

# **AN ANALYSIS OF DIVERGENCE IN DSR AND DG-CASTOR PROTOCOLS TO PROTECT MOBILE Ad Hoc NETWORKS**

**Dr. M.R.Ebenezar Jebarani, Mr. B.Pradeep Kumar**

<sup>1</sup>Associate Professor in Electronic and Communications Department in Sathyabama Institute of Science and Technology, Chennai, India

<sup>2</sup>Research Scholar in the Department of Electronics and Communication Engineering, Sathyabama Institute of Science and Technology, Chennai, India

<sup>1</sup>[rjebamalgam@gmail.com](mailto:rjebamalgam@gmail.com), <sup>2</sup>[pradeepagent13@gmail.com](mailto:pradeepagent13@gmail.com)

**Abstract**—A network which has a collection of mobile nodes that strenuously form a temporary network and are capable of communicating with each other without the use of network infrastructure or any centralized administration, such type of network is called an Ad hoc network. In general, a network is said to be a wellbeing network, whenever it has to satisfy some customs. One of the major customs is maintaining confidentiality while data is being transmitted. This article deals with two major protocols which describe the depth divergence in between Dynamic source routing protocol and DG-Castor protocol and also comparing with different responses when an attack or thread has been reported, by this analysis, it is easy to prefer which protocol is more suitable for a network during data transmission.

**Index Terms**—DSR, DG-CASTOR, Divergence, data transmission

## **I. INTRODUCTION**

Generally, the main aim of a network is to transmit the data as early as possible without facing some consequences like flooding, traffic, weather, road condition, message overhead, network congestion due to flooding packets everywhere etc..These are the main custom issues, which have to overcome by a network, then that particular network has to be named as an efficient network. Regarding these issues, a lot of protocols are available in this Authenticated environment. In order to analyze all the protocols, this article analyzes a complete divergence in two major routing protocols which are Dynamic routing source protocol and DG- Castor protocol to protect the data packets, which are present in Mobile Ad Hoc networks. Whereas in all other routing protocols wireless multi hop approach of forwarding is used. Digital map provides street level map and traffic statistics such as traffic density and vehicle agility on road at disparate times[1]. Digital map is binding in case of Some of Cluster Based Routing Protocols. Virtual Infrastructure is created through clustering of nodes in order to provide scalability the strategy of Recovery is used to reclaim from adverse situations. Recovery strategy is the criteria, which is used to judge the achievement of protocol. A Routing protocol is a decisive facet in communication between networks. It is a set of rules that are framed for swapping the information in a network from one node to another node as specified in the routing protocol. The main divergence between the MANET and VANET routing is network topology, mobility patterns, and demographics, density of vehicles at different timings, rapid changes in vehicles arriving and leaving the VANET. A VANET is a routing mechanism, which routes the data packets in a path from a network to a network or node to node in the same network by using different types of protocols. Different types of protocols and their analysis are given below. In that entire table this article discussed the deep divergence between the two major protocols which enhances the data from source to destination in a network.

## **II. LITERATURE SURVEY**

In this network area, different types of protocols have come into existence, but the major aim of each and every protocol is the same. The usages of different protocols in different areas are unique. Somehow the characteristic features of different protocols are stated in this article. However, some decisive divergences of two main protocols

are analyzed in this article. "A survey on routing protocols in vehicular Ad Hoc networks", is an article, which states about the Dynamic Source Routing-Dynamic Source Routing (DSR) is a reactive routing protocol[2]. This protocol manages route information. If a link or a route is unused or broken then immediately that particular information is handled by route maintenance if there is any route error occurred at the nodes then automatically it will send a RERR (Route Error) message to that particular network itself. This concept is stated by the authors Viswacheda duduku, Chekima, Farrah wong, Jamal ahmaddargham.

An author Chara Wijaya "describes the" Performance Analysis of Dynamic Routing Protocol EIGRP and OSPF in IPv4 and IPv6 Network." [3] It states that how a routing protocol works on behalf of correlating those dynamic routing protocols in IPv4 and IPv6 network and also simulate some network topology and shows that EIGRP is much better than OSPF in many distinct topologies.

"DG-CastoR for Query Packets Dissemination in VANET" is a paper which states about building a virtual community based on future location forecasting of mobile nodes in the network. This seems like a community Rendez-vous group where the nodes may meet in the near future. However, the query is only dispersed between the nodes belonging to the same Rendez- vous group.

"DG-CastoR" [4] was described by the authors "Atechian and al". It is a Geocast routing protocol based on link availability estimation. The main aim of DG-CastoR is to estimate the neighbors that will have the same trajectory (ability to communicate) with the sender all along a period of time, based on the Spatio-temporal similarity part. In DG-CastoR, Rendez-vous region serves the Geocast routing area and the Rendez-vous group the trajectory of the source and the neighbours in which the link availability was esteemed.

"Dynamic Routing Protocols" is an article which was described by "CCNA exploration companion guide", it states the benefits and drawbacks of a dynamic protocol system and also describes the Comparison of static routing and dynamic routing protocols. Which requires less administrative overhead? However, the expense of using dynamic routing protocols is also one of the major issues which dedicate part of a router's resources for protocol operation, including CPU time and network link bandwidth. Although the benefits of dynamic routing, static routing still has its own criteria in its application areas. There are times when static routing is more convenient and other times when dynamic routing is the better choice. Finally the combination of both types of routing in any network that has a moderate level of complexity.

### **III. ANALYSIS OF DYNAMIC SOURCE ROUTING PROTOCOL (DSR)**

In a general way, computers are considered to be a powerful machine, which can be a part of our daily lives. Similarly to enhance this implanted technology to the next level by connecting with other computers with the help of a network. Nowadays choosing a network, to get sustainable results is the main consideration in the scenario of data transmission. However by increasing the computers, there is an increment of ip addresses.

Whenever a lot of ip addresses come into existence in a same network or different network, the routing configuration is enforced, by this phenomenon all the computers can communicate with each other even in different networks. There are some major issues like packet loss and delay while in data transmission due to misconfiguration of the routing table at the router side. Loss of confidential or important data is considered to be a worst complication while after sent.

According to computer networks, the performance is based on a key factor which depends on the number of accurate

entries in the routing table. Somehow if there are changes that occur in the topology, routing tables must be automatically updated soon.

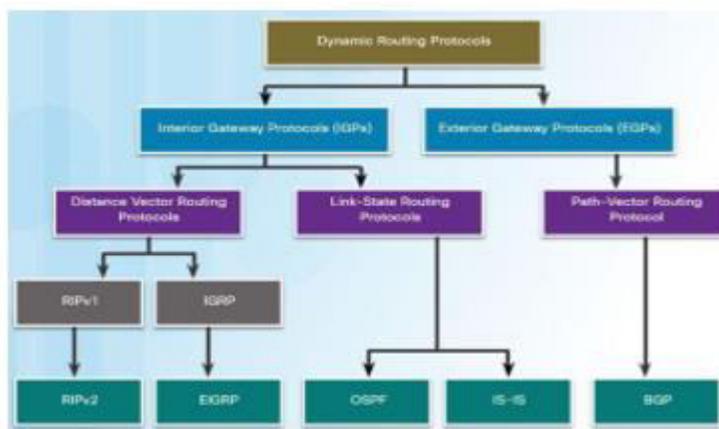
Computer networks basically use two different types of dynamic source routing protocol. Those are distance vector and link-state routing protocols. These two protocols have advantages and disadvantages. EIGP (Enhanced

Interior Gateway Routing Protocol) is used in distance vector type. OSPF (Open Shortest Path First) is used in link – state type. Ipv4 and Ipv6 networks will support both protocols.

In an adhoc network, if a node needs to send a data packet to a destination in an unknown route, it uses a route discovery process to dynamically determine such a route. By flooding the route RREQ packets it can find the route in that network. Each node receiving an RREQ rebroadcasts it, except it is the destination or it has a route to the destination in its route cache. That particular node makes an acknowledgement to this RREQ with a route reply (RREP) packet that is routed back to the original source. RREQ and RREP packets are source routed. The route carried back by the RREP packet is cached at the source for future use[5].

The above explained architecture of dynamic routing protocol has been shown in Fig 1.

**Fig. 1: Dynamic routing protocol architecture**



**IV. DIFFERENT TYPES OF FLOODING ATTACKS IN DYNAMIC ROUTING PROTOCOLS**

Generally, dynamic routing protocols are facing two types of flooding attacks which are SYN flooding attack and Ad Hoc flooding attack. This paper will explain a complete divergence of two major protocols and explains about the performance of each protocol while facing these types of attacks too.

**V. DG-CASTOR ROUTING PROTOCOL**

Direction based Geo cast routing is essentially a location based multicast routing. The main aim of this routing protocol is to manage the high mobility of the nodes by creating a virtual memory between mobile nodes which are able to communicate with neighbor nodes. In a simple way, this protocol will deliver the packet from source node to all other nodes within a specified geographical region (Zone of Relevance ZOR).

In Geo cast routing vehicles outside the ZOR are not alerted to avoid unnecessary diligent reaction. This protocol is considered as a multicast service within a definite geographic region. It normally defines an uphold zone where it directs the flooding of packets in order to diminish message overhead and network congestion caused by simply flooding packets omnipresent. Unicast routing is used to forward the packet at the zone of destination.

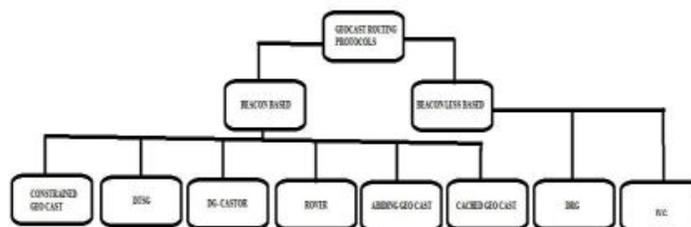
After complete analysis of this protocol this paper comes to an analogy that it has a drawback, which is network partitioning and also unfavorable neighbors, which may affect the proper messages forwarding mechanism. Some of the various Geo cast routing protocols are IVG, DG-CASTOR and DRG.

**A. Distributed robust geocast routing protocol (DRG):**

In VANET the DRG routing protocol works based on the principle of the algorithm stating that further distance is a more sympathetic principle to privilege relays.

Each node receiving a geocast message checks the applicability based on its location. If the node belongs to ZOR it reads the message and if it is in the ZOF range it forwards the message or else the packet is dropped[6].

In DG-CastoR the main asset is that it can supervise a large number of nodes in the network by dodging the unnecessary query packet transmissions and that it reduces considerably the network congestion compared to all other existing routing protocols.



**Fig. 2: Classification of Geo cast routing protocols**

Fig 2 states that the family tree figure of Geocast routing protocol, basically geocast routing protocol is classified into two categories, one is beacon based and another one is beacon less based. In Further beacon based systems are classified into six categories. Namely, constrained geo cast, DTSG, DG-Castor, Rover, Abiding geo cast, Cached geo cast. Another category is beaconless based, this one also further classified into two types, namely DRG and IVG.

**B. A complete divergence and analysis of DG castor and DSR routing protocols**

This chapter provides complete analysis and difference between two major protocols which are DG castor and Dynamic routing protocols. Some of the key features of Dynamic source routing protocol and DG castor protocols are discussed below.

Generally, dynamic source routing protocol is independent of the network size. According to the requirement of administrative knowledge, the requirement of advanced knowledge is mandatory. If the current network needs any changes to increase data transmission rate, no need to change the topology, why? Because it usually adapts to topology changes. Scaling is one of the major factors which show the performance of a routing protocol. By scaling this protocol this paper analyzed that DSR is suitable for simple and complex topologies.

If a network needs to use DSR as one of the routing protocols in its network to transmit the data packets it has to exploit some resources like CPU, memory and link bandwidth. Every routing protocol has to maintain a specific feature which gives a good value in the network areas, one of the major qualities is prediction of less traffic routes in a network while transmitting the data packets. In this routing protocol the prediction depends on the current topology which has to be used in that particular network.

**C. Advantages of Dynamic Source Routing Protocol**

- While adding or deleting a network, the administrator has fewer works in maintaining the configuration in that particular network.
- Protocols automatically acknowledge the topology changes.
- Configuration is less error-prone.
- More scalable; growing the network consistently does not present a problem.
- It is a reactive routing protocol.
- Its scenario is in urban areas.

**D. Disadvantages of DSR**

- Router resources are used (CPU cycles, memory, and link bandwidth).
- Further administrator knowledge is required for configuration, verification, and troubleshooting.

- It does not contain any digital map.
- It faces overhead at multi hop.

There is a routing protocol which is usually used in Vehicular Ad Hoc networks. Due to its performance levels it is highly populated in the area of vehicular Ad Hoc networks. It works based on geo cast routing protocol. Geo-cast routing protocol is basically all locations based multicast protocol. It aims to deliver packets to a group of nodes belonging to a geographical area i.e the geocast region. Some key features of DG castor routing protocol are given below.

### **E. Advantages of DG- CASTOR routing protocol**

In DG-CastoR the main advantage is that it can manage a large number of nodes in the network by avoiding the unnecessary query packet transmissions.

- The benchmark DG- Castor's update latency, computation and communication costs against both Deluge and Sluice[7].
- It contains flooding attack resilience.
- It also reduces the traffic load and the energy consumption of the devices by avoiding the unnecessary packet flooding over the network.
- DG-CastoR is a robust protocol for handling a large number of nodes in VANETs

## **VI. SIMULATION RESULTS**

This section will appraise the divergence between DG castor and dynamic routing protocol while transmitting the data packets and also states which protocol is best for a good network. This paper gives brief analysis and supports the better protocol in this area by using GloMoSim (Global Mobile system Simulator) simulator software.

In the wireless networks world GloMoSim is one of the library-based sequential and parallel simulators. This library will simulate a definite wireless communication protocol for each and every module in the network[8]. It is extensively used for research in MANET.

This paper casts two routing protocols from that library, one is DSR and DG Castor and compares their performance while assuming some network loads like flooding and traffic load. After complete analysis of DG-CastoR protocol, this paper came to a conclusion that, this DG-CastoR reduces the network congestion since it uses an algorithm to propagate the query packet to specific nodes by dodging the unnecessary transmissions. The below experiment shows that the DG- CastoR curtail the traffic overhead compared to Dynamic Source Routing Protocol.

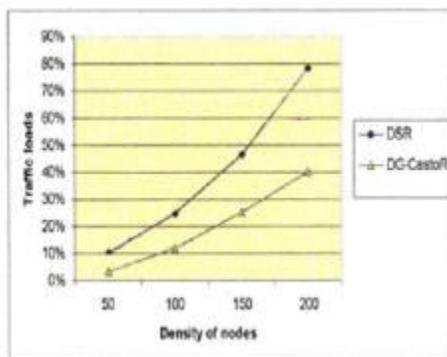
### **A. Simulation Design:**

The network terrain is fixed for 2000 x 2000m; the radio signal transmission range is 175m; the transmission bandwidth of each link 2 to 3Mbps and the simulation time 500seconds.

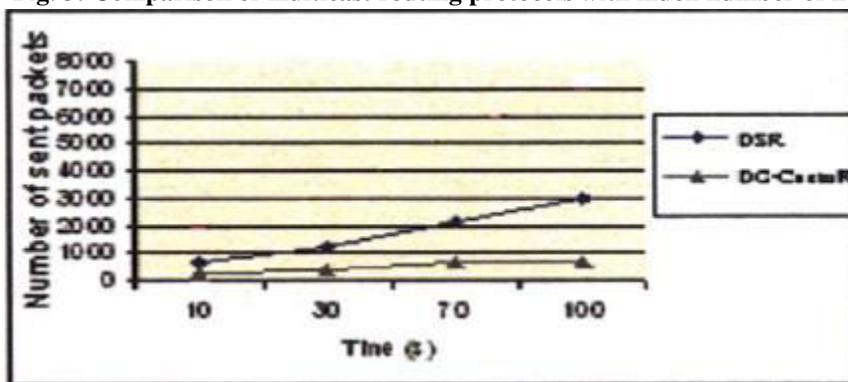
### **B. Acquired results:**

The main purpose of this experiment is to analyze which routing protocol is much acceptable, highly authenticated and also which reduces network congestion. This research compares DG-CastoR with DSR multicast protocols. This experiment varied the number of nodes from 50 to 200 mobile nodes, and calculated the traffic load for each case.

Fig 3 shows the graph statistics, when none of the 2 compared protocols attained the maximum flooding over the network. Which shows the durability of the protocols; but it is absolutely clear also that DG-CastoR reduces the congestion by attempting 40% of flooding with 200 nodes, while DSR reached 80% respectively. In VANET, the routing protocol has to manage all the moving vehicles in the road network even at a high rate and also the routing protocol has to manage a large number of nodes too.



**Fig. 3: Comparison of multicast routing protocols with much number of nodes**



**Fig. 4: Number of packets sent in protocols**

In a view to get accurate results, this paper compared the number of control packets sent to each protocol in the same simulation model with an execution time from 10s to 100s for each time this analysis recorded the number of control packets. Fig 4 shows that the DSR protocol sends packets twice more than DG-CastoR protocol, which clarifies the performance analysis of two major protocols which one will reduce considerably the number of flooded packets and minimizes the network congestion. This simulation results states that the DG-CastoR is a good routing protocol adapted for Vehicular Ad hoc networks (VANETs) when compared with Dynamic routing protocol.

**CONCLUSION**

This paper states the complete divergence and analysis of two major protocols and also chooses a better and suitable routing protocol for fast data transmission in a network. DG- castor routing protocol is one of the fastest routing protocols when compared to Dynamic routing protocol. This paper shows the performance level of DG-Castor protocol while many numbers of nodes are present in road traffic. By using simulator software this paper can easily identify the best protocol while in heavy traffic load. Finally the experimental results show that DG-Castor protocol will reduce the network congestion while comparing with Dynamic routing protocol. DG-Castor will predict the future locations which are stored in a Neighbors’ Trajectory are the major quality which enhances the speed of data transmission.

**REFERENCES**

[1] R. Kumar and M. Dave, “A comparative study of various routing protocols in vanet,” ArXiv, vol.

abs/1108.2094, 2011.

[2] D. Johnson and D. Maltz, "Dynamic source routing in ad hoc wireless networks," *Mobile Comput.*, vol. 353, 05 1999.

[3] C. Wijaya, "Performance analysis of dynamic routing protocol eigrp and ospf in ipv4 and ipv6 network," 12 2011.

[4] T. Atechian and L. Brunie, "Dg-castor: Direction-based geocast routing protocol for query dissemination in vanet," 01 2008.

[5] C. E. Perkins, E. M. Royer, S. R. Das, and M. K. Marina, "Performance comparison of two on-demand routing protocols for ad hoc networks," *IEEE Personal Communications*, vol. 8, no. 1, pp. 16–28, 2001.

[6] H. Joshi, M. Sichitiu, and M. Kihl, "Distributed robust geocast multicast routing for inter-vehicle communication," *Proceedings of WEIRD Work- shop on WiMax, Wireless and Mobility*, 05 2007.

[7] D. H. Kim, R. Gandhi, and P. Narasimhan, "Castor: Secure code updates using symmetric cryptosystems," in *28th IEEE International Real-Time Systems Symposium (RTSS 2007)*, pp. 479–488, 2007.

X. Zeng, R. Bagrodia, and M. Gerla, "Glomosim: a library for parallel simulation of large-scale wireless networks," in *Proceedings. Twelfth Workshop on Parallel and Distributed Simulation PADS '98 (Cat. No.98TB100233)*, pp. 154–161, 1998.