International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Impact Factor (2012): 3.358

A Review Paper on Performance of Routing Protocols in NS-2

Rozy Rana[1], Kanwal Preet Singh[2]

[1]Department of Computer Engineering, Master of Engineering, UCOE, Punjabi University Patiala, India

[2]Assistant Professor, Department of Computer Engineering, UCOE, Punjabi University Patiala, India

Abstract: ***The main goal of this paper is to see the simulation and performance factors of routing protocols. Routing Protocols specifies how communication between two routers takes place. By this we can specify the choice of the route. A routing protocol first shares its information to its routing protocols and then throughput the network. Three routing protocols will helps us in evaluating the performance in NS-2. Analyze literature sources related to wireless networks simulators. Analyze the Network simulator ns-2 and give its detailed Description. Therefore we can see the variation of performance factors packet delay, packet loss and throughput in nodes.***

Keywords: NS-2, AODV, DSDV, DSR, Throughput, Delay

1. Introduction

Wireless Networks are the networks that allow user to access the information electronically. Therefore information can be exchanged electronically with the help of radio waves. Hence services and data can be accessed wirelessly without any knowledge of location. It allows wireless connections for connecting network nodes. It takes place at physical level of OSI model. It avoids the costly process of introducing wire into campuses and building. DSDV, AODV and DSR are the routing protocols used in wireless network. DSDV is destination sequenced distance vector. It is based on Bellman Ford Routing Algorithm. AODV is ad-hoc on demand Distance vector and it maintains the timer based states in each node. The wireless network can be classified into two types: infrastructure and infrastructure less network [2].

1.1 Infrastructure Networks

It consists of network having fixed wired gateways. Here the host which is mobile communicates with base station (access point) but within its radius. When it goes out of its range it starts communicating with other access point. Hence it is known as Handoff. Here the base stations are fixed [3].

1.2 Infrastructure less Networks

Here all the nodes are mobile and they can move in any manner. The range of the host is limited so if it wants to connect the node outside of its range it can communicate the node that will be nearby and send packet to destination. Here node will act as router [3].

2. Wireless Routing Protocols

Ad-hoc networks are divided into Table driven and on-demand routing protocols. Table driven protocols are proactive protocols and it maintains routing table whereas. On-demand routing protocols doesn't maintain any routing table and are active protocols. Three Routing Protocols are

2.1 DSDV

It is a based on Bellman Ford Algorithm [3] and is a table driven routing scheme. Hence an improvement made to bellman ford algorithm by using sequence number so that it cannot form loops. Here each node maintains routing table that will list all available destinations, next hop to reach destination and metric. Destination node generates the sequence number to distinguish new nodes from stale ones.

2.2 AODV

It is Ad-hoc on demand vector. We calculate the route on its demand. Aodv maintains routing table and it maintain one entry per destination. It also provides loop free routes.

2.3 DSR

It is a pure on demand routing protocol. It reduces bandwidth overhead. It allows the network to be self organized and self configured.

3. Bellman Ford Algorithm

Input: Graph and a source vertex src.
Output: Shortest distance to all vertices from src. If there is a negative weight cycle, then shortest distances are not calculated, negative weight cycle is reported.

1) This step initializes distances from source to all vertices as infinite and distance to source itself as 0. Create an array dist[] of size |V| with all values as infinite except dist[src] where src is source vertex.
2) This step calculates shortest distances. Do following |V|-1 times where |V| is the number of vertices in given graph.
   a) Do following for each edge u-v
   If dist[v] > dist[u] + weight of edge uv, then update dist[v]
   dist[v] = dist[u] + weight of edge uv
3) This step reports if there is a negative weight cycle in graph. Do following for each edge u-v
   If dist[v] > dist[u] + weight of edge uv, then "Graph contains negative weight cycle"
   The idea of step 3 is, step 2 guarantees shortest distances

if graph doesn't contain negative weight cycle. If we iterate through all edges one more time and get a shorter path for any vertex, then there is a negative weight cycle.

4. NS-2

NS-2 is Network simulator and it is a discrete event driven network simulation tool. It is used to study the changing nature of communication networks. It is an open source and freeware. We can implement in C++ and OTCL programming languages. It supports different protocols, traffic and routing types. It provides users with a way of specifying protocols and simulating the behaviors. The result of simulation will be a trace file which will contain all events. It is developed by UCB.NS-3 is newest version of network simulator and it has been written in C++ and python. Also NS-3 doesn't support NS-2 Functionality. Some models in ns-3 we still take from ns-2.Because of Missing functionality and totally different API, we still prefer NS-2. It is portable and it can work on windows and UNIX.

4.1 NS-2 Programming Languages

To have a powerful and fast simulator we make use of programming languages in NS-2. Programming language like object oriented C++ we use it to form core of ns-2 which is used to handle header, algorithms and packets. For network scenario creation we uses object Tcl and it allows fast modifications. Languages like O Tcl and C++. Interact with each other through Tcl/C++.

1. OTcl is the language that is having goal to explore number of scenarios. It compromise between speed and abstraction level that has been offered to user. Iteration is also important feature in OTcl.
2. Whereas C++ object oriented we can use it for algorithm implementation and byte manipulation. Withthe help of this language we can achieve fast execution.

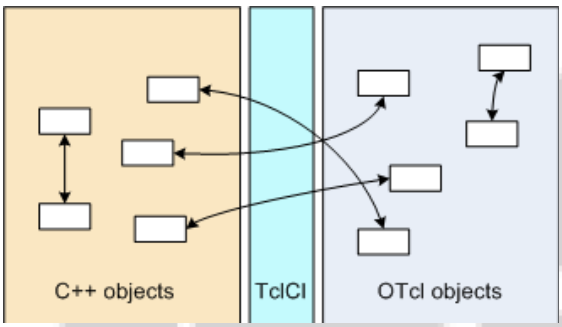

Figure 1: Tclcl

There are several characteristics of Tcl/OTcl languages and that are:

1. Faster development.
2. Graphic interface
3. Compatibility
4. Flexibility for integration
5. Scripting language.

For OPNET, we need a license to use it and whereas NS-2 is open source and freeware. Hence open source option makes it attractive option than others. Complex requirements can be easily tested in NS-2. Modularity approach also makes it better. Whereas in NS-3 there is limited no. of Models and contributed codes in NS-3 as compare NS-2. The First Research Paper [4] tells us about performance metrics and Performance Results of Routing Protocols. The second Research Paper [3] tells that AODV and DSR perform better than DSDV.

5. Performance Evaluation Factors

Scalability of routing protocols provides increase in traffic rate and network rate without degrading the network performance. It is an important issue in routing protocol. Performance of routing protocol is evaluation at different mobility rates. Hence the effect of mobility of routing protocol on various parameters like network traffic and packet delivery ratio has been analyzed

5.1 Throughput

It determines the throughput for each node and thus ns-2 helps in calculating byte received.

5.2 Packet Loss

It helps in calculating packet that is transmitted. It also calculates packets that are not received.

5.3 Packet End to End delay

It calculates the last time packet receives and no of all packets received.

6. Simulation Result

6.1 Packet Delay

This research paper [1] comparing how nodes receiving the packet.

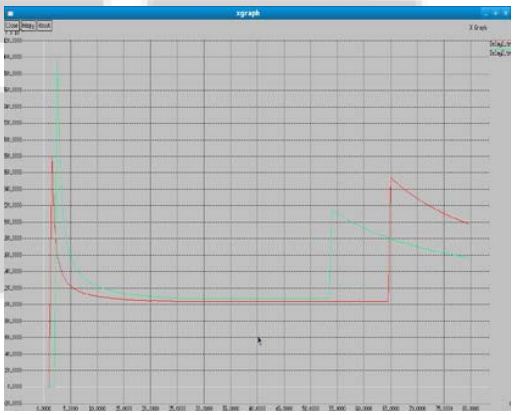

Figure 2: Delay for two nodes

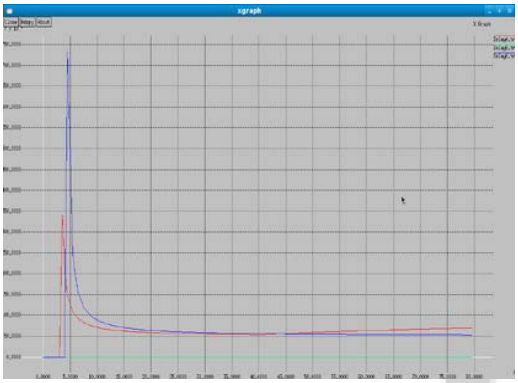

Figure 3: Delay for three nodes

6.2 Packet Loss

This research paper [1] helps in calculating packet that is transmitted. It also calculates packets that are not received. Here this research paper [1] are comparing nodes are showing that.

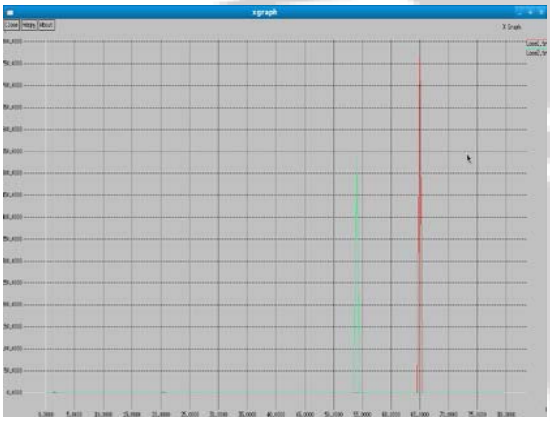

Figure 4: Packet loss for two nodes

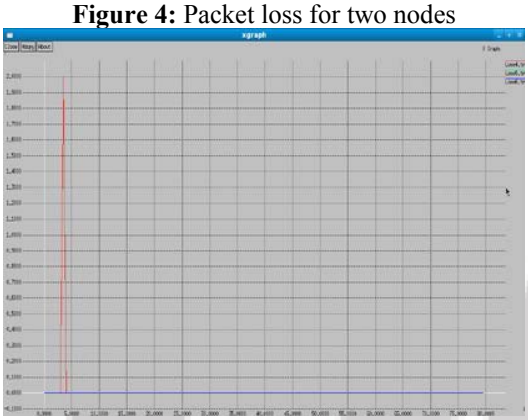

Figure 5: Packet loss for three nodes

6.3 Throughput

This research paper [1] determines the throughput for each node and thus ns-2 helps in calculating byte received. This research paper [1] will compare throughput of nodes to see how nodes affect each other as a result of different emitting times of the nodes.

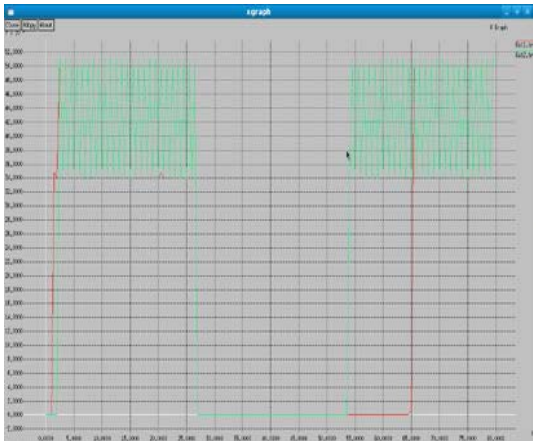

Figure 6: Throughput loss for two nodes

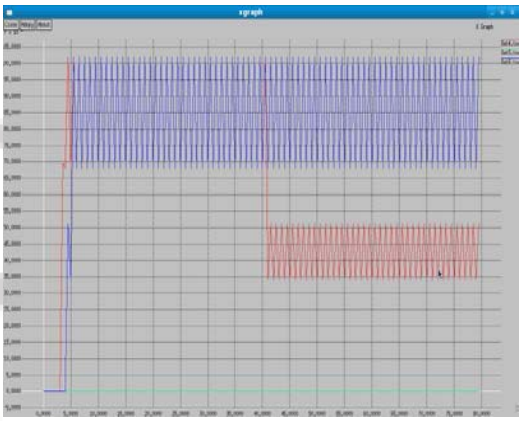

Figure 7: Throughput loss for three nodes

References

[1] Abdalla Gheryani, *Design and Simulation of Wireless Network using NS-2*, ICCSIT, April 2012
[2] Shilpa Shukla, *STUDY & ANALYSIS of DSDV, AODV & DSR*, International Journal of Advanced Research in Computer and Communication Engineering Vol. 2, Issue 5, May 2013, ISSN: 2319-5940
[3] D. Sunil Kumar, *A Simulation Based Study of AODV, DSR, DSDV Routing Protocols in MANET Using NS-2*, International Journal of Advanced Research in Computer Science and Software Engineering, Volume 2, Issue 3, March 2012, ISSN: 2277 128X
[4] Samyak Shah, Performance Evaluation of Ad Hoc Routing Protocols Using NS2 Simulation
NS-2, The ns Manual (formally known as NS Documentation) available at http: //www.isi.edu/nsnam/ Ns/doc.