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Research Article

Broadcasting Scheme for Real Time Video in mobile Adhoc Network

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ABSTRACT: A video on real time system is a multimedia platform that is used by the user to take pleasure in their time and for providing them to select any video. Moreover, no matter what is the time and what is the place suitable for the huge video database storage space in the cloud server. With the increasing demand of video on system major challenges faced are to lessen the buffer space, client waiting time and required bandwidth. To overcome these challenges many videos on demand techniques are developed. In these techniques, there is the problem of many numbers of channels. In this manuscript the problem of broadcasting in mobile ad hoc network is considered. A proposal is designed in broadcasting protocol, which evaluates the performance using the periodic broadcast technique. This technique provides less client waiting time and less buffers requirement than other techniques.

Keywords: Video on Demand (VoD), Staircase Broadcasting Scheme (SBS), Consumption rate, buffer time.

1. INTRODUCTION

Video on Demand (VoD) is an analysis platform in, which customers can watch and identify the video content [1]. Video can be watched by connecting SetTopBox (STB)with television. Video – on – demand allow users to choose video to watch. Users can take benefits at any time with the help of set top box using video cassette by doing payment. Additionally, the users can select any video from a huge on – line video library, which is available in the library and get entertained at home. Already many techniques are developed for the broadcasting the video data in mobile ad hoc network such as staggered broadcasting[7], harmonic broadcasting[3], fast broadcasting[8], pyramid broadcasting[5], pagoda broadcasting[9], skyscraper broadcasting[6], staircase broadcasting[7] and fast staggered broadcasting[1].A limitation of these different broad casting technologies are they require a large client buffer size as compared to the video size and have to wait for playing video[2].In proposed scheme a video is divided into two parts the first part uses staircase broadcasting and the second part uses staggered broadcasting for broadcasting the video data. Furthermore, it reduces the required client buffer size and client waiting time.

2. RELATED WORK

In the paper [7] the authors had proposed a reception schedule that fulfills the essential condition with the minimum use of requirements. A true VoD System allows users to watch the video content anytime and execute any VCR functionality, but providing the video content is very expensive. VoD system uses a more efficient way by making batch of many clients to broadcast video content. Staggered video broadcasting is an approach of near VoD technique which provide the facility of fast forward and fast backward. In the paper [3] authors have proposed a new broadcasting technique named as harmonic broadcasting technique. In this video, K is divided into equal segments. Furthermore, the server bandwidth video is divided into same number of channels and segments with different bandwidth divisions. A particular segment is broadcasted in respective channel repeatedly, such as segment1 is broadcasted on channel 1and segment 2 is broadcasted on channel2 and so on. In paper [8] authors elaborated an efficient segmentation method, which reduces the computational work by a slightly reducing the number of segments, which are comparatively efficient to recursive frequency splitting. Broadcasting is a future approach to sustain video – on – demand services with light communication overhead. Approaches such as to allow clients to share channels, requires the division of video into segments and simultaneously broadcasting these segments into channels. In paper [4] authors proposed a new technique for data broadcasting and receiving. This technique services the movie in the interval of 8 minutes. Furthermore, the feasibility of disk space and transfer rate of the set-top box is examined. The authors also modified the fast-broadcasting scheme for the buffering in the same waiting time. The work includes division of video into N segments of equal size S where S_i is the size of the ith segment. Further the i^{th} channel, C_i is divided into $2i$ sub-channels. In [5] authors proposed a new scheme for video on demand service in metropolitan cities named as Pyramidal broadcasting. They multiplied frequently accessed movies and observed radical improvement during access time and bandwidth use. Authors achieved it by using storage at the receiving end. They increased the available bandwidth and observed an improvement in access time, which is exponential instead of linear as observed in conventional broadcasting.

Hence, larger the bandwidth of network better is the access time. In [1] authors proposed a fast staggered broadcasting technique, which had an improved structure and VoD efficiency. The technique reduces dividing video into segments and switching channels frequently unlike previous periodic broadcasting schemes. On comparing between conventional and proposed VoD schemes the authors noticed significant changes. The scheme was better on the basis of viewer's waiting time and buffering. In the above literature review the major problem faced by the researchers is how to reduce the viewer's waiting time at a given bandwidth and client's buffer requirement. This paper deals with the real time video. Moreover, Staircase Broadcasting Scheme (SBS) and Staggered Broadcasting scheme (SBS) is applied for research work.

3. PROPOSED SOLUTION

Proposed work includes a real time video, which is divided into two parts. First part is broadcast using Staircase broadcasting scheme (SBS) and the second part is broadcast using Staggered Broadcasting scheme (SBS). Suppose a real time video of length L and the consumption rate is r. Thus the size of video is V=L*r.
Let the bandwidth required for video is B. B=a*r, a>=1.

1. Video is now divided into two part L1 and L2. Thus, the size of L1 is V1=L1*r, L2 is V2=L2*r and L2=h (L1+q).
   where h is video dividing coefficient and q is a divided data segment.
2. Bandwidth B is divided into k logical channels where
   k= (B / r) = a
   Let L1 part use m channels and L2 part uses n channels so k= m+n.
3. Video L is divided into N segment. So N-1 segment are broadcast using staircase broadcasting technique and one part is broadcast using staggered broadcasting technique.
   So $N = \sum_{0}^{m-1}(2^{2i}) + 1$
4. Time interval for staggered technique is T2=L1+a.So number of channels in staggered are n=L2/T2=h
   Channels is $k = m + n$.

3.1 Waiting time

When the customer is downloading the broadcasted data there may be some delay and client may require some buffer space. If the customer has buffer space then there may be maximum waiting time to access the broadcast data of the segment size S1. That is

$$S1 = L1 * b/(N-1)$$
$$= L1 * \frac{b}{(2^{2m})-1}$$

So the maximum waiting time

$$q = (L1 * b/(N-1))/(B/k)$$
$$= L1 * k/(q * a * 2^{2m})$$

Now if k=a then

$$q = L1/2^{2m}$$

Now for total video length L=L1+L2
L1=q*2^{2m}
L2=h*q*2^{2m}
So the waiting time

$$q = L1/(h * 2^{2m} + 2^{2m} - 1)$$

3.2 Buffer requirement

To access the video broadcasting users require some buffer space. Users receive (N-1) data segment of video of L1 part with the delay q that is $2^{2m-1} * q$but the consumption rate is r so the consumed data are $2^{2m} * q * r$
So, the maximum buffer time for the customer is

$$Z = L1 * r - (2^{2m} * q * r)$$
$$= L1 * r(1 - 2^{2m} * k/a * (2^{2m} - 1)$$

4. RESULTS

Figure 1 is a comparison between the fast staggered broadcasting technique and staircase staggered broadcasting technique based on the number of channels and required buffer space.

Table 1: Analysis of Buffer Space between the Approaches

	Fast staggered broadcasting technique	**Staircase staggered broadcasting technique**

No. of channels	Required buffer space (in bytes)	Required buffer space (in bytes)
1	650.8655	108.8309
2	109.908	282.9602
3	1205.6943	316.1277
4	1292.7458	323.9318
5	1295.8945	325.8543
10	1298.6598	326.4926
20	1298.6598	326.4926
30	1298.6598	326.4926
40	1298.6598	326.4926
50	1298.6598	326.4926

The table 1 shows buffer space for the various numbers of channels in fast staggered broadcasting technique is 1300 KB which is greater than the proposed staircase staggered broadcasting technique, which is 300 KB.

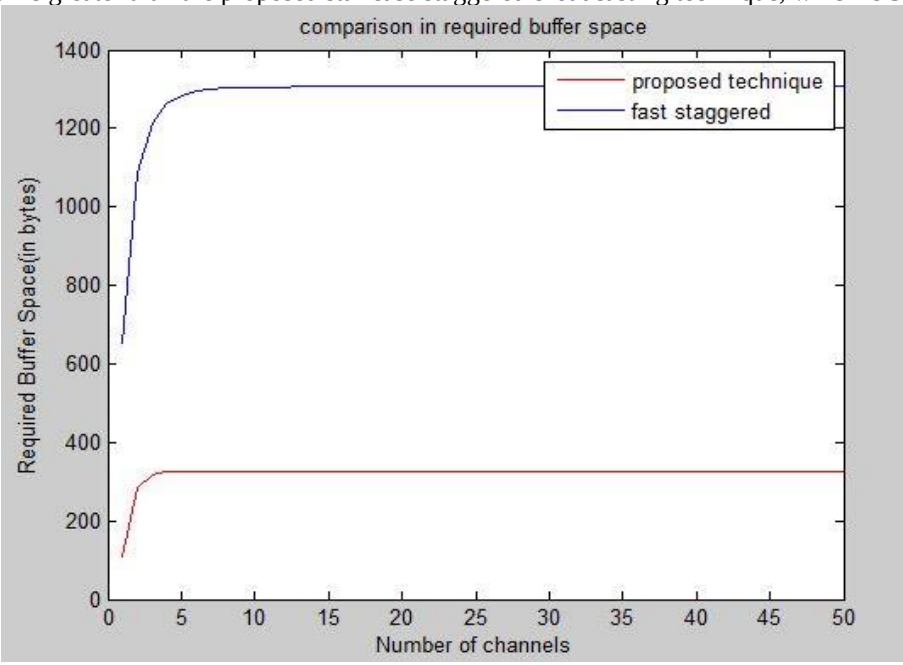

Figure 1: Graph of Comparison in Required Buffer Space

Table 2 shows that the waiting time for the proposed staircase staggered technique for the VoD broadcasting is lesser than the discussed techniques. The waiting time for the staggered broadcasting technique is approximately 326 seconds and 5 sec when number of channels is 1 and 50, respectively.

Table 2: Analysis of Waiting Time between the Approaches

	Waiting time(in sec)			
No. of channels	**Staggered**	**Fast**	**Fast staggered**	**Staircase staggered**
1	326.4926	326.4926	25.1168	12.0923
2	163.2463	108.8309	12.0923	2.9414
3	108.8390	46.6418	5.9362	0.7304
4	81.6231	21.7662	2.9414	.1823
5	65.2985	10.53220	10.5322	0.0456

10	30.4667	5.1824	0.1823	0.0002
20	20.5678	1.8659	0.8416	0.0002
30	15.4360	1.4902	0.4729	0.0002
40	10.8191	1.0082	0.3217	0.0002
50	5.0764	0.9162	0.1363	0.0002

The waiting time for the fast staggered broadcasting technique is approximately 25 seconds and 0.1 seconds when number of channels is 5 and 50, respectively.

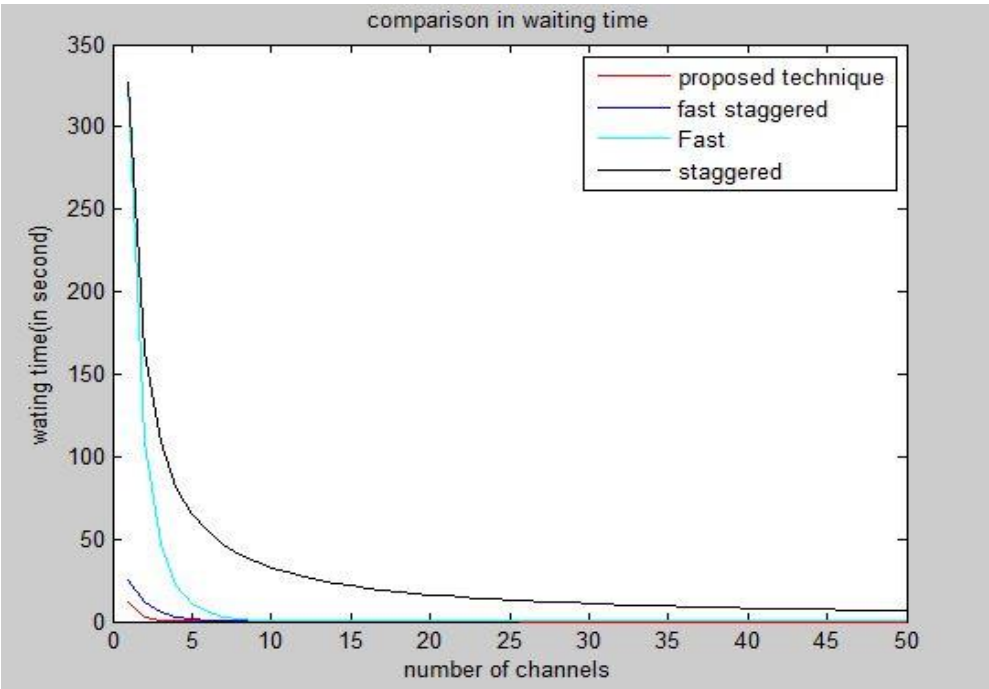

Figure 2: Graph of Comparison in Waiting Time

The waiting time for the proposed staircase staggered broadcasting technique is approximately 2 seconds and 0.0002 seconds when number of channels is 5 and 50, respectively.
So we can see that the proposed staircase staggered broadcasting technique is comparatively better than the staggered, fast and fast staggered techniques.

5. CONCLUSION

In Video on Demand system, huge numbers of channels are needed for the broadcasting of video data and simultaneously video programs are transmitted without higher access time. Many broadcasting techniques minimizes the user's waiting and buffering time however these are difficult to implement due to time complexity. The proposed scheme possesses significantly simple and efficient technique as compared with the existing VoD schemes.
In the present work the staircase technique divides the video divides a part of video into segment and each segment broadcast on a separate communication channel repeatedly. Staggered broadcasting technique also broadcast the second part of the video repeatedly.
VoD application includes various broadcasting techniques such as Staggered, Fast and Fast staggered broadcasting techniques. We have performed comparative analysis for the proposed scheme and studied the performance by staggered, fast, and fast staggered broadcasting technologies. On the basis of our simulation the proposed technique takes lesser waiting and buffer timing than the previous techniques.

6. FUTURE WORK

Broadcasting technology is a broad research area and it is open to future for reducing the waiting time and buffer requirement. It is possible to develop a technique that reduces more waiting time and buffer space than previous

developed technique. We will work on such issues that reduce waiting time and buffer for very large number of clients.

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