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# Performance analysis of Jitter in On-Demand and Table-driven Manet Protocol

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***Abstract*—Jitter is undesired deviation from periodicity of an assumed periodic in Electronics and telecommunication often in relation to reference clock source. The observation of jitter can be characteristics of frequency of successive pulse, signal amplitude or phase of periodic signal. Jitter period is the interval between two times of maximum effect (or minimum effect) of a signal characteristics that varies regularly with time. Jitter may be caused by electromagnetic interference (EMI) and crosstalk with carriers of other signals. Jitter can cause a display monitor to flicker, affect the performance of processors in personal computers, introduce clicks or other undesired effects in audio signals, and loss of transmitted data between network devices. The amount of tolerable jitter depends on the affected application. Thus jitter has important role in designing all routing protocols for MANET.**

***Keywords***— Jitter, Adhoc on Demand Distance Vector(AODV), Dynamic Source Routing(DSR) ,Optimized Link State Routing (OLSR) Protocol.

## I. Introduction

Jitter can be quantified in the same terms as all time-varying signals, e.g., RMS, or peak-to-peak displacement. Also like other time-varying signals, jitter can be expressed in terms of spectral density (frequency content).

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**1.1Sampling Jitter:-** In analog to digital and digital to analog conversion of signals, the sampling is normally assumed to be periodic with a fixed period—the time between every two samples is the same. If there is jitter present on the clock signal to the analog-to-digital converter or a digital-to-analog converter, the time between samples varies and instantaneous signal error arises. The error is proportional to the slew rate of the desired signal and the absolute value of the clock error. Various effects such as noise (random jitter), or spectral components (periodic jitter)[*specify*] can come about depending on the pattern of the jitter in relation to the signal. In some conditions, less than a nanosecond of jitter can reduce the effective bit resolution of a converter with a Nyquist frequency of 22 kHz to 14 bits.

**1.2Packet Jitter in Computer Network**:- In the context of computer networks, jitter is the variation in latency as measured in the variability over time of the packet latency across a network. A network with constant latency has no variation (or jitter).[3] Packet jitter is expressed as an average of the deviation from the network mean latency. However, for this use, the term is imprecise. The standards-based term is "packet delay variation" (PDV). PDV is an important quality of service factor in assessment of network performance.

## 2. EFFECT OF JITTER ON MANET PROTOCOLS

Routing protocols are challenging to design as performance degrades with the growth of number of nodes in the environment and a large ad hoc network is difficult to manage The routing protocols used in this paper is unicast protocols.

The routing protocols in Manets are classified into reactive and proactive and hybrid protocols.

### 2.1 REACTIVE PROTOCOL

The reactive protocols are Ad-hoc on Demand Distance Vector (AODV), Dynamic Source Routing (DSR), Dynamic MANET On-demand (DYMO) routing protocol, Link Quality Source Routing (LQSR), Location Aided Routing (LAR). The proactive protocols are Bellman-Ford, Fisheye, Optimized Link State Routing (OLSR) and Source Tree Adaptive Routing (STAR). The hybrid protocol is ZRP protocol. The general routing Requirements of any routing protocol is scalability, reliability, throughput, load balancing, and congestion control. Performance comparison among some set of routing protocols are already reported by the researchers in papers and many more. These performance comparisons are carried out for ad hoc networks.

### 2.2 PROACTIVE PROTOCOL

A proactive routing protocol discovers the network topology and computes the routing information regardless of whether the network protocol has a packet which needs that information. An on-demand or reactive routing protocol tries to discover a path to a destination only when the network protocol receives a packet addressed to that destination. EX-DSDV [2].

**2. 1.1Dynamic Source Routing (DSR)**

The Dynamic Source Routing (DSR) [4] is one of the purest examples of an on-demand routing protocol that is based on the idea of source routing. It is designed specially for use in multi hop ad hoc networks for mobile nodes. It allows the network to be completely self-organizing and self-configuring and does not need any existing network infrastructure or administration. DSR uses no periodic routing messages like AODV, thereby reduces network bandwidth overhead, conserves battery power and avoids large routing updates. Instead DSR needs support from the MAC layer to identify link failure. DSR is composed of the two mechanisms of Route Discovery and Route Maintenance, which work together to allow nodes to discover and maintain source routes to arbitrary destinations in the network.

***2.1.2*** **Ad hoc On-demand Distance Vector (AODV)**

Ad hoc On-demand distance vector (AODV)[4] is another variant of classic distance vector routing algorithm based on DSDV and DSR. It shares DSR on-demand characteristics, discovers routes on an as needed basis via a similar route discovery process. However, AODV adopts traditional routing tables; one entry per destination which is to DSR that preserves multiple route cache entries fore ach destination. The early design of AODV is undertaken after the experience with DSDV routing algorithm. Like DSDV, AODV provides loop free routes in case of link breakage but unlike DSDV, it doesn't need global periodic routing advertisement. AODV uses a broadcast route discovery algorithm and then the unicast route reply massage.

2.2.1 DESTINATION SEQUENCE DISTANCE PROTOCOL

Destination-Sequenced Distance-Vector Routing (DSDV) is a table-driven routing scheme for ad hoc mobile networks based on the Bellman-Ford algorithm. The improvement made to the Bellman-Ford algorithm includes freedom from loops in routing tables by using sequence numbers. It was developed by C. Perkins and P. Bhagwat in 1994. The DSDV protocol can be used in mobile ad hoc networking environments by assuming that each participating node acts as a router. Each node must maintain a table that consists of all the possible destinations. In this routing protocol, an entry of the table contains the address identifier of a destination, the shortest known distance metric to that destination measured in hop counts and the address identifier of the node that is the first hop on the shortest path to the destination. Each mobile node in the system maintains a routing table in which all the possible destinations and the number of hops to them in the network are recorded.

DSDV requires a regular update of its routing tables, which uses up battery power and a small amount of bandwidth even when the network is idle. Whenever the topology of the network changes, a new sequence number is necessary before the network re-converges; thus, DSDV is not suitable for highly dynamic networks.

***2.2.2 Optimized Link State Routing Protocol (OLSR)***

The Optimized Link State Routing Protocol (OLSR) [24] is an IP routing protocol optimized for mobile ad-hoc networks, which can also be used on other wireless ad-hoc networks. OLSR is a proactive link-state routing protocol, which uses hello and topology control (TC) messages to discover and then disseminate link state information throughout the mobile ad-hoc network. Individual nodes use this topology information to compute next hop destinations for all nodes in the network using shortest hop forwarding paths. In wireless ad-hoc networks, there is different notion of a link, packets can and do go out the same interface; hence, a different approach is needed in order to optimize the flooding process.

**Zone Routing Protocol (ZRP)**

Zone Routing Protocol or ZRP was the first hybrid routing protocol with both a proactive and a reactive routing component. ZRP was proposed to reduce the control overhead of proactive routing protocols and decrease the latency caused by route discovery in reactive routing protocols. ZRP defines a zone around each node consisting of the node's k-neighborhood (that is, all nodes within k hops of the node). A proactive routing protocol, Intra-zone Routing Protocol (IARP), is used inside routing zones, and a reactive routing protocol, Inter-zone Routing Protocol (IERP), is used between routing zones. A route to a destination within the local zone can be established from the source's proactively cached routing table by IARP. Therefore, if the source and destination of a packet are in the same zone, the packet can be delivered immediately. Most of the existing proactive routing algorithms can be used as the IARP for ZRP.

**3.RESULTS AND DISCUSSIONS**

In this section, the performance of AODV, OLSR and ZRP are analyzed and demonstrated based on the results obtained from the simulation A number of experiments are performed to explore the performance of these protocols with respect to jitter. Simulations are performed by varying Packet size and keeping mobility high.

Five models are considered for the comparison on the basis of jitter.

3.1Fig 1 shows model 1 which shows the variation of jitter for 25 nodes network for high mobility. The performance of AODV is poor as the jitter is very high, OLSR has very low values of jitter which shoes that it has got good behaviour, ZRP has got moderate values of jitter for increasing packet size depicting that its performance is better than AODV.

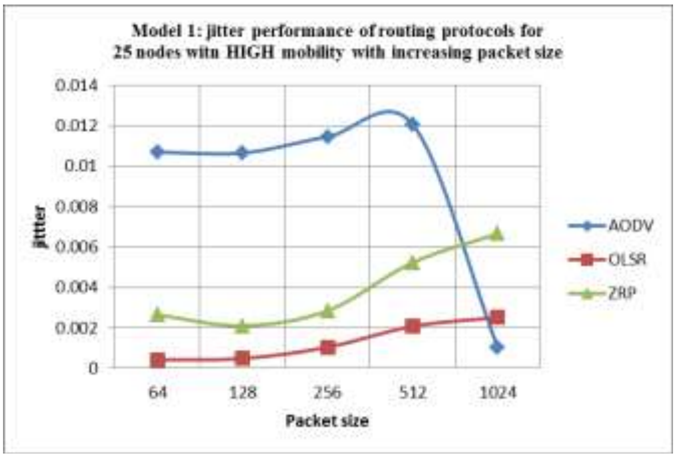


FIGURE-1[ MODEL-1]

3.2 Model 2 responses as is shown in Fig 2, which is a network of 35 nodes. This model shows that AODV has a high jitter value than all other protocols and OLSR[1] has minimum value whereas the value for jitter for ZRP is varying sinusoidal.

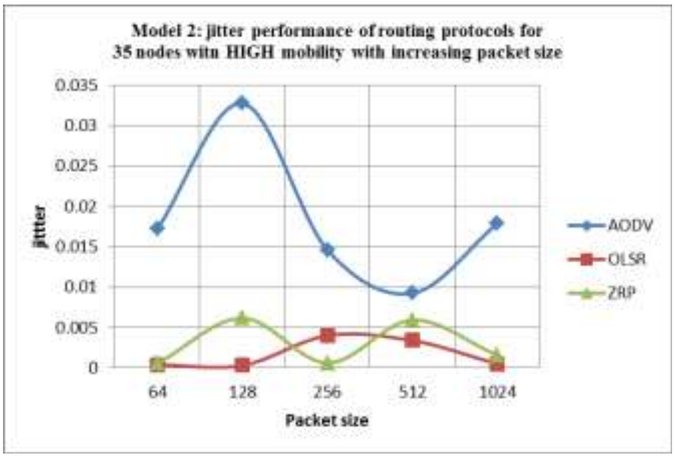


FIGURE-2(MODEL-2)[6]

3.3Fig 3 shows the jitter analysis of Model 3. This network has 50 nodes with high mobility and shows that the jitter is higher when protocol used is AODV and remaining protocols have the nearly same jitter.

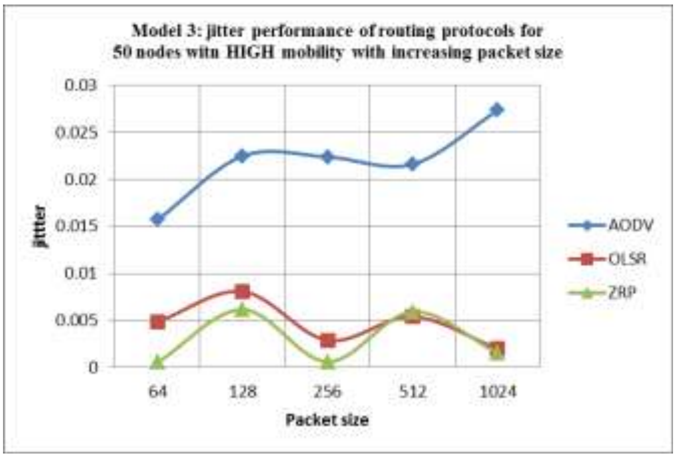


FIGURE-3[MODEL-3]

3.4 Fig 4 is used to represent the jitter analysis of Model 4 which is a network of 65 nodes of high mobility and the jitter observed for Model 4 defines that OLSR and ZRP have minimum jitter again and AODV has maximum.

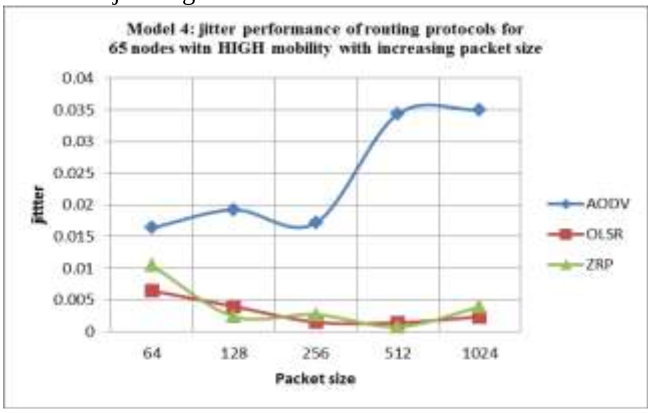


FIGURE-4(MODEL4) [6]

3.5In Fig 5, effect of packet size is shown for a network of 80 nodes, which has very high value of jitter for ZRP, moderate value for AODV and again low value for OLSR.

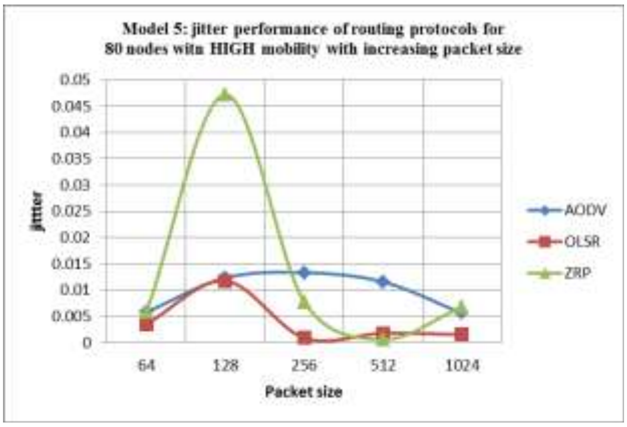


FIGURE-5[MODEL-5]

## 4.CONCLUSIONS

Fig 1 to fig 5 shows the effect of packet size on jitter for various models of 25 nodes, 35 nodes, 50 nodes, 65 nodes and 80 nodes respectively for highly mobile nodes.
The variation of jitter for 25 nodes network for high mobility. The performance of AODV is poor as the jitter is very high, OLSR has very low values of jitter which shoes that it has got good behavior, ZRP has got moderate values of jitter for increasing packet size depicting that its performance is better than AODV. So when aim is to minimize the jitter, On Demand Routing protocols can be used. This work can be further extended to improve this system by implementing another parameters like end to end delay, packet delivery ratio, security issues etc. such that the overhead of selecting routing protocol can be minimized.

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MANET is my favourite topic, in this paper I have done comparison analysis of jitter in different different routing protocol.