

## Design of UI Engine for appropriately Displaying Hierarchical coded Video Services

Sun-young Hong<sup>1</sup>, Seul-ki Song<sup>1</sup>, Dae-kil(Chris) Kim<sup>2</sup>, Jong-ho Paik<sup>1</sup>

<sup>1</sup> Department of Multimedia, <sup>2</sup> School of Communications & Media,  
Seoul Women's University,  
#621 Hwarang-ro, Nowon-gu, Seoul 139-774, Republic of Korea  
{syhong, seulkieomma, chris74, paikjh}@swu.ac.kr

**Abstract.** Recently, users require high quality video services such as a UHD. In accordance with user's needs, most broadcasters have started to establish a UHD system to provide the UHD services. Although both HD and UHD services need to be co-existent, at this time, HD receivers are more popular than UHD receivers. By these reasons, SHVC which is one of video compression standard technologies have been suggested for both HD and UHD services simultaneously. Also, MMT have been standardized in order to transmit hierarchical coded video services. Therefore in this paper we suggest a design methodology of UI engine for hierarchical coded video services to appropriately display the HD and the UHD, respectively.

**Keywords:** MMT, MMT-CI, SHVC, UHD

### 1 Introduction

Along with rapid development of broadcasting communications network as well as the quality of device, it is possible to provide 720p HD(high definition) video services with users on the mobile environment. According to technological advances, it has to do with the trend that users require a higher quality of video service, which results in coming a new video service to fulfill those needs : UHD[1]. UHD is a term that a way of broadcasting technologies offering four times more quality than that of previous HD video services. Broadcasting on the cable, satellite stations etc, has recently announced that it would be common. In order to provide services on terrestrial, it needs highly compressed video codec more than twice compared to as it is. The digital broadcasting transmission technology is essentially required three times more. Broadcasters have committed to provide services as UHD. However, there is a limit to offer only UHD because it is a situation which is not merely just converted from the analogue method to the digital. Also, most users have a HD receiver, so there are co-existent: HD and UHD services. To solve these limitations, SHVC(Scalable HEVC) is becoming the main issue. SHVC is a compression method to make video hierarchical structure. It can give both HD and UHD services to every user.

SHVC, which is one of next generation standard video compression techniques is based on HEVC(High Efficiency Video Coding). It is designed to respond in real time

based on users' device performance, network state and so on [2]. MMT as a container format is suggested to transmit hierarchical coded video services such as SHVC. This defines user-interface as MMT-CI, which helps users receive content services[3]. In MMT-CI, there are defined attributes which for playing video which structured hierarchically. However, only with attributes defined in CI it is hard to play the video. So we design and suggest UI engine based on independent interface.

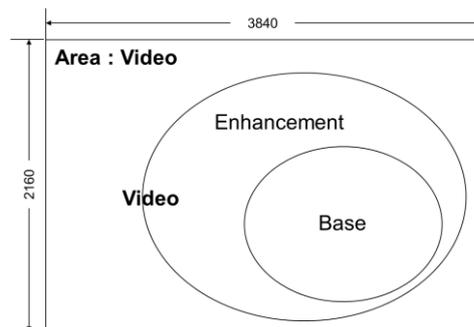
## 2 Related Works

### 2.1 SHVC

SHVC is an extension standard that based on HEVC which is one of next generation standard video compression techniques from JCT-VC (Joint Collaborative Team on Video Coding). It has characteristics as follow: 1) Provide spatial, temporal, and scalability in video. 2) Consists of two layers: base layer and enhancement layer. 3) Can be responded to device performance, network state, and device resolution of people use in real time. In accordance with users' flexible interfaces such as size of device display panel, network bandwidth etc, the environment of users can be adapted effectively by extracting partially a single bit stream from an encoded bit stream. When coding the video of each layer which has different resolutions, the coding is performed with reference to content of a lower layer of the hierarchy, not encoded independently each other, it has advantage of compression efficiency.

### 2.2 MMT-CI

MMT-CI is a way to offer composition information of various contents for multimedia services through a packet-based heterogeneous network. It controls layouts for spatial-temporal of media. In MMT-CI, in order that provide scalable video having hierarchical structure, Fig1 is suggested.

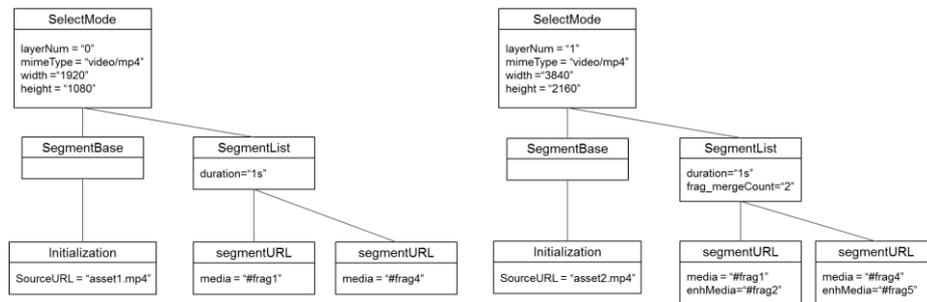


**Fig. 1.** This picture suggests the SHVC media data structure in MMT-CI.

The video is divided into a hierarchical structure of HD video. Each layer is divided into #Base, #Enh1, #Enh2. All layers should exist at the same time, in order to play HD video files. Accordingly, dependency is suggested in MMT-CI: #Enh1 is dependent on #Base.

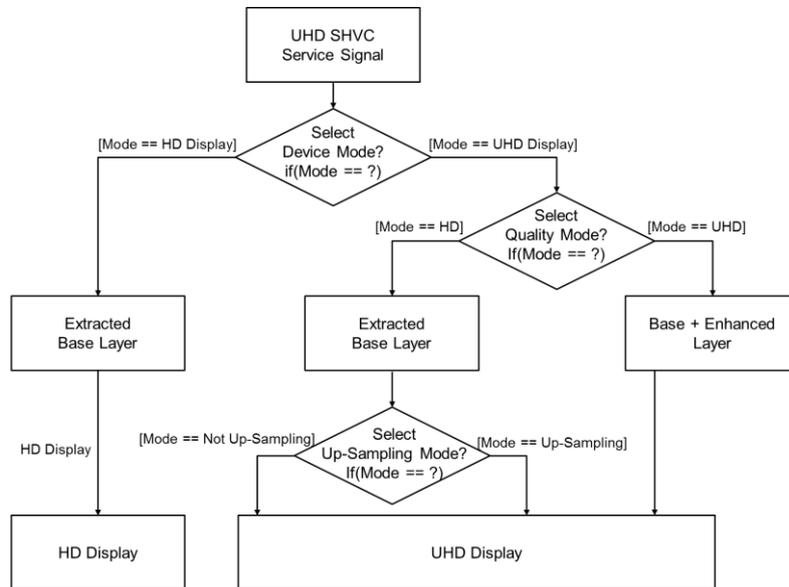
### 3 UI Engine

In this paper, we propose a UI that users can choose various quality of display and provide services of fitting size for each display device in a fixed environment. In Fig 2 shown that is object diagram, having independent feature, designed for hierarchical coded video service. According this, we designed the UI engine.



**Fig. 2.** This object diagram suggests the suggested user interface to provide hierarchical coded video service.

In Fig3, we present a flowchart of the UI engine. When users received a UHD hierarchical coded video service signal, the UI engine is providing the various service of selecting the quality and the display size. First of all, it has select device mode that can fit size each display device when users choose HD Display or UHD Display. If users choose the HD Display, Base Layer is extracted from UHD SHVC service signal. That is playing in HD Display. If users choose the UHD Display, it has second select mode for quality. When users choose the UHD quality, UHD SHVC service signal is decoding to play in UHD Display. However, when users choose the HD quality, UHD SHVC service signal is extracted to Base Layer, and then whichever is playing HD size in divided UHD Display or Up-Sampling UHD size in UHD Display.



**Fig. 3.** This flowchart suggests the suggested user interface engine to provide hierarchical coded video service.

## 4 Conclusion

The purpose of this paper is to design and suggest UI engine based on independent interface for providing hierarchical coded video service with users. We suggest implementation technology of independent user interface for hierarchical coded video services. Also, based on this, this paper represents a flowchart of user interface engine. Finally, by implementing independent user interface code, it will be verified in the future.

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## References

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