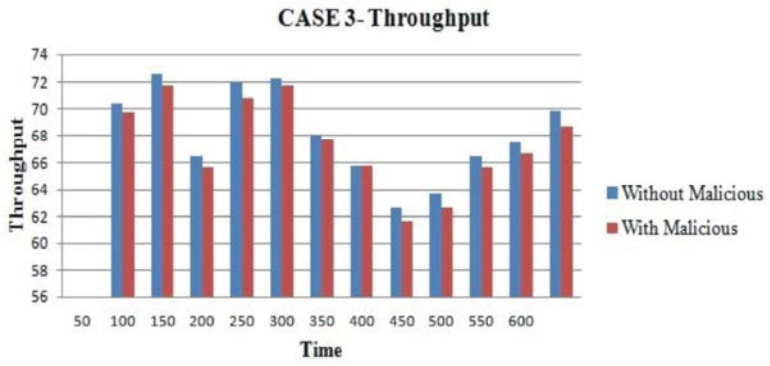

Fig. 10c: Throughput for Case 3 of DTV model

Common Features

Table 2: Common Features of DST, AODV & RAN-DTVOSSP

Feature	DSR	AODV	RAN-DTVOSSP
Protocol Type	Reactive	Reactive	Reactive
Routing Type	Source Routing	Hop-by-Hop	Hop-by-Hop
Mechanisms	Route Maintenance and Discovery	Route Maintenance and Discovery	Route Maintenance and Discovery
Numbering System	Use of Sequence Numbers	Use of Sequence Numbers	Use of Sequence numbers
Tables used	Routing Table	Routing Table	Routing Table
Termination	Use of node Caches	Expiry time	Expiry Time

Special Features of RAN-DTVOSSP:

- Using this algorithm, the node behavior can easily analyze for fixed moving users.
- It is mainly used in the location management, to give better result for fixed user to gather the users' location.
- The energies of the nodes in the network saved since, the cluster head considers only three possible nodes for routing and this protocol prevents the network from cuts.
- The packet transmission from source to destination is secured, because the integration of detection mechanism with this RAN-DTVOSSP routing protocol.
- This protocol is free from loop since the selection of nodes is limited than the other protocol.
- It is reactive and because of this, on demand routing information are maintained using routing tables. It supports periodic broadcast.

CONCLUSION

The principle shortcomings of a MANET are to facilitate as asset obliged, for instance, a MANET has restricted data transmission, battery power and computational force and it is not to carry out to have a dependable incorporated organization. The routing protocols are utilized for exchange of information from source to destination. In this research paper, another protocol called RAN-DTVOSSP (Dynamic Triangular Vision Optimized Slant Selection Protocol) has been acquainted to expand the node capacity, bandwidth and node behavior and throughput competence of the network. The outcomes acquired outflank the current calculations in every single considered parameter and ended up being commendable commitment. In this paper, DTV algorithm is used to select the possible nodes for transmission, whereas the cluster based multi-hop algorithm is used to cluster the selected node. And detection mechanism is incorporated into this routing protocol to drop the malicious nodes in the network.

REFERENCES

1. Navitha, S. and T. Velmurugan, 2015. "A survey on the Simulation Models and Results of Routing Protocols in Mobile Ad-hoc Networks", International Journal of Communication and Networking System, 04(02): 10-15.
2. Sunil Kumar Singh, Rajesh Duvvuru, Jyoti Prakash Singh, 2015. "TCP and UDP based performance evaluation of proactive and reactive routing protocols using mobility models in MANETS", International Journal of Information and Communication Technology, 7(6).

3. Sunil Kr. Maakar and Yudhvir Singh, 2015. "Traffic Pattern based Performance Comparison of Two Proactive MANET Routing Protocols using Manhattan Grid Mobility Model", International Journal of Computer Applications, 114(14): 26-31.
4. Yi, J., J. Fuerters and T. Clausen, 2013. "Jitter Consideration for Reactive Protocols in Mobile Ad Hoc Networks", Network Working Group.
5. Bansal, B., M.R. Tripathy, D. Goyal and M. Goyal, 2015. "Improved Routing Protocol for MANET", Advanced Computing & Communication Technologies (ACCT), 2015 Fifth International Conference on 21-22 Feb 2015, pp: 340-346.
6. Vikaram Agrawal and Hiral Chauhan, 2014. "An Overview of security issues in Mobile Ad hoc Networks", International Journal of Computer Engineering and Science, pp: 1-8.
7. Perkins, C.E. and P. Bhagwat, 1994. Highly Dynamic Destination-Sequenced Distance-Vector Routing (DSDV) for Mobile Computers. Proceedings of ACM SIGCOMM.
8. Shruti Bhalodiya and Krunal Vaghela, 2015. "Enhanced Detection and Recovery from Flooding Attack in MANETs using AODV Routing Protocol", International Journal of Computer Applications, 125(4): 10-15.
9. Cheng, C., R. Riley, S.P.R. Kumar and J.J. Garcia-Luna-Aceves, 1989. A Loop Free Extended Bellman-Ford Routing Protocol Without Bouncing Effect. ACM SIGCOMM Computer Communications Review, 19(4): 224-236.
10. Nilesh Goriya, Indr Jeet Rajput and Mihir Mehta, 2015. "Low Control Overhead for Cluster Maintenance in Wireless Network for DSR Protocol", COMPUSOFT, an International Journal of Advanced Computer Technology, 4(5): 1736-1743.
11. Sanjeev Kumar Srivastava, Dr. Mrs. Ranjana D. Raut and Dr. P.T. Karule, "Evaluation of the Performance Comparison of DSR and AODV Routing Protocols in Mobile Ad Hoc Networks", Special Issue of International Journal of Electronics, Communication & Soft Computing Science and Engineering, pp: 6-9.
12. Rohini Sharma, D.K. Lobiyal, 2015. "Proficiency Analysis of AODV, DSR and TORA Ad-hoc Routing Protocols for Energy Holes Problem in Wireless Sensor Networks", 3rd International Conference on Recent Trends in Computing 2015 (ICRTC-2015), pp: 1057-1066.
13. Jinil Persis D. and T. Paul Robert, 2015. "Ant Based Multi-objective Routing Optimization in Mobile AD-HOC Network", Indian Journal of Science and Technology, 8(9): 875-888.
14. Dube, R., C.D. Rais, K.Y. Wang and S.K. Tripathi, 1997. Signal Stability- Based Adaptive Routing (SSA) for Ad Hoc Mobile Networks. IEEE Personal Communications, 4(1): 36-45.
15. Anandhi, M. and T.N. Ravi, 2015. "Dynamic Triangular Vision and Optimized Slant Selection Protocol for Mobile Ad hoc Network", International Journal of Applied Engineering Research (IJAER), 10(82): 508-514.
16. Ting-Yu, Lin and Sheng-Po Kuo, 2011. "A Survey on the Location Management Problem in Mobile Networks", Cyber Journals: Multidisciplinary Journals in Science and Technology, Journal of Selected Areas in Telecommunications (JSAT), March Edition, 2011, pp: 1-9.