

Centralized System in MANET with GRP Protocol

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ABSTRACT

A MANET is an autonomous collection of mobile users that communicate over relatively bandwidth constrained wireless links. Since the nodes are mobile, the network topology may change rapidly and unpredictably over time. The network is decentralized, where all network activity including discovering the topology and delivering messages must be executed by the nodes themselves, i.e., routing functionality will be incorporated into mobile nodes.. In this paper routing protocols GRP for mobile ad hoc network with centralized system is checked to know the performance of the network. We will see that, is their any change in the performance of the network if will deploy centralized system in MANET.

Keywords: GRP; MANET; OPNET; Routing Protocols;

I. INTRODUCTION:

The emergence of wireless networks has gone a long way in solving the growing service demands. The focus of research and development endeavor has almost shifted from wired networks to wireless **networks**. The limitations of wireless network techniques such as high error rate, power restrictions, bandwidth limitations and other constraints have not deterred the growth of wireless networks [1]. Mobile Ad-hoc network (MANET) is one of the most demanding field in the area of wireless network. MANET consist of mobile devices or users which are generally known as nodes, and each one of which is equipped with a radio transmitter and a receiver [2]. MANET is a temporary network of wireless mobile nodes which has no fixed infrastructure. There are no dedicated routers, servers, access points, base stations and cables [3]. The mobile nodes which are within each other's transmission range can communicate with each other directly; or else, other nodes in between can forward the packets if the source and the destination node are —out of each other's range. Every node acts as a router to forward the packets to other nodes whenever required [4]. One of the main areas of research is the packet routing technology, which is the focus of this paper. Mobile ad-hoc network is —infrastructure-less network having nodes which can act as a transmitter, router or receiver. MANETs have a dynamic topology where nodes are mobile. To monitor the workings of these nodes and the nature in which they behave while sending, receiving or forwarding.

II. CENTRALIZED SYSTEM:

A centralized network is a type of network where all the users connect to a central server that is the acting agent for all communications. The server stores both the user account and communication information. Centralized computing is similar to a client/server architecture where one or more client nodes are directly connected to a central server. Typically, each client node is a thin client with no or very limited computing capacity. They generally have a visual display, basic input devices and a thin CPU with networking capabilities. Client nodes are connected over the network to a central server that processes their computations. The central server is deployed with the primary application, massive computing resources, storage and other high-end computing-intensive features. All the client nodes are entirely dependent on the central server for any application access, computing, storage, Internet access and security. Moreover, the administrator in a centralized computing infrastructure manages all the client nodes from the central server interface.



Fig 1. Centralized Systems

III. MANET VULNERABILITIES

Vulnerability is a weakness in security system. A particular system may be vulnerable to unauthorized data manipulation because the system does not verify a user's identity before allowing data access. MANET is more vulnerable than wired network. Some of the vulnerabilities are as follows:-

3.1 Lack of centralized management: MANET doesn't have a centralized monitor server. The absence of management makes the detection of attacks difficult because it is not easy to monitor the traffic in a highly dynamic and large scale ad-hoc network. Lack of centralized management will impede trust management for nodes.

3.2 Resource availability: Resource availability is a major issue in MANET. Providing secure communication in such changing environment as well as protection against specific threats and attacks, leads to development of various security schemes and architectures. Collaborative ad-hoc environments also allow implementation of self-organized security mechanism.

3.3 Scalability: Due to mobility of nodes, scale of ad-hoc network changing all the time. So scalability is a major issue concerning security. Security mechanism should be capable of handling a large network as well as small ones.

3.4 Cooperativeness: Routing algorithm for MANETs usually assumes that nodes are cooperative and non-malicious. As a result a malicious attacker can easily become an important routing agent and disrupt network operation by disobeying the protocol specifications.

3.5 Dynamic topology: Dynamic topology and changeable nodes membership may disturb the trust relationship among nodes. The trust may also be disturbed if some nodes are detected as compromised. This dynamic behavior could be better protected with distributed and adaptive security mechanisms.

3.6 Limited power supply: The nodes in mobile ad-hoc network need to consider restricted power supply, which will cause several problems. A node in mobile ad-hoc network may behave in a selfish manner when it is finding that there is only limited power supply.

3.7 Bandwidth constraint: Variable low capacity links exist as compared to wireless network which are more susceptible to external noise, interference and signal attenuation effects.

3.8 Adversary inside the Network: The mobile nodes within the MANET can freely join and leave the network. The nodes within network may also behave maliciously. This is hard to detect that the behavior of the node is malicious. Thus this attack is more dangerous than the external attack. These nodes are called compromised nodes.

3.9 No predefined Boundary: In mobile ad-hoc networks we cannot precisely define a physical boundary of the network. The nodes work in a nomadic environment where they are allowed to join and leave the wireless network. As soon as an adversary comes in the radio range of a node it will be able to communicate with that node. The attacks include Eavesdropping impersonation; tempering, replay and Denial of Service (DoS) attack [2].

IV. MANET CHALLENGES

Regardless of the attractive applications, the features of MANET introduce several challenges that must be studied carefully before a wide commercial deployment can be expected. These include [15, 16]:

4.1 Routing: Since the topology of the network is constantly changing, the issue of routing packets between any pair of nodes becomes a challenging task. Most protocols should be based on reactive routing instead of proactive. Multi cast routing is another challenge because the multi cast tree is no longer static due to the random movement of nodes within the network. Routes between nodes may potentially contain multiple hops, which is more complex than the single hop communication.

4.2. Security and Reliability: In addition to the common vulnerabilities of wireless connection, an ad hoc network has its particular security problems due to e.g. nasty neighbor relaying packets. The feature of distributed operation requires different schemes of authentication and key management. Further, wireless link characteristics introduce also reliability problems, because of the limited wireless transmission range, the broadcast nature of the wireless medium (e.g. hidden terminal problem), mobility-induced packet losses, and data transmission errors.

4.3. Quality of Service (QoS): Providing different quality of service levels in a constantly changing environment will be a challenge. The inherent stochastic feature of communications quality in a MANET makes it difficult to offer fixed guarantees on the services offered to a device. An adaptive QoS must be implemented over the traditional resource reservation to support the multimedia services.

4.4. Inter-networking: In addition to the communication within an ad hoc network, inter-networking between MANET and fixed networks (mainly IP based) is often expected in many cases. The coexistence of routing protocols in such a mobile device is a challenge for the harmonious mobility management.

4.5. be optimized for lean power consumption. Conservation of power and power-aware routing must be taken into consideration.

4.6. Multicast: Multicast is desirable to support multiparty wireless communications. Since the multicast tree is no longer static, the multicast routing protocol must be able to cope with mobility including multicast membership dynamics

4.7. Location-aided Routing: Location-aided routing uses positioning information to define associated regions so that the routing is spatially oriented and limited. This is analogous to associatively-oriented and restricted broadcast in ABR.

V. THE GRP PROTOCOL

GRP (Gathering based routing protocol) protocol is source initialized protocol in MANET routing protocol in which all the routing path is created by source node in Mobile Ad-hoc network. In this protocol, source node collects all the information about the route to the destination. In this procedure, source node sends a destination Query toward the destination through network. It works like AODV and DSR using RREQS (Reverse Request Query by Source). In it, when destination Query reached to the destination, destination sends a packet called Network Information Gathering (NIG) which approach through network. When NIG packet reached at a router, router gives it all the information about the network and its resources. There are many nodes called Effective Outgoing Links (EIL) where NIG packet does not riches, routers send this information to these EILs. At last NIG reaches at source node and source node get all the information [4, 5].

5.1 Advantages of GRP

In GRP does not require maintained of routing tables or route construction prior to or during the forwarding process. Moreover GRP offers a number of advantages over convention ad hoc routing strategies. The forwarding process also allowed a packet to adopt to change in the topology by selecting the next best choice if an intermediate node used by previous packets becomes unavailable. These approaches do not require table maintains other than immediate neighbor nor dissemination of topology information even without the need for route construction [6]. Routes can be altered node by node and packet by packet simply by considering additional Quality -of- Services (QoS) parameters relating to the next-hop neighbours, such as delay or available bandwidth [7].

5.2. Disadvantages of GRP

One of the major disadvantages of GRP is complexity and overhead required for a distributed location database service. However, The over- head of the location service cannot be entirely apportioned as the routing overhead if location-aware nodes and location-centric data become an integral part of pervasive computing and mobile sensor networks used for control and monitoring of applications. For example, location-aware capabilities provide facilities for unicast and multicast messaging into specific user-defined geographic areas [8]

VI. SIMULATION PARAMETER & MODEL

In scenario1, we have created a MANET network with centralized system with GRP Protocol with HELLO packet exchange as a Parameter. As shown in fig 4.5 we create two MANET network with 3 nodes each & a mobile server .Two other nodes Application configuration & Profile configuration are used for defining the topology & the configuration required for the network. In this Scenario, we create a centralized system in MANET to increase the performance of the network, for that we create two MANET network with 3 node each & a mobile server. Then we connect these mobile server to each other with a special type of wlan_router to join both the network. WLAN_ROUTER has a ability to connect two BSS id. So we give both the MANET network a differentBSS id & join then WLAN_router to know the performance of a MANET network with centralized system.

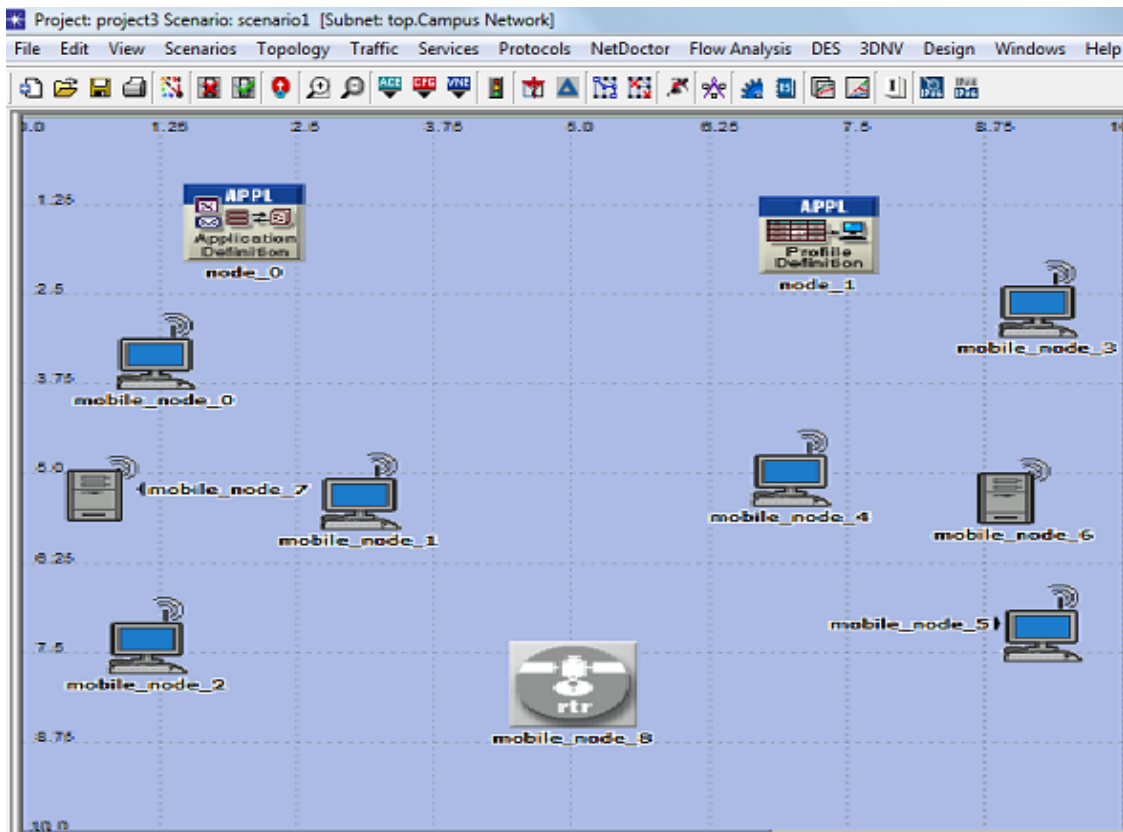


Fig 2. Centralized Systems in MANET with GRP Protocol

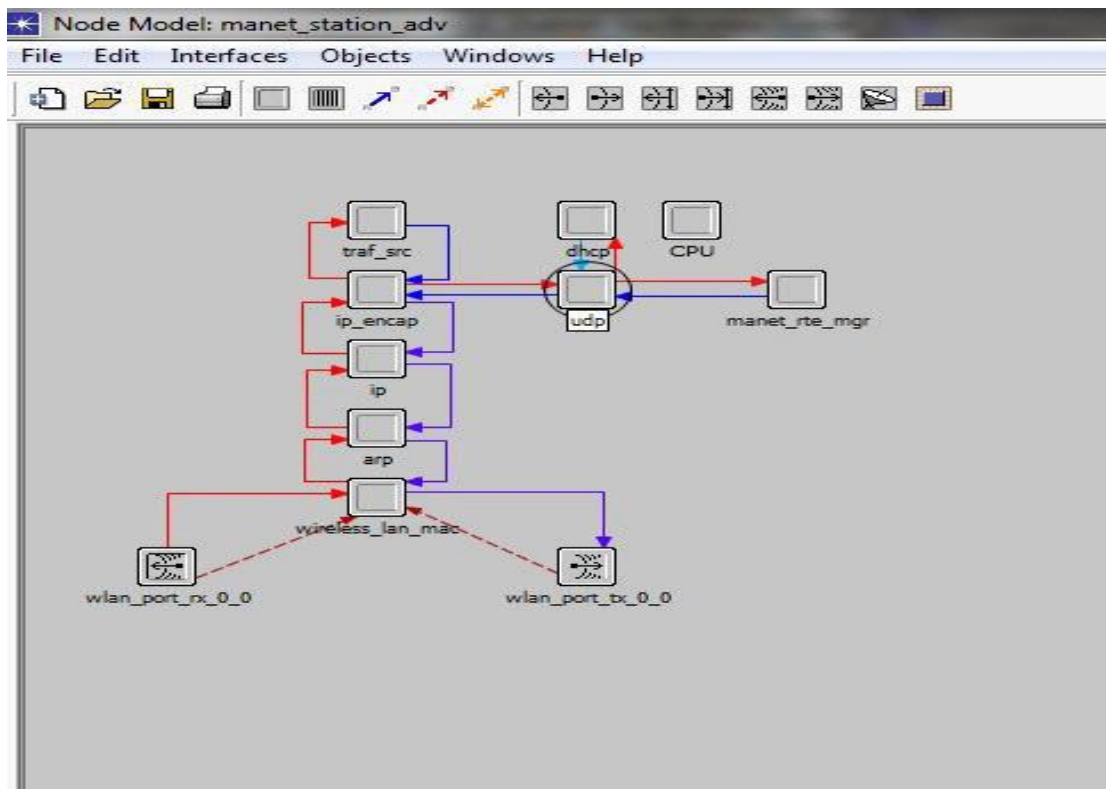


Fig 3: Node Model

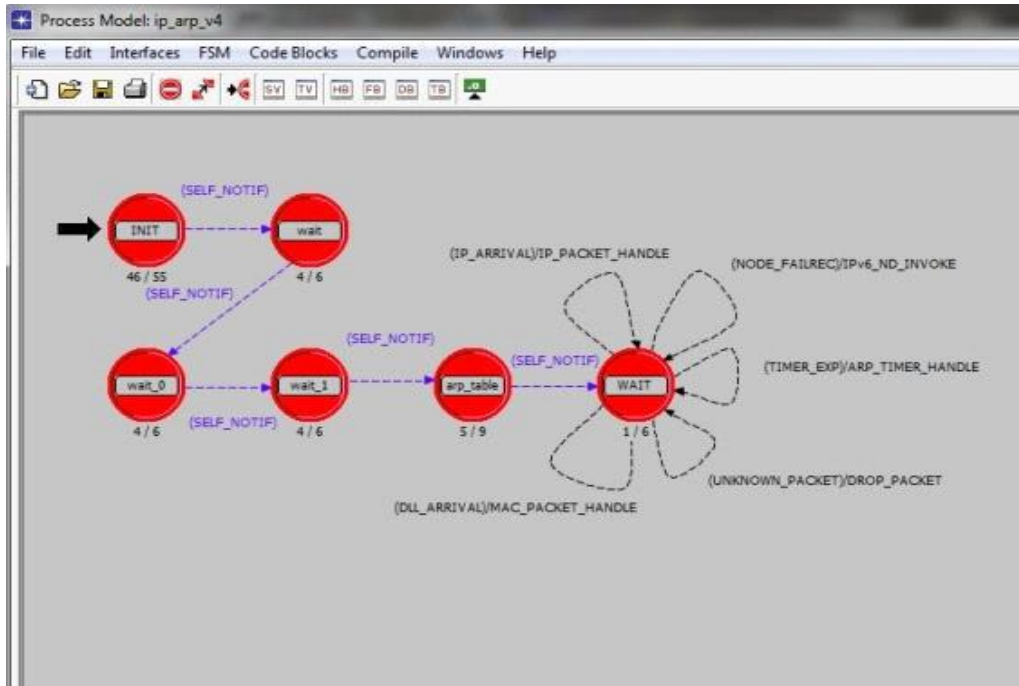


Fig 4: Process model

The simulation parameters are shown in the table below.

Parameter	Value
Transmitter Range	100 m
Data Rate	54MBPS
Simulation Time	1 Hour
Number Of nodes	5
Environment Size	100 x 100 m
Traffic Type	Constant Bit Rate
Seed	128
Values per statistic	100
Update Interval	500000 events
Simulation Kernel	Based on Kernel-type preference
Trajectory Information	Random Wave point
Area of movement	Within Network
Speed	5(m/s)
Altitude	10 m

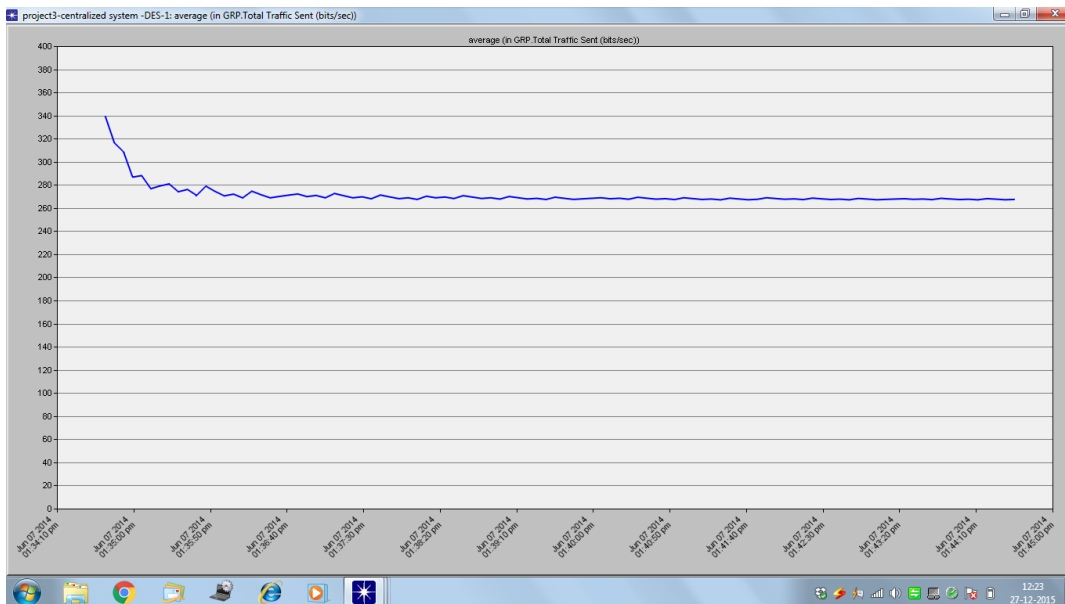
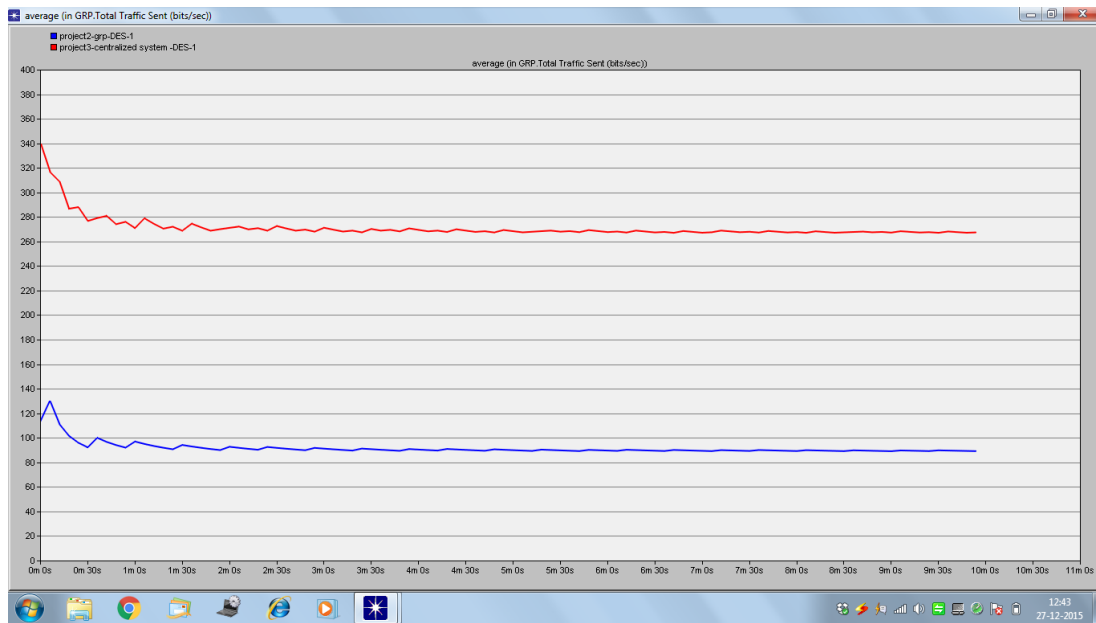


Fig 5: Hello Packet Exchange in Centralized System in GRPProtocol

MANET network with centralized system with GRP Protocol with HELLO Traffic Parameter have a network performance to 220 bits/sec

6.1 Comparison of centralized system & MANET network

Now we check that how much affect the MANET network & the centralized network. by comparing both the scenario of the with MANET & with centralized system in MANET



Graph show that Centralized system have very high network performance then MANET.

VII. CONCLUSION

In this paper, we analyze the performance of mobile Ad-hoc network in GRP routing protocol with Centralized system. The simulation results shows GRP protocol has better performance in the term centralized system than MANET. The same result also holds good for other networking applications. On the basis of this simulation we can deploy the network in all over the world with efficiently and provide the platform for location based security because security is the primary concern for any ad-hoc network.

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