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Packet Flow Analysis in Wireless Scenario

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Abstract— The aim of this research paper is to simulation and design of wireless network by using NS-2 simulation tool. A Wi-Fi technology is used to analyzing packet flow in UDP and TCP protocol. This paper also analyze packet drop rate in UDP and TCP protocol during wireless data transmission and a brief compare of AODV and DSDV routing protocol.

Keywords— LAN, MAN, NS2, AODV, TCP, UDP, WIRELESS.

I. INTRODUCTION

A network without wire is known as a wireless network. In this research paper we created wireless scenario by using NS2 simulator. Electromagnetic wave such as radio waves, are used to carry the data from source to destination. Wireless network is a cost effectiveness deployment. It is best where the wiring is complicated. It is the best solution as compared with wired network. Designing of wireless scenario and studying the behavior of network, the various simulation tools are often used by various researchers. Network Simulator version 2 (NS2) is a simulation tool. It is commonly known as NS-2. It used in wired and wireless network for packet flow analysis in UDP and TCP transport layer protocol. Also analyze different background behavior of networks.

Wireless network define as a network without wire that communicate by using wireless technologies [10]. In telecommunications, information transfer without use of wires is known as wireless communication [1]. Wireless network refer to any kind of computer network that is wireless. It is commonly associated with a telecommunications network whose interconnections between network devices are implemented without use of wires [5]. The various kind of wireless communication networks exist, but a distinctive attribute of a wireless network is that communication takes place between computer devices. These devices cover printers, laptops and servers. Computer devices have a resource of interfacing with a particular type of network [6].

II. RELATED WORK

A. Related Work

The various researchers have done quantitative and qualitative analysis of UDP and TCP protocol of transport layer in wired and wireless scenarios. A few of them are declared below. Bruno R. in at al [9] differentiated the performance of UDP and TCP protocol in an IEEE 802.11 wireless LAN scenario based on throughput.

Kusum D. in at al [11] compared throughput with UDP is much greater than TCP. Packet drop rate and collision rate is less in TCP as compared to UDP.

Sirisha M. in at al [13] improves the TCP performance over wireless network.

Santosh K. in at al [14] TCP protocol used where the reliability is required that is internet. UDP performance is better where time is constraint irrespective of reliable delivery, whereas TCP is suitable where time is not constraint and reliable delivery is essential.

B. Destination Sequence Distance Vector (DSDV)

DSDV is a routing protocol that uses table-driven routing method for mobile adhoc networks. DSDV is based on the Bellman-Ford algorithms and invented by P. Bhagwat and C. Perkins in 1994.To resolve the routing loop problem, all entry in the routing table contains a sequence numbers. Each mobile node manages a hop count for each destination. The sequence number is used to distinguish stale routes from new ones and avoid the creation of loops. Update is both time-driven and event-driven [7].

C. Adhoc on Demand Distance Vector Routing (AODV)

AODV is a routing protocol for mobile adhoc networks and other wireless adhoc networks. It was developed by C. Perkins, E. Belding-Royer and S. Das. It uses a very special technique for maintain routing information. It is an on-demand and a table-driven protocol. It is used to avoid the counting-to-infinity problem of other distance vector protocols. It uses a sequence numbers on route update. It is a technique pioneered by DSDV. It is supported both unicast and multicast routing [7].

The Comparison Table of DSDV and AODV are shown as Table I.

TABLE I
DSDV AND AODV COMPARISON

Protocol Property	DSDV	AODV
Route trace	Periodically	As per demand
Proactive/Reactive	Proactive Protocol	Reactive Protocol
Size of packet	Identical	Identical
Network appropriate for	A few no. of nodes	Highly dynamics
Multiple-hop wireless	Support	Support
Routing Overhead	Less than AODV	More than DSDV
Network overhead	High	Average
Rout Discovery	Not Possible	Possible
Source Routing / Table Driven	Table Driven	Source Routing & Table Driven
Multiple Route	No	No

D. Compare Between GNS3, NS2 and NS3 Simulator

- *GNS3*

  It is CISCO software. It is a network simulator with the purpose of allows simulation of complex networks with no need to purchase network hardware devices. In previous, we would have had to spend lots of money on purchasing the network devices to perform practical labs. It is most useful tools to real labs for network engineers, administrators and people they want to pass certifications such as CCNA, CCNP, CCIP, CCIE, JNCIA, JNCIS, JNCIE.

  It is an open source, free program that may be used on multiple operating systems such as Windows, Linux, BSD, and MacOSX. We can design very complex network by using GNS3.

- NS2 and NS3

  NS2 stand for Network Simulator version 2. It is developed by UCB (University of California Berkley) in 1989. NS1 was developed by Floyd and McCanne. NS2 was developed at LBNL (Lawrence Berkeley National Laboratory) and maintain by VINT project (Virtual Internet Test Bed) [4]. NS2 are written in C++ and TCL languages. It is platform independent software tool. NS2 works on most Windows and Linux operating Systems. It is support on Linux (Ubuntu, Fedora etc.), FreeBSD, SunOS/Solaris, HP/SGI, and Windows 95/98/ME/NT/XP/2000/2003[6].

  NS3 stand for Network Simulator version 3. It is written in C++ and Python came as a replacement for NS2 in 2006. It is not an enhance version of NS2. It is a new simulator that doesn't support NS2 APIs. A new API and missing functionality in NS2 are introduced in NS3. NS2 popularity is more than NS3 [6].

III. DESIGN AND SIMULATION OF WIRELESS SCENARIO MODEL

A. Wireless Simulation Model

In this research paper, we created wireless scenario with size 500m*5000m, it consist of four mobile nodes such as n0, n1, n2 and n3. Their initial node position is shown in figure 1. To design this scenario we are using NS2 simulation tool. To transmit the data between the node n0 and n1 we are using TCP transport layer protocol, in same way to transmit the data between the node n2 and n3, we are using UDP transport layer protocol. AODV routing protocol is used to provide the route between source and destination.

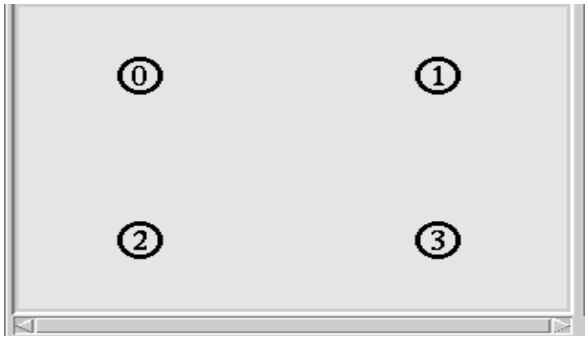

Fig.1 Nam output window

B. Parameters for Generating Wireless Scenario

These models created with the help of Nam (network animator) software tool, to executing TCL script consider the following simulation parameters are illustrate in table II.

TABLE III
WIRELESS SCENARIO PARAMETER

Parameter	**Value**
NS version	NS-2
Channel	Wireless Channel
Interface queue	DropTail
Packet size	500 bytes
Queue Length	50
No. of nodes	4
Transport protocol	UDP and TCP
Total Simulation Time	12 second
Network interface	Wireless
Mobile speed	90 m/s
FTP start time	0.0 second
CBR start time	0.0 second
CBR stop time	10.3 second

C. Experimental Analysis

To analyze the packet flow in wireless scenario for UDP and TCP transport layer protocol, we generated following scenario. All these scenario figure show packet transmission and packet drop during data transmission time for UDP and TCP. We can see that in figure 2, 3, 4 and 5 packets are dropping only at node 2 and node 2 used UDP protocol to transmit the data packet. While at node 0 does not packet loss any, and it uses TCP protocol to transmit the packet. It means packet drop more in UDP protocol as compared to TCP. Transmission speed also more in UDP.

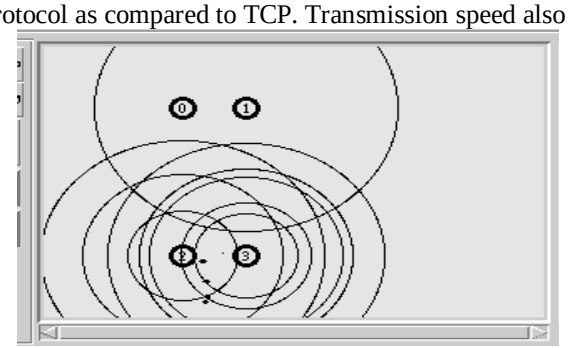

Fig. 2

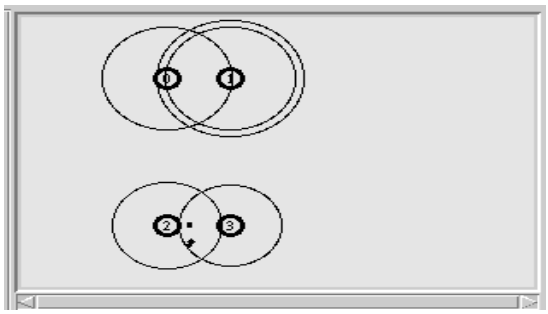

Fig. 3

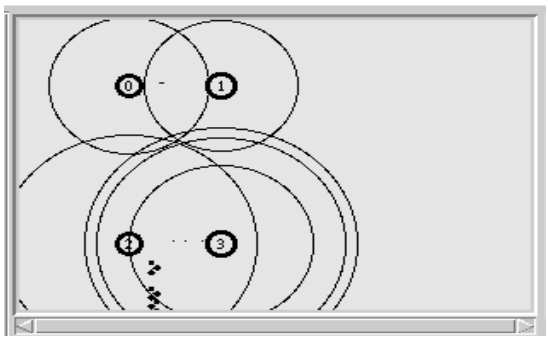

Fig. 4

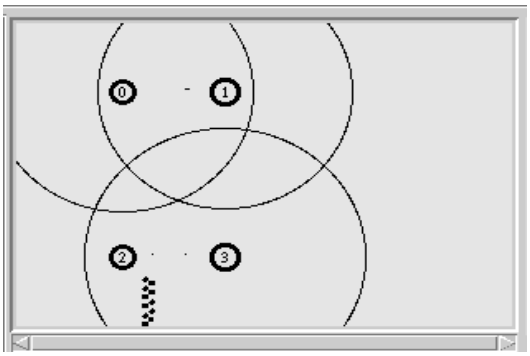

Fig. 5

The other point of notice is that UDP transmit the data packet by packet while TCP transmit the data queue by queue. In TCP destination also send the acknowledgement to the source node while UDP, no concept of acknowledgement. In UDP packets transmission is quick as compared to TCP. To see the acknowledgment sent by destination to the source node in TCP we have need to zoom all scenario, without zoom we cannot see acknowledgement concept in TCP.

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IV. APPLICATIONS OF NS2 SIMULATION

NS2 simulation has following Applications

1 For different network topologies, mobility scenarios and routing algorithms especially that the NS-2 simulator is developed to better cover the UWB technology, considered to be in high prominence.
2 To resolve the realistic problem in the teaching and experiment of computer network courses, a NS2 based demonstration and experiment system has been constructed.
3 AgentJ framework, which provide a Java interpretation capacity to the NS2 network simulator.
AgentJ design adopts the standard NS2 method for interacting between TCL scripts and C++ objects thereby making it NS2 user friendly.
4 NS2 is not a sophisticated and ended product, but the result of an ongoing effort of research and development. In particular bugs in the software are still being discovered and corrected. NS2 users are responsible for verifying for themselves that their simulations are not invalidated by bugs.
5 It is very expensive to set up a complete test bed containing multiple networked computers, routers and data links to validate and verify a certain network protocol or a precise network algorithm. The network simulators in these conditions save a lot of money and time in accomplishing this task. Network simulators are also particularly useful in allowing the network designers to test new networking protocols or to change the existing protocols in a controlled and reproducible manner.
6 Application of NS2 to overcome computer networks attacks.
7 Ns-2 has also an emulation feature that is the ability to introduce the simulator into a live network and to simulate a desired network between real applications in real-time.
8 A new generic architecture to simulate, emulate and test new protocols that use in underwater sensor networks in real life experiments via the proposed framework, the code written for simulation test with ns-2 can be reused to perform real tests in the water.
9 A possibility of simulation for satellite networks in Network simulator (NS2). It is possible to simulate satellite networks (LEO and GEO). NS-2 drawbacks are that it is impossible to create NAM file for satellite networks, we overcame this fact with using nssat- plot program. The next restriction is that the current status of routing in satellite networks is incomplete.

V. CONCLUSIONS

This paper summarizes, UDP transmission rate and packet drop rate is high as compared to TCP, and no acknowledgement concept in UDP. NS2 simulation tool are used to generate all scenarios. The comparison between DSDV and AODV routing protocols and find that DSDV is proactive and AODV is reactive. Routing overhead is less in DSDV. Routing discovering is not possible in DSDV while it is possible in AODV.

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