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EFFECTS OF REALISTIC CHANNEL CONDITIONS ON THE PROPOSED KEY DISTRIBUTION TECHNIQUE FOR MANET

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***Abstract*— Efficiency of key distribution performance in mobile ad hoc network (MANET) is contingent on several parameters. Besides several parameters propagation model, mobility, scalability and routing protocols are the some of them. Where, nodal mobility is accountable for network topology, nodal scalability is accountable for network range, routing overheads are accountable for route discovery process and propagation model is accountable for computing signal strength at the receiver end. In the wireless system MANET undergoes a massive loss in performance of key distribution due to obstacle between transmission, topology, range of the network and variation in signal strength at the receiver end. Many key distribution techniques are proposed grounded on which abandonment the effect of fading and path loss. So it is important to find the effect of fading, nodal scalability, nodal mobility and routing protocols for efficiency estimation and analysis of performance of key distribution techniques in MANET. In this work investigation is attempted to calculate the effects of fading channels on nodal scalability, nodal mobility and considered routing protocols in proposed key distribution technique RET in realistic channels. Investigation is performed taking two performance parameters in account routing overheads and remaining energy.**

Keywords— **MANET, Key Distribution, RET, KDC, Propagation Model, Mobility, Scalability, Routing Protocols**

I. INTRODUCTION

In MANET wireless operator constructs a system provisionally without trusting on static infrastructure. Each movable node discovers route over rudimentary route discovery method and vicissitudes topology of network animatedly. Practically entirely routing protocols primarily be influenced by radio signal propagation aimed at the efficacious communication. Routing protocols are accountable for communiqué and upholding route amongst the nodes. Either for the single hop or for the multi hops among the source and the destination. On the other side, creating a wireless system needs discovery out the handling of radio waves in direction to conclude number of equipment to be required. The radio handling is contingent on wave range, radiation power and employed frequency of situation where it is created. Enactment of routing protocol depends on defining worthy link from ruthless link throughout active communiqué on assumed consequence [1]. Broadcasting frequency of a node can be altered due to movability of node that origins the alteration in signal strength of the receiver [2]. The signal strength might fades caused by several explanations such as antenna position, transmission power, distance among the sender and the receiver, attenuation caused by building.

The Signal which propagates over a wireless system take a long the difficulties of multipath fading, path loss and shadowing fading [3] which is associated to surroundings. Accordingly it turn out to be supreme important to evaluate performance of key distribution in all account such as nodal scalability, nodal mobility and considered routing protocols to get accuracy of the keys distributed though mobile wireless ad hoc network. In this paper we investigate the importance of fading channels on mobility, scalability and routing protocols in the key distribution process with respect to the routing overhead and remaining energy. NS2 simulator is used in this work to analyse the performance of key distribution on realistic channels such as TwoRayGround and NakaGami models. .routing protocols such as AODV, DSR and DYMO over two ray ground, free space and Rayleigh, shadowing and Nakagami model.

The work is organized as follows. Section II give summary of related work done in this field, section III will explain Projected key distribution technique RET, Section IV illustrates the performance analysis which is divided into further three subdivisions gives A) Performance Matrices, B) Simulation Environment and C) Results and Analysis, Section V gives the conclusion.

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II. RELATED WORK

Reference [4], Sukant Khisoro Bisoy, Parshant Kumar Pattnaik presented investigation of the result of propagation model (individually fading and non-fading) and agility on the enactment of the ad-hoc routing protocol such as Dynamic MANET On Demand (DYMO), Ad hoc On Demand Distance Vector (AODV) and Dynamic Source Routing (DSR) and represent the results congregated from simulation conducted on simulator NS2. The outcomes demonstrate that mobility and propagation mode has robust influence on the enactment of MANET routing protocols.

Aimed at multi-hop ad hoc networks wherever nodes travel rendering to the arbitrary waypoint mobility prototypical, the author improved the simulations presented in [5] to incarceration the consequence of nodes mobility and interaction between the source node and the hidden nodes, carrier sensing and interfering.

In reference [6] author deliberate the enactment of various ad hoc routing protocols in various propagation models. The outcomes demonstrate that the propagation model has a robust influence on ad hoc routing protocols enactment.

This paper [7] examines the effect of physical layer and propagation model on the routing protocols of MANETs. Author also examined a realistic physical layer simulant which is capable to enumerate the radio connection through various physical layer parameters.

Author In reference [8] author investigated the impacts of the Non-line of sight propagation model over enactment of routing protocols in urban-street surroundings. They applied peer to peer propagation prototypical with the Non-line of sight pathways and evidenced that it is suitable for street-grid surroundings. Over the simulation they have revealed that in the urban-street surroundings numerous redirected signals are suitable significant and the power of received signal can't be selected arbitrarily. Though we are provided with certain radio propagation model, they require certain computational possessions and therefore they may not be appropriate for the possessions-constraints surroundings such as MANET.

Consequently the author [9] projected the ascendable ray-optical radio frequency propagation prototypical which is appropriate to upsurge the network enactment and improve the accurateness in the frequency range presently used in the wireless networks. In this work author has demonstrated over simulation and experimentation.

In reference [10] the author deliberated the enactment of routing protocol of ad-hoc network in various broadcast models grounded on the Finite State Markov Chain channel prototypical. A combined cross layer algorithm encompassed of routing and physical layer is projected wireless ad hoc network. Plus it is practical Optimized Link State Routing (OLSR) protocol. The objective of this work was to discover the utmost optimum route by addressing the difficulty of route and link immovability by concentrating principally on Multi-Point Relay (MPR) assortment technique. Their outcomes demonstrate that cross layer method advances the throughput and decrease the delay in the network as equated to original OLSR.

III. DESCRIPTION OF PROPOSED KEY DISTRIBUTION TECHNIQUE(RET)

A novel key distribution technique is projected with the purpose of considerably increase the remaining energy and decrease the routing overheads to of existing key distribution technique and projected technique is entitled as Ring Expansion Technique (RET). Nodes existing in the network are designated as Key Distribution Centre's in ring expansion style on the bases of ranking scheme which is contingent upon the nodal; signal strength, mobility, range and power. In the projected work procedure of selecting KDC's proceed in the levels in ring expansion style. Where a trivial range is fixed for every node employed as KDC's to hunt for the Stationary and relatively stationary nodes.

Working in levels proceeds as follows;

In Level1: First of all a stationary node is designated arbitrarily from network through the ranking scheme among all the nodes as server node and this node is designated as KDC.

In Level2: In the second level server node presently employed as Key distribution centre trace in its static region for the stationary and relatively stationary nodes and designate them as key distribution centres.

In Level3: In the third level the nodes employed as KDC's in level2 further start tracing their respective static regions for the stationary and relatively stationary nodes to designate them as KDC's.

This process of tracing nodes to designate them as key distribution centres will precede until the entire network is covered. The projected work makes the procedure of key distribution more optimized with the benefits like; less time consuming, with more remaining energy and successfully decreases the routing overheads.

IV. PERFORMANCE ANALYSIS

Analysis of performance of ring expansion technique in comparison to existing technique can be seen in sections mentioned below:

A. PERFORMANCE MATRICES

Remaining energy and routing overheads are the two enactment metrics taken in account to calculate the performance of RET. These matrices are calculated by evaluating the effects of propagation models such as TwoRayGround and NakaGami on RET in realistic channels using different nodal scalability, nodal mobility and routing protocols. Simulation results are designed among scalability vs. remaining energy, scalability vs. routing overheads, mobility vs. remaining energy, mobility vs. routing overheads, routing protocols vs. remaining energy and routing protocols

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vs. routing overheads for comparing the performance of projected technique in account of different fading channels such as TwoRayGround and NakaGami. However, routing overheads in the network is computed with the ratio of no. of control packs transmitted by sender node versus no. of data packs successfully received by receiver node. Huge amount of energy is spent in ad-hoc networks while performing simulations and one of the objectives of proposing new technique is to save maximum energy in their technique. 30 joules is the fixed initial energy taken in RET.

B. SIMULATION ENVIRONMENT

Simulations are accomplished in NS2.345 simulator tool by means of VMware workstation on the IEEE 802.11 medium access control layer in two sections firstly with TwoRayGround and secondly with NakaGami. Mobility model used is Random waypoint, scalability of network is 20 nodes, 400*400 m2 area is taken for accomplishing simulations, 30 joules is the fixed initial energy is used and simulations are performed on window8. However nodes can change their velocity (m/s) and can move independently throughout the network figure (1).

SIMULATION ENVIRONMENT	
NAME	VALUE
Channel Type	Wireless Channel
Propagation	Two Ray Ground
N/W Interface Type	CMU PriQueue
Protocol	DSR
Antenna	Omni Antenna
NO. of Nodes	20
MAC	IEEE802.11
Simulation Area	400*400 m*m
Initial Energy	30 Joules
Node Speed	0,2,5ms

Fig. 1. Simulation Environment

C. SIMULATION RESULTS AND DISCUSSIONS

1. **Number of Nodes:** No. of Nodes in the network impacts the performance of key distribution. In the projected key distribution technique with increase in the no. of nodes the process of key distribution turn out to be more efficient; denser the network more effective will be key distribution. The results are calculated for investigating the effects of fading channels TwoRayGround and Nakagami on scalability of network by varying the size of network from 20, 30 and 40 no. of nodes. In TwoRayGround remaining energy is more than the NakaGami routing and routing overheads in TwoRayGround is less than of NakaGami as illustrated in figure (2) and figure (3).

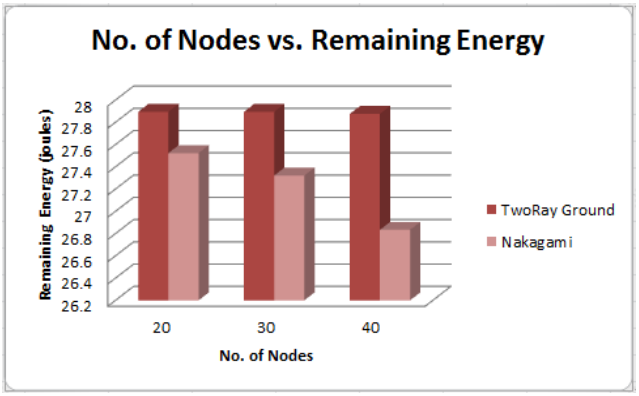

Fig. 2. No. of Nodes vs. Remaining Energy

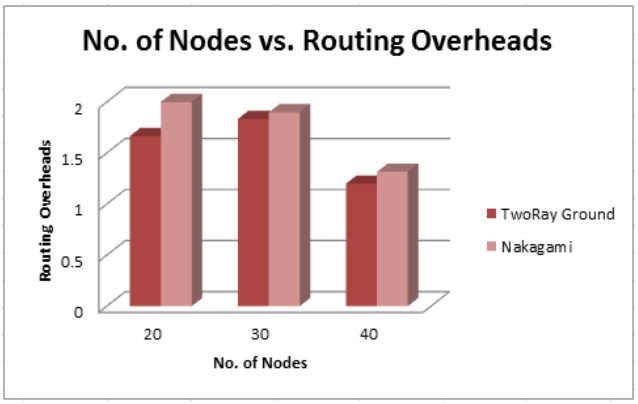

Fig. 3. No. of Nodes vs. Routing Overheads

2. **Protocols:** Routing protocols performs differently with different mobility used [11]. The enactment of an ad-hoc network is contingent on performance of routing protocols. Performance of routing protocols also differs on different fading channels. To investigate the effects of fading channels TwoRayGround and Nakagami on routing protocols of network by using different protocols such as reactive like DSR, AODV and AOMD and proactive protocols like DSDV. In TwoRayGround remaining energy is more than the NakaGami routing and routing overheads in TwoRayGround is less than of NakaGami as illustrated in figure (4) and figure (5).

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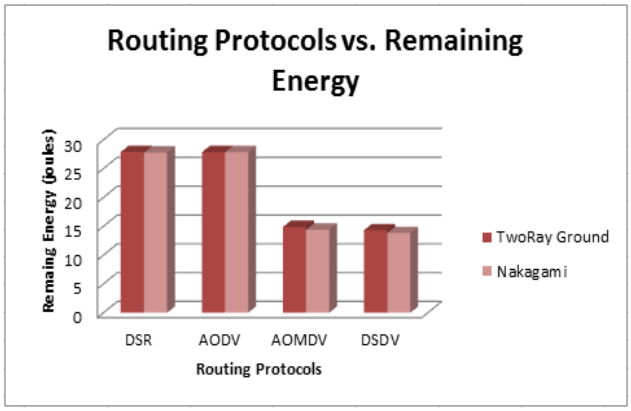

Fig. 4. Routing Protocols vs. Remaining Energy

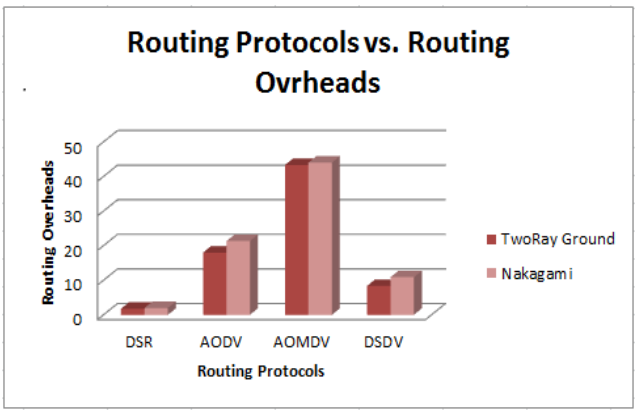

Fig. 5. Routing Protocols vs. Routing Overheads

3. Mobility: The velocity of the nodes in the system is described as mobility of mobile ad hoc network. This node velocity defines the frequency of link breaking and associating routing overheads for a network. Velocity is inversely relative to the range of ad-hoc network. Where, routing overheads of an ad-hoc network is directly proportional to route preservation of routing protocol. For investigating the effects of TwoRayGround and Nakagami realistic channels on mobility of network different nodal mobility's (6ms, 12ms and 18ms) are taken in account for computing the simulation results in terms of remaining energy and routing overheads as illustrated in figure(6) and figure(7).

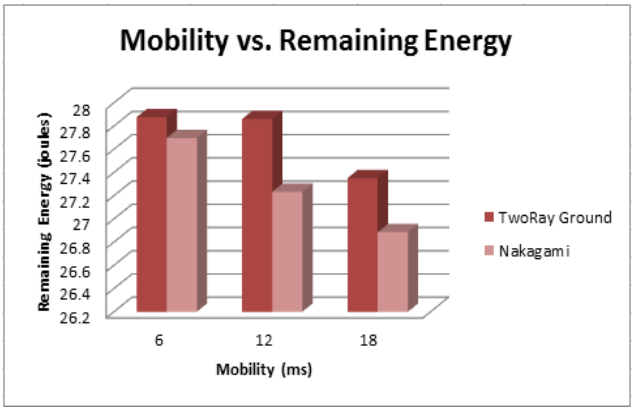

Fig. 6. Mobility vs. Remaining Energy

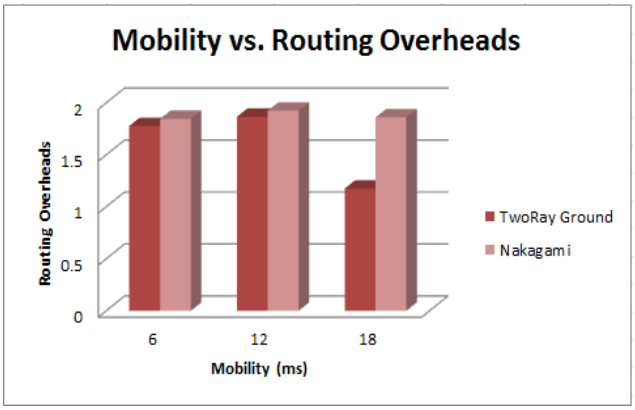

Fig. 7. Mobility vs. Routing Overheads

V. CONCLUSION AND FUTUE SCOPE

This research work is focused to investigate the effects of realistic channels on the novel key distribution technique entitled as Ring Expansion Technique. Effects are measured in relation to remaining energy and routing overheads over different simulation methodologies. Variations in simulation environment are projected in terms of nodal scalability, nodal mobility and routing protocols. After reviewing the simulation results and discussions we analyzed that TwoRayGround appraised the performance of RET where NakaGami degrades the performance of RET. So, we can conclude that TwoRayGround channel is more effectual then NakaGami channel for Ring Expansion Key Distribution Technique.

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