Performance Comparison of Tcp And Cbr Traffic Based In Wimax Environment Using NS-2

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Abstract: *WiMAX will offer high speed broadband wireless access within a range of several kilometers. The same radio technology will also offer high speed data services to all nomadic terminals (laptops, PDAs, etc.) with an optimized tradeoff between throughput and coverage. To provide high speed internet services in WiMAX technology can be useful. So we have decided work for this technology. In this paper we have compare the performance with different traffic source like as TCP and CBR using AODV routing scheme in wireless environment, and find the performance metrics like as packet delivery ratio and average end to end delay with variation of nodes.*

Keywords: *WiMax, TCP, CBR, NS-2.*

I. INTRODUCTION

Ad-hoc networking is a concept in computer communications, which means that user's wants to communicate with each other form a temporary network, without any form of centralized administration. Each node participating in the network can acts both as host and a router with willingness to forward packets for other nodes. For this purpose, a routing protocol is needed.

In the 1990s, data transmission went into the wireless era. Wireless transmission includes Bluetooth, Infrared, RF, IEEE 802.11, IEEE 802.15 and 3G. Currently there are several competing communication technologies for providing wireless Internet access. The primary competitors are 3G, Wi-Fi (IEEE 802.11) and WiMax (IEEE 802.15). Wi-Fi is a wireless local area network technology designed for home and small area implementations. WiMax is a wireless metropolitan area network technology which can cover larger area and support mobile Internet access at speeds up to 120km/hr. Each individual technology is designed for a particular application, but their capabilities at least partially overlap. WiMax is a newer technology that promises longer ranges and mobile access. Wi-Fi has been used for ten years, but has recently been implemented in campus-wide and city-wide networks.

WiMax cover larger area and support mobile Internet access at speeds up to 120km/hr. Each individual technology is designed for a particular application, but their capabilities at least partially overlap. WiMax is a newer technology that promises longer ranges and mobile access. The requirement for exchanging data information over the wireless environments in the recent years is rapidly growing. There is an increasing demand on connections to access the Internet; therefore there is a need for reliable and effective routing protocol.

In this work Demand Distance Vector Routing have in used. A simulation model feature based on MAC and physical layer models is used to study interlayer interactions, their performance and implications the performance differentials are analyzed using varying no. of nodes with different traffic sources like as TCP and CBR. These simulations are carried out using the network simulator version 2, which is used to run Ad hoc simulations. The results presented in this work illustrate the importance in carefully evaluating and implementing routing protocols when evaluating an Ad hoc network protocol.

The rest of the paper begins with performance analysis of CBR and TCP Traffic sources. To evaluate the effectiveness of the scheme. And section VIII display the simulation graph with discussion and last section discussed about conclusion and References.

II. AODV ROUTING PROTOCOL

Ad-hoc On Demand Distance Vector Routing Protocol is one of the reactive protocol in which source node initiates data packet to destination node only when requires the route discovery is occur. There are no periodical exchanges of routing information [16].The Protocol consist of two phases:

- Route Discovery
- Route Maintenance.

A. Route Discovery: The route discovery process is initiated when a source needs a route to a destination and it does not have a route in its routing table. To initiate route discovery, the source floods the network with a RREQ packet specifying the destination for which the route is requested. When a node receives an RREQ packet, it checks to see whether it is the

destination or whether it has a route to the destination. If either case is true, the node generates an RREP packet, which is sent back to the source along the reverse path. Each node along the reverse path sets up a forward pointer to the node it received the RREP from. This sets up a forward path from the source to the destination. If the node is not the destination and does not have a route to the destination, it rebroadcasts the RREQ packet. At intermediate nodes duplicate RREQ packets are discarded. When the source node receives the first RREP, it can begin sending data to the destination [1-3].

***B. Route Maintenance*:** When a node detects a broken link while attempting to forward a packet to the next hop, it generates a RERR packet that is sent to all sources using the broken link. The RERR packet erases all routes using the link along the way. If a source receives a RERR packet and a route to the destination is still required, it initiates a new route discovery process. Routes are also deleted from the routing table if they are unused for a certain amount of time. It is performed by the source node and can be subdivided into: i) source node moves: source node initiates a new route discovery process, ii) destination or an intermediate node moves: a route error message (RERR) is sent to the source node. Intermediate nodes receiving a RERR update their routing table by setting the distance of the destination to infinity. If the source node receives a RERR it will initiate a new route discovery. To prevent global broadcast messages AODV introduces a local connectivity management. This is done by periodical exchanges of so called HELLO messages which are small RREP packets containing a node's address and additional information [2-5].

III. WIMAX

Worldwide Interoperability for Microwave Access is a useful technology provides fixed and mobile access and offers the same subscriber experience for fixed and mobile user. WiMAX as an extension to WLAN is taking Wireless Internet Access to the next level and with the increase of time; it would have been achieving similar attach rates to devices as WLAN. WiMAX can be considered as an extension to WLAN and can deliver internet access miles away from the nearby WLAN and blanket large areas i.e. WANs.

IEEE 802.16 Work Group develops standards and recommended practices to support the development and deployment of Broadband Wireless Metropolitan Area Networks Institute of Electrical and Electronics Engineers is an international professional organization about engineering on areas including aerospace systems, computers, telecommunications, biomedical engineering, etc.

Worldwide interoperability of microwave access is a name given to the IEEE 802.16 standard, which was developed to standardize the last mile wireless distribution technology. WiMAX is one approach for the metropolitan area to address the last mile problem of providing connections to individual homes and offices. Like the IEEE 802.11 standard, the IEEE 802.16 has several working groups. One of the working groups is developing the IEEE 802.16e standard. The IEEE 802.16e standard is attempting to standardize the technology used to provide wireless network access service for mobile users while maintaining a connection at speeds up to 93 miles per hour.

IV. TRAFFIC SOURCES USED OUR WORK

A. Transmission Control Protocol

TCP is a Transport layer protocols provide for end-to-end communication between two or more hosts. It is connection oriented because it must set up a connection between two processes before one application process can begin to send data to another, which is also known as “three-way handshake” as three types of preliminary segments are transferred in this phase to establish the parameters of the data transfer [3]. Process-to-Process Communication, Stream delivery services, full duplex communication and reliability are the services offered by TCP to process at application layer. Transmission control protocol reliable end-to-end data packet transmission of the information across the wireless and MANET networks, here the key problem in MANET is to find and choose reliable, effective and accurate routing protocol that plays optimal role for selecting the best route. In MANET, TCP is still required due to its commonly used for achieving the integration very smoothly through the current global Internet. TCP is used of major Internet applications such as the World Wide Web, email, remote administration and file transfer. General Features in TCP

- It is Connection Oriented.
- Reliability.
- Segment Format
- Data Flow.

B. Constant Bit Rate

This type of traffic implies data of UDP type and application traffic agent is CBR. Here, the former is a transport layer protocol and latter is application layer protocol. It offers transmission of data at constant bit rate and does not communicate in phases, and traffic moves in one direction from source to destination without any feedback from destination. It offers three basic characteristics mentioned below:

- Unreliable
- Unidirectional
- Predictable

V. SIMULATION PARAMETERS

Simulation Parameters is as follows:

Parameter	MAC-802.16 (WiMax)
Channel	Wireless
Network Size	1200x800m
Source	CBR & TCP
Routing Protocol	AODV
Number of Nodes	20,40,60,80,100
Simulation time	500s
Mobility Model	Random Way Point
No. of Connection	10
Connection rate	2 Mbps
Pause Time	1.0s
Seed	1
Maximum Speed	10 m/s

VI. PERFORMANCE METRICES

These parameter shows the performance of Routing Protocol is as follows:

Packet Delivery Ratio- It is calculated by dividing the number of packet received by destination through the number packet originated from source.

$$PDR = (Pr/Ps)$$

Where Pr is total Packet received and Ps is the total Packet sent.

Average end-to end delay- It is defined as the time taken for a data packet to be transmitted across an MANET from source to destination.

VII. SIMULATION MODEL

The mobility model uses the random waypoint model in a rectangular field. The field configurations used is: 1200m×800m field with vary the nodes from 20 to 100. Here, each packet starts its journey from a random location to a random destination with a chosen speed from 10 m/s. Once the destination is reached, another random destination is targeted after a constant interval of pause time 1.0s. The pause time, which affects the relative speeds of the mobiles, is varied. Simulations are run for 500 simulated seconds. Identical mobility and traffic scenarios are used across protocols to gather fair results. Mobility models were created for the simulations for 20 to 100 nodes.

VIII. SIMULATION AND RESULTS

We have demonstrated and investigate the performance of the proposed solution the types of scenarios are taken into Consideration i.e. based on no. of nodes. In both the cases the effect of Node Mobility and network performance discussed in next section and gives a result in graphical form. The Simulation was run at different no. of nodes were sent with different traffic models like as TCP and CBR. Therefore better speed of transmission, but as an exception in the scenario of number of nodes, as the density of nodes increases, the average end to end delay also increases and the speed of transmission decreases. So in this work, the concept is used with variants of TCP to give a comprehensive performance. In graph presents the averages values of results.

No. of nodes	Packet Delivery Ratio	
	CBR	TCP
20	45.36	59.29
40	51.28	67.54
60	56.32	63.45
80	49.21	50.37
100	60.39	61.41

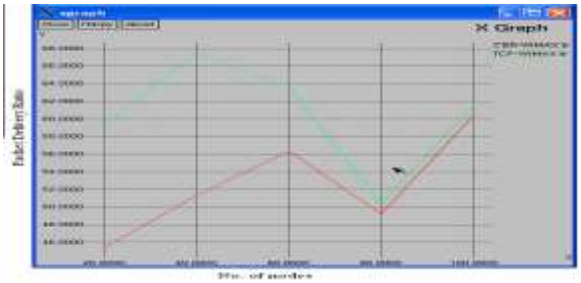

Figure 1: Packet Delivery Fraction with varying no. of nodes.

No. of nodes	Average End to End Delay	
	CBR	TCP
20	61.59	42.37
40	23.69	11.68
60	55.46	22.36
80	53.11	21.99
100	123.57	58.46

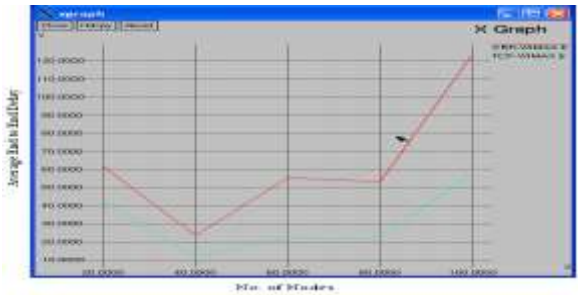

Figure 2: Average End to End Delay with varying no. of nodes.

IX. CONCLUSION

In this paper we measured the PDF, Delay and concluded our presented work; Wireless technology is doing great and is widely in use over internet. The implement scheme significantly improves performances of wireless TCP by correctly identifying the cause of packet loss. It firstly identifies the actual cause of packet loss and invokes standard congestion control scheme in case of congestion loss. Therefore better speed of transmission, but in the scenario of number of nodes, as the density of nodes increases both scenario (TCP or CBR) but TCP Delay is less compare than CBR traffic sources. For future extensions in this work, the concept can be used with various routing schemes of TCP and CBR Traffic sources and find out the results and to give a comprehensive performance analysis for various other reactive protocols and performance metrics.

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