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Review of Dependent Parameters Using Taguchi Loss Function of AOMDV Routing Protocol in MANET Environment

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Abstract--- In this paper we presents a method for handling multiple metrics and different network parameters simultaneously to analyze the loss factor of routing protocols in mobile ad hoc network(MANET) environments. We have used Taguchi' loss function to determine the best parameters giving maximum throughput, packet delivery ratio (PDR), average delay, DROP and routing over head simultaneously for AOMDV protocol. In this paper we have consider various different mobile ad hoc network parameters such as Terrain size, No of Nodes, No of source nodes, Packet transmission rate, Node speed, Pause time, Transmission range, Queue size, Antenna height and receiving power on a multiple signal to noise ratio (MNSR), performance and contribution level of parameters have been analyzed by analysis of variance (ANOVA). The analysis of results shows that the parameters which more affecting the AOMDV performance in mobile ad hoc networks are Queue size, Receiving power, Source node, Packet transmission rate, Antenna height and transmission range.

Keywords---Perf*ormance metric, Taguchi's loss function, AOMDV, analysis of variance (ANOVA).*

I. INTRODUCTION

A mobile ad hoc network is an autonomous communication system of mobile nodes having radio transmitters and receivers. The device is free to move in any direction independently and links among these devices changed normally. Ad hoc is a Latin word and it standing for "for this purpose". The first challenge in building a Mobile ad hoc network is mobile station every device to unceasingly maintain the knowledge needed to properly route traffic. Such networks could manage by themselves or could also be connected to the bigger net. Mobile ad hoc network could be a wireless network that transmits from pc to pc. In ad-hoc networks, some pairs of terminals might not be able to communicate directly with one another and relaying of some messages is needed, in order that they are delivered to their destinations. Such networks square measure usually remarked as multi-hop or store-and-forward networks. Mobile hosts and wireless working hardware have become wide out there and in depth work has been done recently in group action these parts into ancient networks like the web. Usually events square measure used as means that of communications between simulation entities. During this section, we tend to gift performance metrics that are planned for (or used in) the performance analysis of associate ad-hoc network protocol. The subsequent metrics square measure applied to comparison the protocol performance. A number of these metrics square measure advised by the mobile ad hoc network (MANET) working party for routing protocol analysis.

A. Packet delivery ratio: Packet Delivery ratio is outlined because the ratio of the packets received by the CMBR sinks at the destinations over the packets generated from the CMBR sources. Nodes can stop a" pause-time" quantity before moving to a different destination purpose. Within the simulation we tend to vary the pause time from 10-50 sec.

B. Routing packet overhead: Routing Packet overhead RPO is that the total variety of transmissions routing packets transmitted throughout the simulation. For packets sent over multiple hops, every transmission of the packet (each hop) counts mutually transmission.

C. Packet drop: Packet drop happens once one or additional packets of information movement across an electronic network fail to succeed in their destination. Packet loss is distinguished mutually of the 3 main error sorts encountered in digital communications; the opposite 2 being bit error and spurious packets caused attributable to noise.

D. End-to-End delay: This includes all doable delays caused by buffering throughout routing discovery latency, queuing at the interface queue, and retransmission delays at the waterproof, propagation and transfer time four performance metrics (i.e., packet delivery fraction, average end-to-end delay, normalized routing load and normalized waterproof load) square measure studied as a perform of pause time and variety of sources. Simulation results show that AODV reach wonderful performance with relation to packet delivery quantitative relation and routing load, whereas poor performance with relation to average delay and normalized waterproof load. there\'s no specific style to

maximize packet delivery fraction and minimize average finish -to-end delay, normalized routing load and normalized waterproof load at the same time. As what they did, they modified the extent of parameters by attempt to error approach. With all the viewpoints, this study proposes a scientific performance study of AODV routing protocol with perform of many mobile ad-hoc network parameters and multiple metrics. During this paper associate approach for confronting multiple victimization. Taguchi's loss perform to see the parameter effects and optimum mobile ad-hoc network style is given.

E. Throughput: turnout or network turnout is that the rate of sure-fire message delivery over a line. This knowledge could also be delivered over a physical or logical link, or suffer a definite network node. The turnout is typically measured in bits per second, and generally in knowledge packets per second or knowledge packets per interval.

II. LITERATURE SURVEY

In general, performance of routing protocols is evaluated victimization simulation and is targeted on one-factor-at a-time approach. During this approach, one issue is assumed to own the strongest have an effect on on the protocol performance is chosen and its parameter is varied to some vary whereas holding all alternative parameters constant throughout the analysis. however this can be unattainable, as performance depends on quite one issue. In literature, Taguchi technique of style of experiment is wide employed in evaluating the performance of routing protocols for MANETs.

Performance of Dynamic supply Routing Protocol (DSR) is analyzed. The packet drop rate metrics analyzed supported 3factors particularly piece of land size, pause time and node speed by constructing L4 orthogonal array. The study indicates that among 3 factors piece of land size found to be the strongest effects followed by pause time. With twenty five × twenty five M2piece of land size, pause time of fifteen seconds and node speed of zero.72 m/s, a minimum of three.26% drop rate is obtained.

Taguchi methodology was accustomed verify the factors that have an effect on the performance of Destination Sequence Distance Vector routing protocol for Edouard Manet. The performance of the protocol was analyzed with relevance the packet delivery magnitude relation supported 3 factors particularly node speed, node pause time and traffic load. Multivariate analysis was accustomed determine the many issues moving the response and therefore the very best factor level combination was verify through the analysis of the signal/noise. Traffic load was found because the strongest impact on packet delivery magnitude relation followed by the pause time.

A scientific procedure was conferred that uses Taguchi style to investigate (DSDV) routing protocol with relevance packet delivery magnitude relation supported four factors particularly piece of land size, node speed, network size and pause time every of that having 2 levels. it absolutely was found that network size and piece of land have vital impact on the packet delivery magnitude relation. Here, L8 orthogonal array was used.

Taguchi's quality loss perform approach was used for performance optimization of dynamic supply Routing (DSR) protocol for Eduard Manet. Six factors particularly piece of land, network size, node speed, pause time, range of sources and transmission rates were optimized with single performance metrics as well as packet loss and routing overhead. Results showed that transmission rates was the foremost vital parameter contributes to the performance of outturn whereas the amount of sources was the foremost vital parameter contributive the performance of end-to-end delay.

III. TAGUCHI' LOSS FUNCTION

Taguchi's loss perform parameter style could be a powerful technique to see the best combination parameters. The most objective is to use Taguchi style for predicting the higher parameters which will optimize the performance metric through the setting of style parameters and cut back the sensitivity of the system performance to the supply of variation. Taguchi parameter style uses a special style of orthogonal arrays (OAs) to check the complete factors with little variety of experiment solely. The world organization have a balanced property during which each parameter setting happens an equivalent variety of times for each setting of all alternative parameters within the experiment. The world organization permits researchers or designers to check several parameters at the same time and might be accustomed estimate the consequences of every parameter freelance of the opposite parameters. Taguchi used a loss perform to calculate the deviation between the experimental price and therefore the desired price. The loss perform is completely different for various objective functions. Typically, higher turnout and lower the quantity of packet drop and routing overhead area unit want ready in ad-hoc networks system. Therefore, to get best ad-hoc network style, the larger-the-better performance metric for turnout should be taken. On the opposite hand, the smaller -the-better performance metric for

variety of packet drop and routing overhead ought to be taken for getting best ad-hoc network style.

Taguchi methodology emphasizes the importance of the center (parameter style) stage within the total style process; a stage that is commonly neglected in industrial design observe. The methodology involves the identification of these parameters that area unit underneath the management of the designer, then the institution of a series of experiments to ascertain that set of these parameters that has the best influence on the performance and variation of the planning. The sty leer so is ready to spot the elements of a design that most influence the required outcome of the planning method.

The second connected side of the Taguchi methodology - the Taguchi loss perform or quality loss perform maintains that their 'associate increasing loss each for producers and for society at massive, that could be a perform of the deviation or variability from the best or target price of any style parameter. The larger the deviation from target, the larger is that the loss. The idea of loss being keen about variation is well established in style theory, and at a systems level is expounded to the advantages and price related to responsibility.

IV. TAGUCHI' LOSS FUCTION PARAMETERS

The Taguchi's parameter design is a powerful technique to determine the optimal combination factors, including the controllable factors and noise factors. Taguchi parameter design can optimize the performance metrics through the setting of design parameters and reduce the sensitivity of the system performance to the source of variation. Taguchi parameter design uses a special design of orthogonal arrays (OAs) to study the whole factors with small number of experiment only. The OAs have a balanced property in which every factor setting occurs the same number of times for every setting of all other factors in the experiment. The OAs allows researchers to study many factors concurrently and can be used to estimate the effects of each factor independent of the other factors. Taguchi recommends the use of the loss function to measure the performance metric deviating from the required value. The value of the loss function is further transformed into a signal-to-noise ratio (SNR). Usually, there are three categories of the performance metric in the analysis of the SNR, that is the lower-the-better, the higher-the better and nominal the best. Regardless of the category of the performance metric, the larger the SNR corresponds to the better performance metric. The optimal level of the factors is the level with the highest SNR.

The term Taguchi methods is often wont to cowl 2 connected concepts. the primary is that, by the employment of applied math strategies involved with the analysis of variance, experiments could also be made that modify identification of the necessary style factors to blame for degrading product performance. The second (related) construct is that once deciding the effectiveness of styles, the degree of degradation or loss could be a perform of the deviation of any style parameter from its target worth.

These concepts arise from development work undertaken by Dr Genichi Taguchi while performing at the japanse tele communications company NTT within the Nineteen Fifties and Nineteen Sixties. He tried to use experimental techniques to realize each primequality and cheap style solutions. Parameter style determines the foremost applicable, optimizing set of parameters covering these style parts by characteristic the settings of every parameter which can minimize variation from the target performance of the merchandise.

V. CONCLUSION

In this paper, The Taguchi' loss function is applied to achieve the more significant parameters of the mobile ad hoc network under the consideration of multiple metrics. Among the ten parameters tested Queue size is found to be the most significant parameter followed by Receiving power, Source node, Transmission rate, Antenna height, Transmission range, Node speed, Pause time, No of nodes and Terrain size.

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