

Resource Optimization in Video Transmission Using Manet for Defence

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Abstract: The project's aim is transmission of video that revolves three main constraints they are faster transmission of data, transmission of data with reduced bandwidth and secured transmission. This application is implemented for defence purpose hence it helps in monitoring the present scenario. The monitoring is done in battlefield and borders hence it prevents loss of life. This is done by implementing protocols in the tool called Network Simulator (NS2). For faster transmission we use AODV (Ad-hoc On Demand Distance Vector) compared to DSR and DSDV and future works will be done for less consumption of bandwidth and for secured data transmission. The transmitting nodes are MANET (Mobile Ad-hoc Network).

Key words: AODV · DSDV and DSR · MANET · NS2

INTRODUCTION

MANET's are been widely used nowadays as the impact on mobile and all electronic devices have increased its usage. MANET is composed of set of independent nodes [1]. There are varieties of electronic devices present and MANET has a combination of both wireless and mobile devices, on continual basis the interconnections of nodes are capable of changing [2]. These devices are easier to afford due to their technological evolution. The connection of mobile host is done using multichip wireless link. Several nodes are present and each mobile node act as a router that helps in the transmission of data where it forward's to the next nearest hop and finally reaches the destination.

There are few limitations in MANET and they are limited bandwidth, limited physical security, energy constrains operation and cooperative algorithm [3].

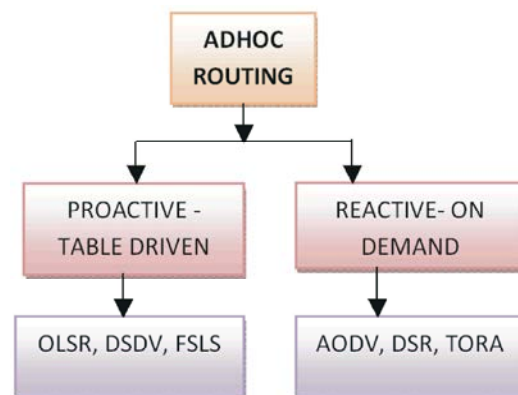
The classifications of wireless networks are of two types and they are infrastructure based wireless network and Adhoc based wireless network [4]. The Adhoc Networks doesn't require a fixed network infrastructure like access point or base station hence it could be set quickly anywhere as it could withstand environmental conditions and inexpensive [5]. Each and every node in aAdhoc network can act as both router and host. This faces a critical issue during communication [6].

Adhoc Network are classified into two types of routing protocols and they are On Demand routing protocol and Table Driven routing protocol [7].

These protocols on further classification will result in three common protocols and they are AODV, DSDV and DSR which will be further discussed in detail.

The major goal of the project is to implement this in military territories for the purpose of monitoring. The monitoring is done in battlefield and borders which is very important for soldiers as these are the places where they must be very cautious. The purpose of monitoring is to prevent loss of life. At battlefield it will monitor what the present situation is i.e., at war time, in case of any emergency immediate response will be made to them. Secondly at borders it keeps them updated.

Related Works: In order to perform faster transmission three protocols are taken into account and they are calculated through their performance. These protocols include AODV, DSDV and DSR[8].



DSDV: DSDV (Destination Sequenced Distance Vector Routing) is based on Bellman-Ford Algorithm. It is originated from Conventional Routing Information Protocol (RIP) to adhoc network. In this protocol each mobile node maintains a routing table, this table has a list of all available destinations, thus it has all the information stored [9].

Its main drawback is that route fluctuations arise due to the criteria of route updates which uses bandwidth and the battery power. This protocol does not support multipath routing. It does not suite highly dynamic network [9].

DSR: DSR (Dynamic Source Routing), has two mechanism that is Route discovery and Route maintenance. Here when a mobile (source node) needs a route to another mobile (destination node) it results in route discovery process, it is based on flooding. Its main concept is source routing and forms route on demand. It uses source routing instead of relying on the routing table at each intermediate device.

This protocol similar to AODV the periodic routing message is not used hence reduces bandwidth overhead and conserves battery power [10].

Both DSR and AODV are similar as the route discovery process is based on flooding. The only difference between them is based on how they store their information, hence in DSR storage is done in the source and in AODV storage is done in intermediate nodes [2].

The Bellman-Ford algorithm as discussed in the above protocols, computes the shortest path from a single source vertex to all the other vertices in a weighted digraph and it is versatile. The availability of paths to all destinations in network shows the delay is required less.

Faster Transmission: The data in order to be transmitted faster protocols are implemented, hence AODV protocol is used.

AODV: AODV (Ad-hoc On Demand Distance Vector) is based on Bellman-Ford Algorithm and it is a reactive routing protocol. Reactive protocol is also called as On-Demand. This protocol does not maintain route to the destination hence its routing table maintains routing information therefore the node is able to send data to all destination without flooding in network [11].

The main advantage of this protocol is that, the recent route transmitted to the destination is found by destination sequence number and routes are established

on demand. The delay is lower in the connection setup. It has a drawback that it leads to unnecessary bandwidth consumption.

This drawback could be overcome by using Poly harmonic broadcasting protocol and thus the next section is about reduced bandwidth [12].

Bandwidth Consumption: The AODV protocol above has one particular drawback that is consumption of unnecessary bandwidth hence future works could be made to overcome by using Poly harmonic broadcasting which consumes less bandwidth.

Poly Harmonic Broadcasting Protocol: This protocol's major goal is to transmit data with reduced bandwidth and here once the user want to view a video as soon as the client clicks the video it starts downloading hence this process kills the waiting time [13].

It divides the video into segments that is to be transmitted and proposes a ratio that is defined as the total time of the video to the number of segments.

$$a = \frac{t}{n}$$

It is obvious that no user can download the first video segment, the process could be done only when the total n segments of data is finished so for our implementation there will be an ongoing download process hence the data could be corrupted by other persons. For safer transmission of data cryptographic techniques are used.

Secured Transmission: Future works should be done on secured transmission of data. The data to be transmitted must be confidential thus cryptographic techniques such as encryption and decryption which involves symmetric, asymmetric and hashing.

Symmetric Key Cryptography: Symmetric cryptography or conventional cryptography or secret key hence this refers to the encryption process, they use same key at both sender and receiver. The pair of communicating nodes share a secret key for a secured transmission.

AES: AES (Advanced Encryption Standard) is also called as Rijndael. It was established by the U.S National Institute of Standards and Technology (NIST) in the year 2001.

The block size is 128 bits (minimum) for encryption and decryption, any unclassified or even sensitive material can be secured [6]. The key size depends on the number of rounds and they are 128, 192 and 256 bits [7]. This algorithm ensures high performance in speed and less resource is consumed. This operates in a 4*4 matrix thus for instance let us consider a 16 bytes and could be represented as $a_0, a_1, a_2, a_3, \dots, a_{15}$.

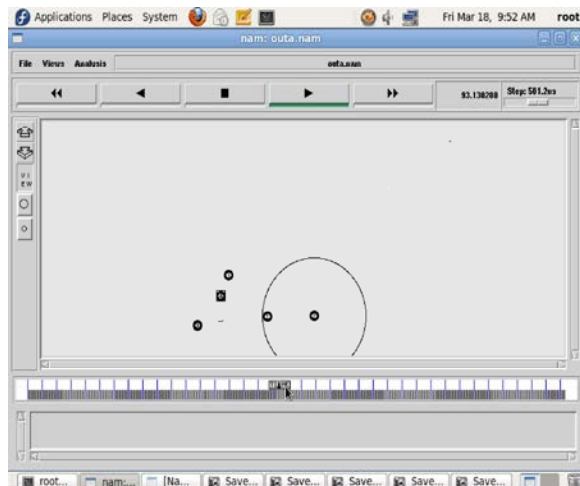
$$\begin{bmatrix} a_0 & a_4 & a_8 & a_{12} \\ \vdots & \vdots & \vdots & \vdots \\ a_3 & a_7 & a_{11} & a_{15} \end{bmatrix}$$

Simulation Parameter

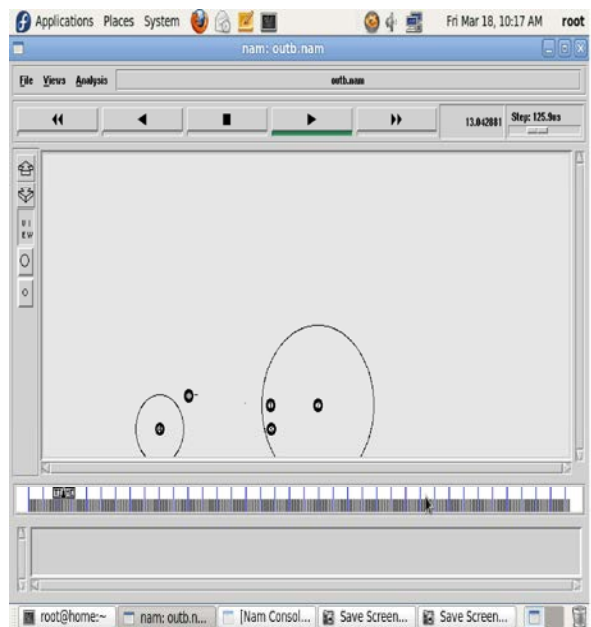
CHANNEL TYPE	Wireless network
RADIO PROPAGATION	Two Ray Ground
NETWORK TINTERFACE TYPE	Wireless /phy
INTERFACE QUEUE TYPE	Queue drop tail
ANTENNA MODEL	Omni antenna
MAC TYPE	MAC/ 802-11
LINK LAYER TYPE	LL
Max PACKET IN IFQ	50
ROUTING PROTOCOL	AODV.DSDV and DSR
No of MOBILE NODES	5,50,100,150,200
X,Y DIMENSION	500,500

Simulation Results: The process of each protocol that is AODV, DSDV and DSR are obtained thus the corresponding measures are displayed below

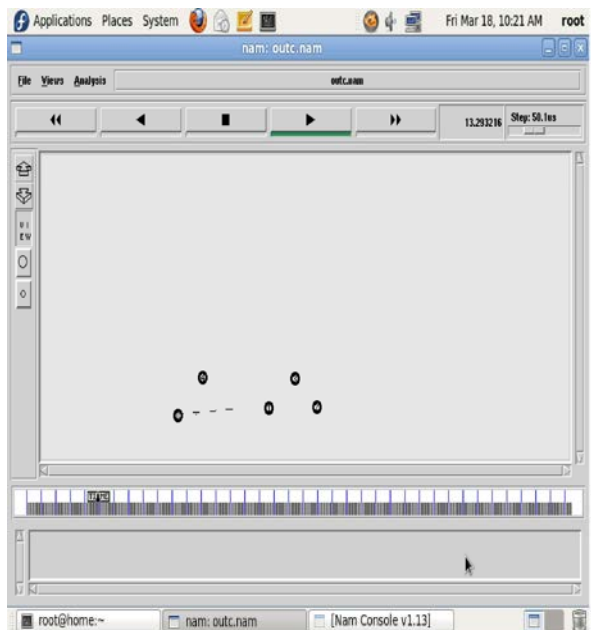
AODV



DSDV



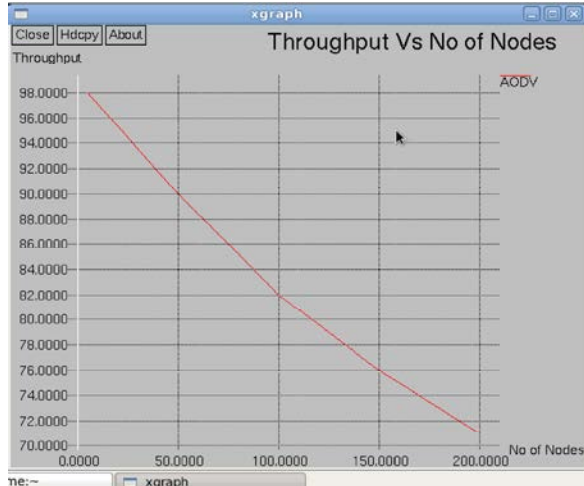
DSR



Among these protocols AODV is considered as the best performing protocol hence the calculation of throughput, packet delivery fraction and average end to end delay are been graphically displayed.

Graphical Representation: AODV

THROUGHPUT:



AVERAGE END TO END DELAY



CONCLUSION

This project will be very helpful for the soldiers as it has a very keen thought in preventing lives. According to the present situation corresponding measures could be taken and very well implemented. Among the above three protocols AODV is found to be the best performing protocol, since both AODV and DSR are similar in their function their performance vary. AODV can perform with large number of nodes whereas DSR could perform with smaller number of nodes. Thus ns2 is user friendly and is the best method for implementing protocols. Therefore we have taken three protocols each performing a particular task. The future works on video transmission could be still made on its performance.

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