Video Packets in Wireless Ad-Hoc Network: Two Ray Propagation Model

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ABSTRACT
Wireless Adhoc Network has acquired attention in research, since it has enabled mobile wireless nodes to communicate without any existing wired or fixed infrastructures. Another feature of mobile ad hoc network lies in the exciting topology. As the nodes move within the network, the links between nodes are often formed and broken down. The node flexibility affects not only the source and destination, as in a conventional wireless network, but also the intermediate nodes. In this paper for experimental purpose, Researcher studies video delivery packets in wireless adhoc network using Two Ray Propagation Model and calculate throughput & traffic in bytes for this researcher has considered 500mx500m terrain area and illustrate the network performance parameter for wireless adhoc environment with 4 nodes.

Keywords
Network, Mobile, Packets, Adhoc, Throughput, Two Ray

1. INTRODUCTION
The communication of variable bit rate video packets imposes great challenges to the wireless network infrastructure, where the wireless-link typically has limited bandwidth and relatively high bit error rate [1]. In this context, video scheduling is particularly important to make efficient use of the limited wireless bandwidth to provide quality of service in wireless adhoc network. A network is a collection of nodes competent of communicating with each other without help from a network infrastructure is wireless adhoc network. Applications of wireless adhoc network include large no of applications, which are used in the battlefield applications, rescue work, as well as civilian applications like an outdoor meeting, or an adhoc classroom. As the demand of wireless adhoc networks is increasing, number of applications based on this with more concerns to video delivery is also increasing.

Wireless adhoc network has nature of great vision to system security designers since the wireless network is more inclined to attacks ranging from reactive listen in to active interfering, next the lack of an Trusted Third Party adds the impenetrability to install security mechanisms, and mobile devices have a tendency to have restricted power burning up and computation capabilities which makes it more susceptible to refutation of service attacks and incapable to execute computation-complex algorithms like public key algorithms, finally in wireless adhoc network, there are more probability for trusted node being compromised and then being used by adversary to launch attacks on networks, in another word, we need to consider both insider attacks and outsider attacks in wireless ad hoc networks, in which insider attacks are more difficult to deal with; finally, node mobility enforces frequent networking reconfiguration which creates more chances for attacks, for example, it is difficult to distinguish between stale routing information and faked routing information.

Though wireless adhoc network provide many services but basically it restricts itself to authentication, confidentiality, integrity, non-repudiation, availability. Authentication means that correct identity is known to communicating node, Confidentiality means certain message information is kept secure from unauthorized node, integrity means message is unaltered during the communication, non-repudiation means the origin of a message cannot deny having sent the message, availability means the normal service provision in face of all kinds of attacks. Among all the security services, authentication is probably the most complex and important issue in wireless adhoc network since it is the bootstrap of the whole security system. Without knowing exactly who you are talking with, it is worthless to protect your data from being read or altered. Once authentication is achieved in wireless adhoc network, confidentiality is a matter of encrypting the session using whatever key material the communicating party agree on. Note that these security services may be provided singly or in combination.

MANET [1] communication between mobile users is becoming more popular than ever before. This is due to recent technological advances in laptop computers and wireless data communication devices, such as wireless modems and wireless LANs. This has lead to lower prices and higher data rates, which are the two main reasons why mobile computing continues to enjoy rapid growth. Alteration in topology takes places very frequently during the lifetime of the network, as nodes may move around within the network by creating or breaking links between nodes. Due to the mobility, Nodes may also enter or leave the network if a node moves out of range of all other nodes in the network. This occurs most frequently near the geographical edge of the network cluster of nodes. An ad-hoc network uses no centralized administration. This is to be sure that the network won’t collapse just because one of the mobile nodes moves out of transmitter range of the others. Nodes should be able to enter/leave the network as they wish. Because of the limited transmitter range of the nodes. Multiple hops may be needed to reach other nodes. Every node is wishing to participate in ad-hoc network must be willing to forward packets for other nodes. Thus every node acts as a host and as a router. The source sends the packet to one of its neighbors, who in turn forward it to another neighbor, until the packet reaches the destination node. In order for this to occur, the path from source to destination must be determined.

2. VIDEO TRANSMISSION

The exponential development of wireless communication and networking protocols, such as 802.11 and mobile networks, is bringing video into our lives anytime, anywhere, on any device. However, wireless video delivery faces several challenges, such as high error rate, bandwidth variation and limitation, battery power limitation, and so on. Media coding over wireless networks is governed by two dominant rules. One is the well-known Moore's Law, which states that computing power doubles every 18 months. It has work for codec evolution, and there have been huge advances in technology in the ten years since the adoption of MPEG-2. The second governing principle is the huge bandwidth gap between wireless and wired networks. This bandwidth gap demands that coding technologies achieve efficient compact representation of media data over wireless networks. Obviously, the most essential requirement for "wireless video" is coding efficiency. [2]

3. VIDEO TRANSFER OVER ADHOC NETWORK

In video over wireless adhoc network real time traffic is important in two aspects. First, the gradual popularity of wireless adhoc networks especially for certain circumstances such as research conference. Second, the need to make all kinds of network suitable for real time traffic. Researchers have concentrate on adhoc routing protocols to optimize the overall performance while some another others are more interested in user's data rate and codec used for compression / decompression.[3] Introduces multistream coding with multipath transport for video traffic over wireless ad hoc network. First, a video bit stream is divided into several sub-streams by video encoder and then packets from different substreams are sent to several different paths. At receiver, everything is reversed. Moreover, to make multistreaming appropriate for wireless adhoc, they propose three different multistreaming techniques each with different advantages. A study is carried out using H264 video standard to study video transport over ad hoc networks in [4]. Their simulation shows that packet size of as small as 300 bytes should be used under unfavorable condition as any increase results in degradation of PSNR. For higher error probabilities, even smaller than 300 bytes is good for significant PSNR. Regarding retransmission attempts, 3 per MPDU gives highest achievable PSNR. Increasing beyond 3 gives no fruit as far as PSNR is concerned. This is useful analysis and good approximation to calculate packet size, error probabilities etc. for a given PSNR.

In real network traffic, there is a loss of packets due to antenna poor efficiency, interference, fading, and weather conditions etc. resulting in need for retransmission (ARQ) or some mechanism to recover the original signal (e.g. FEC). [5] gives a very nice way of dynamically develop strategies for FEC (e.g. no of redundant packets) and ARQ (e.g. dynamic change in transmission rate) in order to meet certain QoS requirements. Moreover, buffers (of client and server) play an important role in delay jitter (in ARQ). Hence, they also develop a control mechanism for buffers with the notion to minimum delay jitter.

4. SIMULATION SETUP

The objective of this research paper is to analyze, simulate and do a comparative analysis of Video packet over wireless adhoc network, by keeping terrain area fixed i.e 500 x 500 and keeping the routing protocol DSDV. The DSDV protocol has different properties and based on the way they are designed, it behave differently in different environments. Therefore it becomes essential to analyze this protocol by simulating it in an ideal environment and find out how it performs, so that appropriate methodologies could be followed in the future research works to improve on the areas where a protocol is lacking. In this paper for experimental purposes, Investigators considered ns2 simulator. NS, a network simulator which was developed by Berkeley University, is used for simulation purposes [6].

Following parameters have been set for simulation:

set val(chan)   Channel/WirelessChannel   ;# channel type

set val(prop)Propagation/TwoRayGround ;# radio-propagation model

set val(netif) Phy/WirelessPhy   ;# network interface type

set val(mac)   Mac/802_11   ;# MAC type

set val(ifq)   Queue/DropTail/PriQueue ;# interface queue type

set val(ll)   LL   ;# link layer type

set val(ant)   Antenna/OmniAntenna   ;# antenna model

set val(ifqlen) 50   ;# max packet in ifq

set val(nn)   4   ;# number of mobilenodes

set val(rp)   DSDV   ;# routing protocol

set val(x)   500   ;# X dimension of topography

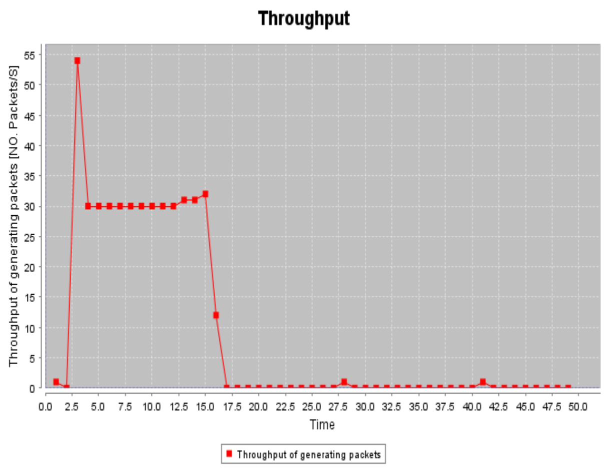
set val(y)   500   ;# Y dimension of topography

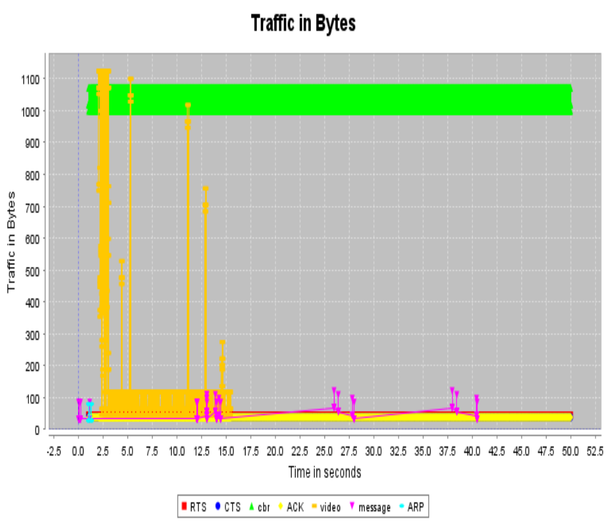
set val(stop)   50.0   ;# time of simulation end

Results:

Simulation length in seconds	:	49.981475075
Number of nodes	:	4
Number of sending nodes	:	4
Number of receiving nodes	:	4
Number of dropping nodes	:	4
Number of generated packets	:	10365
Number of sent packets	:	10364
Number of received packets	:	10292
Number of forwarded packets	:	0
Number of dropped packets	:	1
Minimal generated packet size	:	32
Maximal generated packet size	:	1072
Average generated packet size	:	210.0

Number of generated Bytes	:	2182988
Number of sent Bytes	:	2182944
Number of received Bytes	:	2179504
Number of forwarded Bytes	:	0
Number of drop Bytes	:	44





5. CONCLUSION

After experimental studies of various results in respect of Propagation Model Two Ray Ground Propagation and sending no of packet, average packet sending time, receiving no of packets, average packet receiving time, packet loss, and Packet drop rate in DSDV, Investigators are able conclude that in the fixed terrain area of 500 x 500, , Antenna model OmniAntenna and no of nodes are 4 and using DSDV routing protocol we able to conclude that Two Ray Ground Propagation model work appropriately in delivering video packets in wireless adhoc network.

6. REFERENCES

[1] P. de Cuetos, K.W. Ross, Optimal streaming of layered video: joint scheduling and error concealment, in: ACM Multimedia 2003, Berkeley, US, 2003, pp. 55–64

[2] Minoruetoh, Takeshi Yoshimura, “Advances in Wireless Video Delivery” Proceedings of the IEEE, Vol. 93, NO. 1, January 2005

[3] Shiwen Mao; Shunan Lin; Panwar, S.S.; Yao Wang; Celebi, E.; “Video Transport Over AdHoc Networks: Multistream Coding With Multipath Transport” Selected Areas in Communications, IEEE Journal on Volume 21, Issue 10, Dec. 2003 Page(s):1721 – 1737

[4] E. Masala. 1., CF Chiasserini. 2., M. Meo. 2., JC De Martin "Real-Time Transmission of H.264 Video Over 802.11-Based Wireless Ad Hoc Networks"

[5] Shiwen Mao, Dennis Bushmitch, Sathya Narayanan, and Shivendra S. Panwar ;“MRTP: A Multi-flow Real-time Transport Protocol for Ad Hoc Networks”. in

[6] the Proceedings of the Fall IEEE Vehicular Technology Conference, Orlando, Florida, 2003

[7] Shiwen Mao, Shunan Lin, Shivendra S. Panwar, and Yao Wang, "A multipath video streaming testbed for ad hoc networks," in the Proceedings of the Fall IEEE Vehicular Technology Conference, Orlando, Florida, 2003

[8] Takahata, K.; Uchida, N.; Shibata, Y.; “Optimal data rate control for video stream transmission over wireless network” Advanced Information Networking and Applications, 2004. AINA 2004. 18th International Conference on Volume 1, 2004 Page(s):340 - 345 Vol.1

[9] ns-2 imulatonetwork sr: http://www.isi.edu/nsnam/ns.