# A Survey On Video On Demand In Mobile Ad Hoc Network

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## Abstract

*In the modern era there is rapid increment in the use of video on demand system. Video on demand system is the one of most popular application over internet and it is also a broad research area. In the video on demand System many challenges occur in the process of designing video on demand system that is how to reduce the client waiting time required bandwidth and client buffer space. In this Survey provide the details of existing technology of Video on Demand in Mobile Ad Hoc Network, Challenges and problems occurs during the design Process.*

## 1. Introduction

A Mobile Ad Hoc Network (MANET) is a collection of mobile nodes which communicate with each other via wireless links either directly or based on other nodes as routers. It does not have any pre existing infrastructure or base stations. In MANET devices are free to move anywhere. As the nodes are mobile in the MANET due to this, network topology changes continuously without any prior information [1]. So In developing the MANET main problem arises is to continuously maintain the information for route the traffic for each device. Video on Demand is the systems by which users can select and watch to video content on demand of user whatever they want and whenever they want [2]. Video can be watch through a SET-TOP box connected with TV. It work parallel to the cable system but the discrepancy in Video on demand and cable system is that in Video on Demand system user can select the data from a large database .Video on demand system contain video server to store the video data. It has potential to store quite a lot of Megabytes or Gigabytes and facilitate the way in method for accessing the video data to many users in the real time and distribute. Each have a different bandwidth .Data delivery network which interrelate the user and set top boxes .Video on Demand in Mobile Ad hoc network system contains the server and mobile nodes. Client request for the video to the server and server replies with the video data.

Video data is divided into part and then broadcast via channels to the client. Client can download these video by communicating with the channels.

### 1.1 Types of Video on Demand System

Video on Demand system has the following types [3].

**1.1.1 Interactive Video on demand:** It is a pattern imitated form of video on demand system which have the functionalities such as play/resume, stop, pause, Jump Forward, Jump Backward, Fast Forward, reverse, Slow Down, Fast Reverse, Slow Down ,Fast Reverse, Slow Reverse .

**1.1.2 Exclusive video on Demand:** In it the data is broadcasted to particular TV.

**1.1.3 Quasi Video on Demand:** In it there may have some delay and it is program in such a way that only some subscriber can sign up for this.

**1.1.4 Free Video on Demand:** In it operators makes available part of data in free.

**1.1.5 Transactional Video on demand:** In this type of video on demand pays for view video on demand to transactional distributers.

**1.1.6 True Video on Demand:** In this there is dedicated transmission channel from the server to each client using these transmission channel data can be transfer without any delay.

**1.1.7 Near Video on Demand-** In this content are broadcasted on to several channels with a time period due to this client may have to wait or there may be some delay.

## 2. Broadcasting in Video on Demand

Video on demand provide broadcasting of recorded video content, of every sizes, also very large size

all over the world. With the help of Video on Demand users can see the video whenever they want even if too many request for the same video at the same time. In the broadcasting of video data protocols used for data transmission is the integrated service digital network (ISDN) and Asynchronous transfer mode (ATM)

The following techniques are used in broadcasting in Video on Demand [4]

1. Staggered Broadcasting
2. Harmonic Broadcasting
3. Fast Broadcasting
4. Pagoda Broadcasting
5. Pyramid Broadcasting
6. Permutation-based Broadcasting
7. Skyscraper Broadcasting
8. Staircase Broadcasting

## 2.1 Staggered Broadcasting

Staggered broadcasting [6] technique is simplest technique. In the staggered Broadcasting technique let the video of length l. Video is divided into k equal sized segment the time for each segment is s=l/k. Let the consumption rate is r so the required bandwidth for video is r*k. Now Bandwidth is also divided into k equal channels and each segment is broadcasted at every channel repeatedly. Client can download the video by communicating with these channels. A client can communicate with a single channel at a time and it can communicate at any time so it can play the video directly there is no requirement of buffer space in the staggered broadcasting technique so client cache requirement for staggered broadcasting is 0% of video and waiting time for this is the size of first segment that is l/k. But In staggered Broadcasting technique also some disadvantage that is its service delay.

## 2.2 Harmonic Broadcasting

Harmonic broadcasting [7] technique is also divide the video into k equal size segment and bandwidth is also divided into k equal channels. Each channels broadcast a single segment repeatedly client has to tune all the channels for downloading the video .In the Harmonic Broadcasting a client tune the first channel and play the video as it downloaded and cache the received data and then tune to the second channels and so on. Cache space required for harmonic broadcasting is 40% of the video size.

An advantage of the Harmonic Broadcasting technique is less required server Bandwidth and the disadvantage of this is its usage much buffer space

## 2.3 Fast Broadcasting

Fast broadcasting [8] technique divides each video into m equal size segment and bandwidth is divided into k channels and each channel can broadcast the multiple segments.

For example let channel 1 broadcast the segment 1, channel 2 broadcast the segment 2 and segment 3, channel 3 broadcast the segment 4,5,6,7, and so on. So the number of segment in the fast broadcasting are m= (2^k)-1 .Let the size of the video is l then maximum delay may occur are l/ ((2^k)-1). In this technique client tune up all the channels and received the data from each channel stored in cache so it requires high cache space.

## 2.4 Pagoda Broadcasting

Pagoda broadcasting [9] also broadcast the multiple segments on single channel .In this technique video is divide into m equal size segment and bandwidth is divided into k channel with equal time period.

In Pagoda Broadcasting client have to communicate with all channels to download data and store data into the client cache. The video is played as it downloads the first part.

## 2.5 Pyramid Broadcasting

Pyramid Broadcasting [10] divides video into k segment and each segment is the multiple of a (a>=1). Bandwidth is also divided in to k channels of same rate .Each segment of the video is broadcasted on a single channel repeatedly that is channel 1 broadcast segment 1 repeatedly ,channel 2 broadcast the segment 2 repeatedly and so on. In pyramid broadcasting client have to tune up with all the channels and store the subsequently segment of video. So in this technique user waiting time is depend upon the size of first segment and the buffer requirement for this technique is 75% of video data.

## 2.6 Permutation Based Broadcasting

Permutation Based [11] Broadcasting is a modified technique of Pyramid Broadcasting which reduces the buffer space. Permutation based Broadcasting technique divided the each channel into q sub channels and each sub channels broadcast copy of segment on that channel repeatedly . So the client can download the video data from sub channels which decrease the client buffer space that is it requires 50% of video data.

### 2.7 Skyscraper Broadcasting

Skyscraper broadcasting [12] divides the video using the following function by Hua and Sheu [12];

$$F(x) = \begin{cases} 1 & x = 1 \\ 2 & x = 2,3 \\ 2f(x-1) + 1 & x \bmod 4 = 0 \\ f(x-1) & x \bmod 4 = 1 \\ 2f(x-1) + 2 & x \bmod 4 = 2 \\ f(x-1) & x \bmod 4 = 3 \end{cases}$$

(i.e.) the size of segment are [1,2,2,5,5,12,12,25,25,52,52,.....]

Skyscraper broadcasting also divides the bandwidth in to k channels .Buffer space required for skyscraper Broadcasting is 20% of video size

### 2.8 Staircase Broadcasting

Staircase broadcasting [13] is broadening technique of Fast Broadcasting in This Broadcasting scheme each segment is divide into n segment of equal size. If the segment size is s then $i^{th}$ segment is divided into 2^i data .Similarly Bandwidth is also divided into n channels and each $i^{th}$ channels is divided into $2^i$ sub channels .Buffer space require for Staircase broadcasting scheme 25% of video size.

## 3. Challenges in Video on Demand

The primary challenge in developing a video on demand in mobile ad hoc network is that to place the device continuously for maintaining the information essential to appropriately route traffic. In scheming, a video-on-demand system, one of the most important challenges is how to reduce the viewer's waiting time maintaining a given bandwidth and how to reduce the client's buffer space [14].As the range of communication is limited. an 802.11enabled host have the range of 100m and the Bluetooth have the range 10 m for a transmit where the limited bandwidth it is hard to suit all the clients and one another challenge is that 802.11g and 802.11b and Bluetooth provide a maximum bandwidth of 54Mbps, 11 Mbps and 1Mbps respectively. So it cannot deliver more than 36.1 Mbps [15].

To solve these problems, many Video on Demand techniques were projected. Though, most Video on Demand schemes require frequency channel, managing many channels, and using many channels at the same time. Therefore, to the difficulty is a barrier to functioning.

## 4. Architecture of Video on Demand

Video on demand system play a key role in provides the data to user whenever he wants the architecture of the video on demand contains:

### 4.1 Client server architecture

It contains client, server and local forwarder. In Client server architecture client request for the video to the local forwarder and local forwarder send this request to the server and server broadcast the data to local forwarders because due to less transmission rate it is not possible to communicate with the user at very long distance so the local forwarder provided the communication between the client and server**.** Local forwarder work as node and it is connected to client and server via network [16].

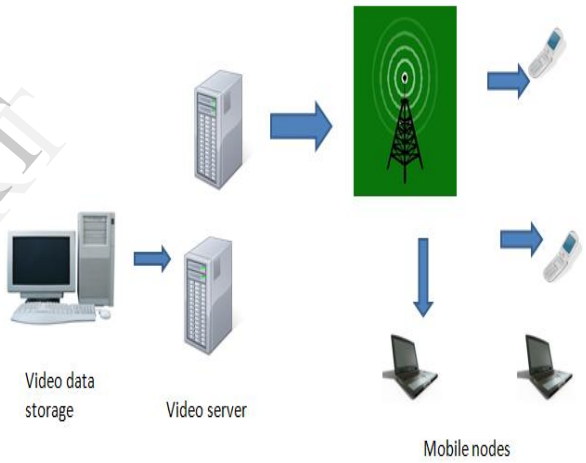


**Fig1: client server architecture in video on demand**

### 4.2 Hierarchical Network Storage Architecture

It contains three layers of storage [17]. At the first level of this architecture local service centre handle the request from client if the data is not found in local service centre then request is transferred to second level that is Local central service centre if the data is not found in local central service then it is again transferred to third level that is central service centre. It provides the data to the local central service centre which transmit to local service centre.

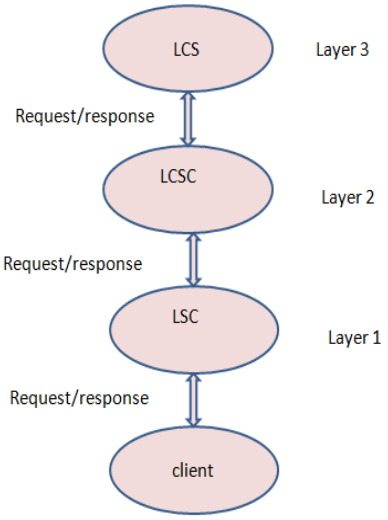


**Fig2: Hierarchical network storage architecture**

### 4.3 Centralize Server Architecture

In centralized server architecture [18] there are no any local server client communicates the video server directly that is the request of client handle by the video server directly. In this Video server work as node and provide the decoding, de-multiplexing, regeneration, encoding of the video data and then this data is broadcasted to the client and at the client side again decoding of data occur. In this architecture if the data connection fails then it block that connection. This is the main problem in this architecture.

### 4.4 Distributed Architecture

To overcome the problems of centralize architecture a new architecture is developed that is distributed architecture [18]. In the distributed architecture of video on demand local proxy takes place in the network. Client can communicate with the server as well as local proxy .local proxy provides a medium between client and server. Local server provides the requested data to the client in case of blockage that client communicates with the video server directly [19].

## 5. Conclusion

This survey represents the challenges of video on demand that are how to reduce the waiting time required buffer space and required bandwidth. In it we try to highlight the architecture of video on demand (i.e.) different-different type of architecture is used for reducing the waiting time most commonly used architecture for video on demand is client server architecture for video on demand. It elaborates about the types of video on demand how. This survey also provide the details about the existing broadcasting technology which provides the way to reduce the waiting time, required buffer space and required bandwidth. The active broadcasting technology does not yield good performance. Different relative researches show that most of the technologies require more rebroadcasts with respect to the number of the retransmitting nodes, thus facing problems in a high density mobile ad hoc network.

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