Universal Windows Platform Application for Streaming Analysis

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Abstract

The internet is becoming viral and vital now a days so the applications needs to support on different platforms to serve the users, with that video streaming is one of the fast growing technology with dynamic adaptive streaming over HTTP (DASH), so there is a need to monitor the streaming on different devices, in which by considering the Download Rate and Playback Rate of the stream analysis the performance of the streaming with respect to different conditions by developing the universal windows platform application. As developer should develop application for different platforms it needs time and cost so in order to avoid these latencies of production of application Microsoft provides the Universal Windows Platform where developer can develop application and run on different platform. With this approach the proposed system is developed to analyze the streaming process.

Keywords - *DASH, Adaptive, Streaming, UWP, Bitrate.*

I. INTRODUCTION

Recent days, The Technology of Adaptive streaming has provided the solution for streaming multimedia over the computer networks, by extensively using the HTTP. RTP and RTSP Protocols were used for streaming purpose before the advent of HTTP. Technology using HTTP is designed to improve the work efficiency on larger distributed network over the internet.

The Adaptive streaming checks the real time Users bandwidth and the device CPU capacity to adjust the quality of streaming of video accordingly to the available resources. For this to happen it requires the Encoder which can able to encode a single video stream into multiple bit rates as shown in the figure 1. By this content receiving side user unknowingly switches between the different streaming encoding rates depending upon real time available resources. As a result, user can expect the reduction in the buffering time with better experience and fast start time for both high end low-end connection sides.

As of now extensively adaptive streaming is using a method of video streaming over the HTTP, where source content segmented into small multi second parts along with encoding into multiple bit rates. The small segmented multi parts of content are stored in a manifest file depending on the server configuration. As user request for the content from the streaming server, Adaptive streaming collects the information about resource availability from the receiver and stream the content with particular bit rate. If the user finds that the download rate is higher than the playback rate then it requests the next level of higher bit rate streaming segments from the streaming server. Otherwise if the download rate of stream is less than the playback rate of stream due to network throughput deteriorated then it requests a lower bit rate segment from manifest files. The bitrate adaptation is based on network deterioration on current situation.

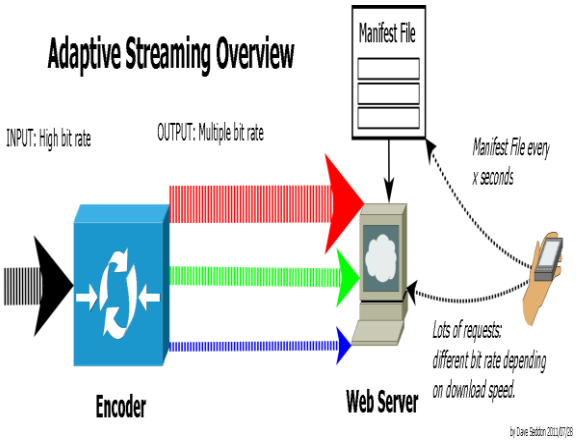

Figure 1: Adaptive Streaming

Universal Windows Platform (UWP) is Introduced with Windows 10 for all their devices. It provides the common platform for all devices and runs over the windows 10. With that UWP provides the guaranteed core API for all windows devices. As the UI for the broad range of devices screen resolution and sizes, the New adaptive controls and layout panels help us to tailor, with that it responds to multiple kinds of device input. A unified widows app store makes the app available on Windows 10 devices such as PC, tablet, Xbox, HoloLens, Surface Hub, and Internet of Things (IoT) devices as shown in the figure 2.

Universal Windows Platform(UWP) is flexible and support for languages such as C#, C++, JavaScript, and VB for coding. If user have a desktop

app of C++ we can modernize into UWP append can sell in Microsoft store.

Figure 2: UWP Platform device list

UWP app characteristics

- There is a common API surface across all devices
- Extension SDKs expose the unique capabilities of specific device types
- There's one store for all devices.
- Apps distributed from the Store provide a seamless install, uninstall, and upgrade experience
- Apps support adaptive controls and input

II. LITERATURE REVIEW

Desheng Wang et al. [1] proposed a framework which uses wireless adaptive multimedia transcodes based on the new technology called edge computing. The author designed the architecture such that it gives low latency while transfer the video over the network by edge computing where the transcoders are placed near to the base station. Earlier the core network used to send one single video to each user who requests. So, the network traffic was very high and congestion used to happen. In order to elevate the traditional approach DASH came into existence. In DASH, the core network sends only single video to the base station and the base station has multiple bitrate of the same video. According to the client channel the video is transferred to the client means if client network is slow then lower bitrate video is sent and if the client network is fat then high-quality video is sent. And also, author proposed efficient bandwidth usage while streaming the video.

Ahmed H. Zahra et al. [2] presents ARBITER+ which includes new algorithm for adaption streaming. ARBITER+ has a various component which ensures high video bit rate or QoE with dynamic change of the network in the client's mobile. The components contain the video files with shorter rate tracking, tunable adaption, multiple samplings of video streams, and controlled switch. The author checked the algorithm performance with real video and cellular network. They proved that the algorithm has best QoE with cellular networks. They also showed that if mobile or cellular users shares the same base station, users achieve best QoE in the application-level.

Masaki Bandai et al. [3] proposed algorithm for quality of experience (QoE) for the users streaming the video. It uses HTTP protocol with selection of quality while streaming the video. Author proposed two types of controls for improving the QoE. First, inserting the different quality for the single video and suppression of QoE. The tested this algorithm using DASH and checked the QOE. They proved that using ACR (Absolute category rating) method, QoE can be achieved.

Xue Zhang et al.[4] formulate a problem formulates for the user to select the optimal views for the camera for which the client requested for downloading and also satisfies the bandwidth constraints. As adaptive streaming assembled on the top of HTTP protocol by opposing the Real time protocol (RTP) based adaptive streaming with segments having no difficult traversing firewall and Network address translation, with HTTP as a client driven approach and all the adaptation technique will be reside at the client side so it reduces the requirements for the persistent connection between the two connections as of client and server application ,further the server is not required to maintain the session state information of each client so scalability automatically increases, with HTTP based adaptive streaming the HTTP caches and servers can be adopt seamlessly.

Venkata Phani Kumar M et al.[5] A quality of experience (QoE) is key importance given by the author. He used HTTP adaptive streaming which contains both bandwidth and video quality is taken into consideration for both service providers and subscribers. Adaptive streaming checks the real time Users bandwidth and the device CPU capacity and adjust the quality streaming of video accordingly, for this to happen it requires the Encoder which can able to encode a single video streaming into multiple bit rates ,so playing user switches between the different streaming encoding rates depending upon real time available resources a result we can expect the less buffering with good experience and fast start time for both high end low-end connection sides.

III. DASH

Dynamic Adaptive streaming over HTTP (DASH) is also named a MPEG-DASH it is also adaptive streaming with bitrate technique that increases the quality of Experience (QoE) in streaming by enabling the encoder to each segment into multi bit rate manifest file to stream over the network to deliver the users from the conventional HTTP web servers as shown in the figure 3.

However, like Apples HTTP live streaming MPEG-DASH work by breaking streaming content into smaller HTTP file-based segments, all the segments contain shorter interval of playback bits of the streaming file, as like live streaming of sports or videos are encoding into different bitrates with alignment of short interval of playback time.

The receiving client selects the lesser bitrate stream depending on the network condition. Based on the network distortion the download rate will also keep on decreasing than the play back rate. Later the DASH server automatically adopts the lower bit rate stream in order to match with playback rate. After each interval or segment, it automatically selects the new interval segment to run by collecting the resources from the receiver side to adopt new bitrate, however if the download rate is more than the playback rate MPEG-DASH client automatically switches to the higher value bit steam. It is hence understood that MPEG-DASH can make the video streaming without causing the buffer in the process.

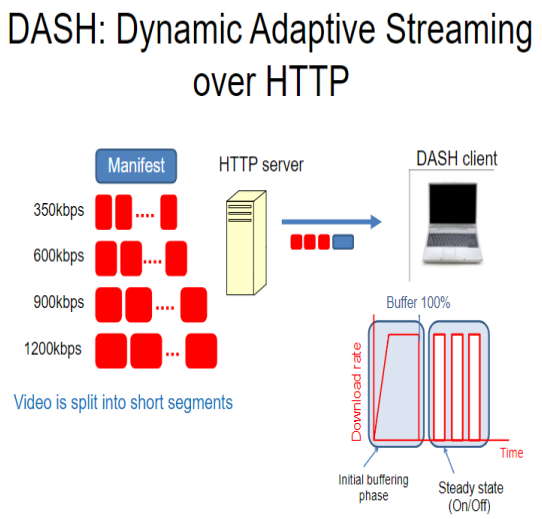

Figure 3: DASH Architecture

MPEG-DASH is new technology based on the HTTP protocol and it is the first adaptive streaming which is accepted as international standard. It uses TCP protocol with the existing web architecture which is currently used worldwide. This technology can be used in the devices which can be accessed over the internet to stream the video like IP Television, setup boxes, desktop, laptops etc. These devices can adapt to the technology which gives best experience for video streaming. It is mainly used for entertainment or media networks. It helps in providing the different bitrates or quality of video over the network. It is accepted universally for its performance for streaming purpose.

A. Advantages of DASH

- As Dash works over http, it is used worldwide network
- It is on-demand Live streaming.
- Efficient and ease of use of existing CDN.
- It maintains cache at the edge devices.
- Multiple base URL's for single video

Streaming solution is intended to provide confidence to the media and entertainment market that the solution can be adopted for universal deployment, as like smooth streaming by Microsoft or HDS by adobe.

IV. PROPOSED SYSTEM

Due to increase in the number of users on internet, the video streaming also has become one of the major activity. Due which the internet availability is not uniformed and causing the distortion and delay in the content streaming. To overcome all these problems many technologies came into existence in that Dynamic adaptive streaming over HTTP(DASH) is also one of that. In today's world many enterprises stream the content using this technology. In the paper it has been proposed a model on analysis of the dynamic streaming over HTTP in a different condition by an application. This is achieved with help of results obtained by analyzing the number of bits received during the streaming time.

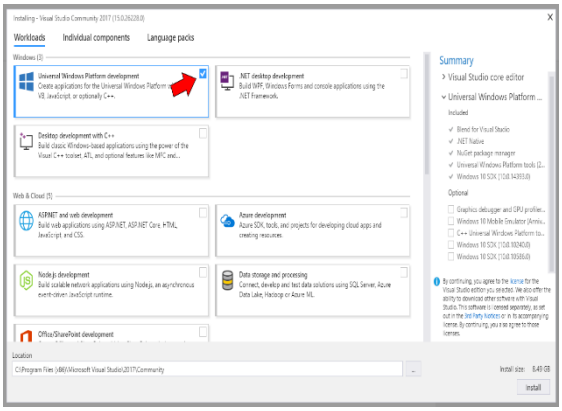

Figure 4: Universal windows platform package

The application is developed using language C# and XML for the UI on the universal windows platform. As shown in the figure 4. The UWP application is created by selecting suitable universal windows platform package from the Microsoft visual studio where the proposed system is created by following way:

- Select a new project under the widows universal in the Microsoft visual studio
- Create the blank app with .NET framework of 4.5.2 and add the name for project as UWPASwithAMS
- After the naming of the project the user need to choose the target version for the windows 10 and they have to select the minimum version on

which the application can run. Later the project will be created with properties, References, Assets list with app.xaml and Mainpage.xaml class files.

Where in the properties file the assembling of all the classes of the project takes place with that it also includes the default .NET optimizing characters these can be modified based on user requirement.

In the reference file system analyzer, metrolog or semilog and Microsoft.NET core references are added to support the different classes of the project. The assets folder is used to target the assets by mentioning their dimensions to run the application on that device.

The App.xaml class used to create the UI for the application is carried out by selection of required element from toolbox of the application likely buttons, pointers etc.

The Mainpage.xaml class file includes the Microsoft library called AdaptiveMediaSource is used to carry out the server process when the user gives the stream URL as input for the application. it takes the stream and make it into number of manifest files by segmenting into smaller parts with different bit rates that will be streamed to receiving side user based on their resource availability that is analyzed by taking the consideration of download rate and Playback rate. It can be used to run on different platforms like PC, Mobile, Xbox and IoT devices. To analyze the streaming in different devices having different platforms, where the application takes the URL as input and if the input is not proper it shows the notification about improper URL, otherwise it will check the URL of streaming video and run through the adaptive streaming server.

V. RESULT

As providing the URL to the application, the application validates the stream URL and make it to run using the dynamic adaptive streaming. Where the content is divided into multiple small segments. Encoder encodes each segment into multiple bit rates and store in manifest files to make easy for access of different clients of network conditions in order to avoid the delay during the play of video.

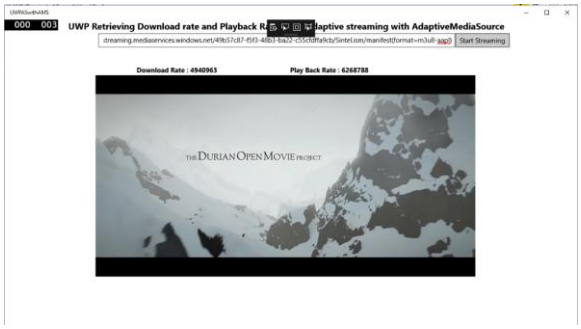

Figure 5: Application output

Download Rate: 4940963 Bits
Play Back Rate: 6268788 Bits

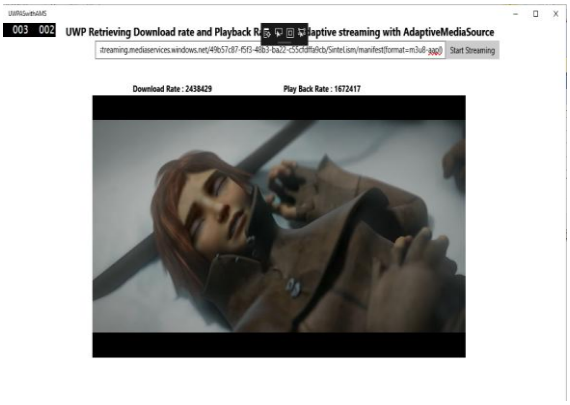

Figure 6: Application output
Download Rate: 2438429 Bits
Play Back Rate: 1672417 Bits

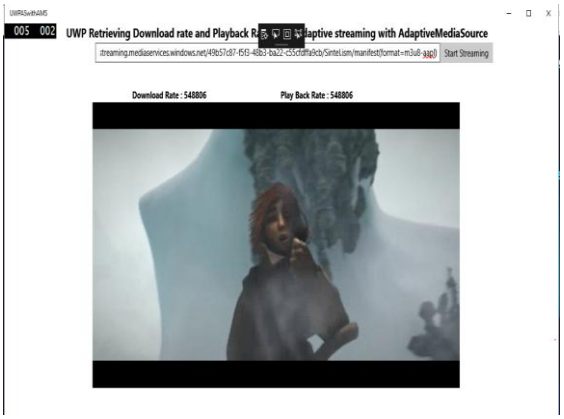

Figure 7: Application output-3
Download Rate: 3613084 Bits
Play Back Rate: 3613084 Bits

By comparing the results in the figure 5,6 and 7 the user gets a different download rate and playback rate based on the network availability, then by analyzing these data user can find out the faults in the process like error in the server or in the network.

VI. CONCLUSION

The Dynamic Adaptive Streaming over HTTP made better view experience for the receiving side user by making the various Bit rate stream to adopt for diverse user network condition to receive the segments of different bit rate based on network strength. Later by considering the specific bit rate of content to stream over the internet it reduces the buffering time. Which can be analysed UWP application. UWP platform can control the whole lifecycle application on all devices, it has the potential to greatly reduce the time for the administrators to spend on applications. Because each

UWP application is pushed to the Store as a single package, Administrators no longer need to support multiple versions of the application for different device types. Administrators enjoy a single delivery and maintenance mechanism for all devices, hence they can say goodbye to updating different versions of their application for various device types.

Combination of UWP Application with streaming technology provides the real-time data with the network capability of the users, this helps in the Non-Functional Testing approach for the streaming based Application.

VII. FUTURE WORK

The proposed system can be enhanced by collecting the logs of the system during the application running state. Later represent that data in graphical representation to make it easy for the analysis of obtained results in the future research work.

VIII. ACKNOWLEDGMENT

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