

The implementation of 4K Digital Signage System

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Abstract— The digital signage system is mainly installed on outdoor and used to convey an ad or information. Outdoor digital signage is used mainly LED, however, it has a lot of discomfort because of low resolution. So we developed the ultra-high resolution digital signage for 4K (UHD). The developed 4K digital signage system is composed of two parts. One is the production system that controls the client system. The other is the display(client) system that shows contents those are downloaded or streamed from the production system.

Keywords— Digital signage, 4K, UHD, Production/Display system

I. INTRODUCTION

Digital signage services are generally used to display something in public or private place. Something will be contents including text, images, animations, video, audio, and interactivity to inform someone about information for product. And these are mainly displayed in out-of-home and big screen. That is to say, the common goal of digital signage is to deliver the targeted message to specific persons in specific location using specific device at specific times as scheduled.[1][2]

The environment for digital signage, however, has been gradually changed.

One of many changes in advertisement is the appearance of the ultra-high resolution (4K-3840x2160, UHD) contents and devices.

4K contents are being produced in a variety of fields such as broadcast, digital cinema, digital signage and etcetera keeping pace with the release of the equipment for the output of 4K contents such as TV, projector and camera.

Another change in advertisement is bi-directional service. The traditional advertisement system displayed the advertisement in one way to consumers. But the recent one is interactive with consumers through touch-screen, mobile phone, camera and etc.[2][3][4]

The interaction is the other big current of digital signage. It makes a digital signage far more useful. It can be included in user interaction techniques that buttons, touch-screens, multi-touch, gesture using camera and mobile phones.[5][6][7][8]

Use of the touch-screen has experienced resurgence in popularity in the past five years as a result of the success of mobile devices that use this interactive interface, namely, the iPhone and Android smart-phones, as well as the increasingly popular tablet computers and e-book readers. An interesting consequence of this popularity is that people who see non-interactive digital signage are touching the screens and

expecting a reaction. Even for digital signage that has a traditional touch capability; users are likely to try using multi-touch gestures to zoom in and out on the display.[9][10][11]

Multi-touch has become so popular for mobile phones that it's probably only a matter of time before it becomes the industry standard for all touch-based interaction. However, when employed for large signage, multi-touch is a costly proposition because the capacitive touch-screen solution does not scale well, and light beam solutions require precise engineering. The industry is working hard to invent cost-effective multi-touch solutions for use on large LCD display panels.[9][10]

In this paper, we show the system for 4K digital signage. The proposed system is composed of two parts. One is the production system and the other is display system. The production system encodes 4K contents into H.264. And it delivers the contents in a way of downloading or streaming to the display system. Also it controls the display system through the project or schedule for display. The display system can show 4K contents and interact with user using touch-screen.

The paper is structured as follows: Section 2 briefly describes the proposed overall system. Section 3 explains the production system and display system in detail. Section 4 concludes the paper with a summary of key points.

II. OVERALL SYSTEM

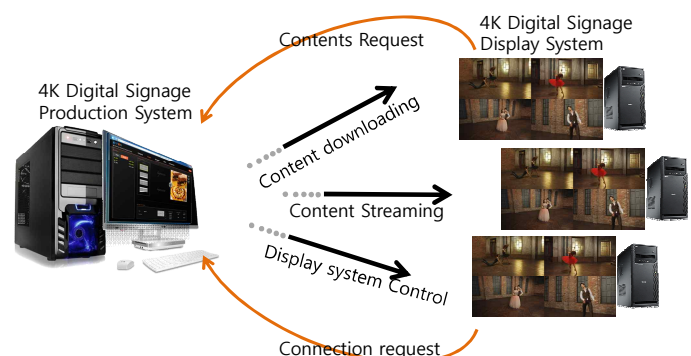


Figure 1. 4K digital signage system

Fig.1. above shows the composition of our 4K digital signage system. The proposed 4K digital signage system is divided into two parts. One is the production system and the other is display system. The Production system is mainly

responsible for the contents delivery. The types of the transmission are download and streaming. That is to say, the display system plays the contents downloaded or streamed.

III. 4K DIGITAL SIGNAGE PRODUCTION SYSTEM AND DISPLAY SYSTEM

A. 4K Digital Signage Production System

Fig. 2. shows the 4K digital signage production system. It is designed to web based application. It has many functions such as 4K contents encoding, contents registration, project, schedule, client and so on.



Figure 2. Web based 4K digital signage production system

1. 4K contents encoding & registration

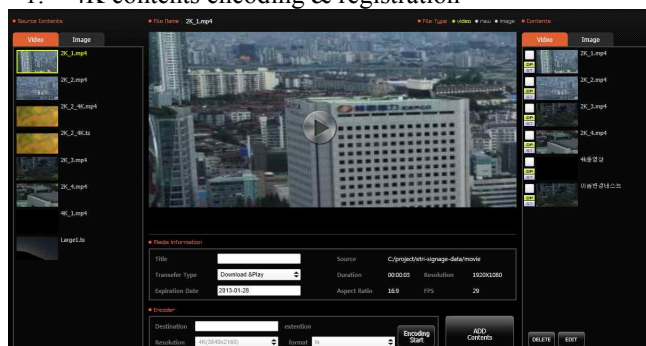


Figure 3. 4K contents encoding & registration

Fig.3. is the picture of 4K contents encoding & registration of the production system.

The production system encodes the raw format 4K content with the H.264 codec. It supports 4K encoding in a way to both split mode and whole mode. In case of split encoding mode, it proceeds faster encoding than the whole encoding mode. The splitted and encoded contents are played synchronizing with each other in the decoding process.

It also has the function that determines whether 4K contents are serviced to “download and play method” or “streaming method”.

The encoded contents must be registered through the registration process

2. Project

This function determines what layout to apply to the display, what content to place in each area of the layout. And it is able to get rid of hassle for specifying the content one by one on each panel every time.

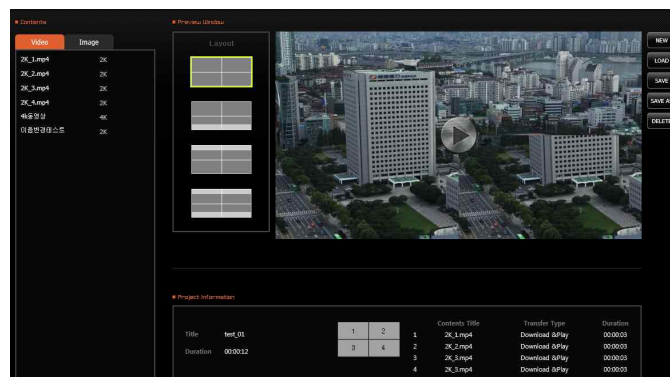


Figure 4. The function of project generation & management

3. Schedule

It is the function that designs what time slot place project made for some time, which is determined according to the request of an advertiser.



Figure 5. The function of schedule generation & management

Schedules can be applied directly to the display system, which makes user relieve hassle to select and play projects on time

4. Client

It has the ability that manages each display system and verifies the status of that.

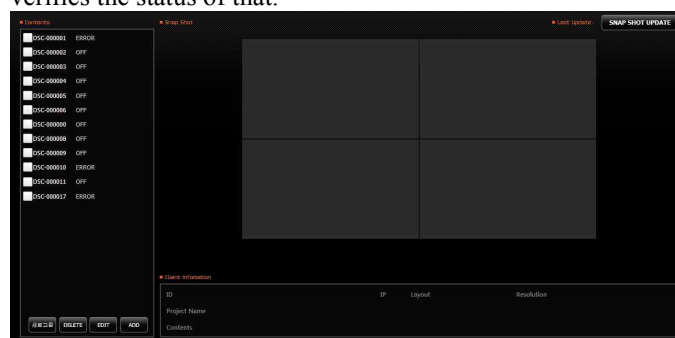


Figure 6. The management of the display system

B. 4K Digital Signage Display System

In this section, we describe the 4K digital signage display system. It has the main function that plays the contents located in local PC or streamed from the production system. According to the interaction with user, our display system scale up or down the pointed content and changes the location displayed. And also it can synchronously play with the

partitioned contents at the encoding module of the production system.

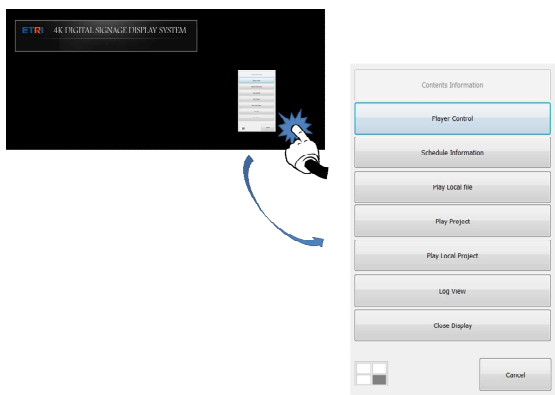


Figure 7. The display system of 4K digital signage system

Fig. 7. shows the main screen of the display system. Using the right click of mouse or screen touch, we can display the main menu of the display system.

1. Local play

Fig. 8. is the picture displayed in screen when we select the “play local file” in the menu of fig. 7.

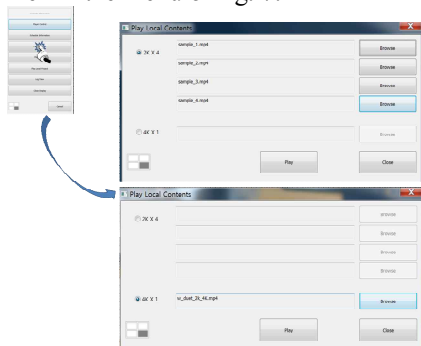


Figure 8. Local play

We can play them after selecting four 2K contents or one 4K content.

2. Project play

If you select the contents one by one for content playing in every time it will be very cumbersome. “Play Project” is the menu that plays the contents designed at the production system in advance.

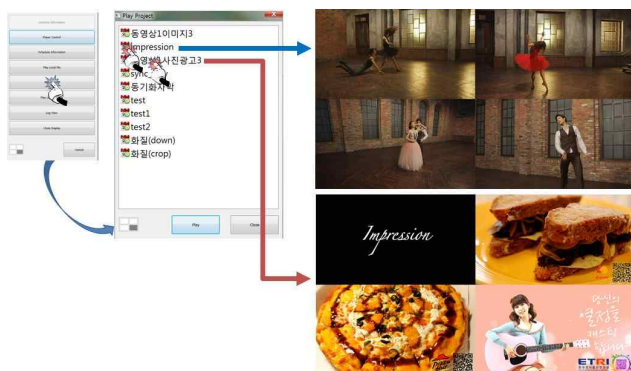


Figure 9. Project play

Our system can compose the 4K screen diversely as fig.xx above.

3. Schedule play

Schedule play can make it possible to play the contents according to the pre-made schedule at the production system although you do not take any action.

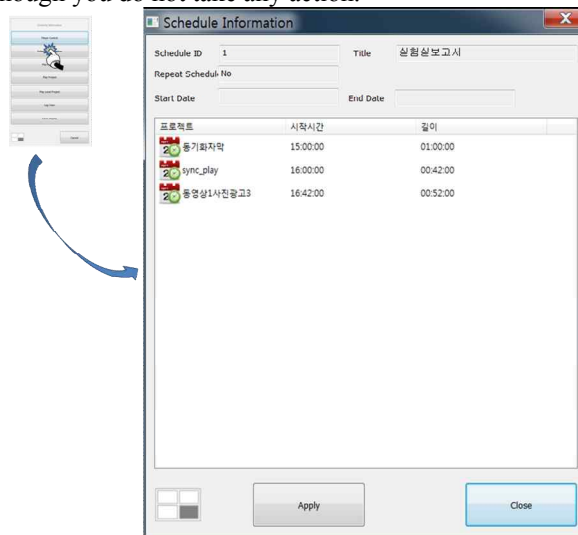


Figure 10. Schedule play

You can see the fig.10 when you select “Schedule information” on the menu. In fact, schedule is composed of many projects. That is to say, schedule play is to add the time to the project play for selecting the contents.

4. Download and streaming play

Our 4K digital signage system supports the download and streaming play of 4K contents as shown in fig.11 below.

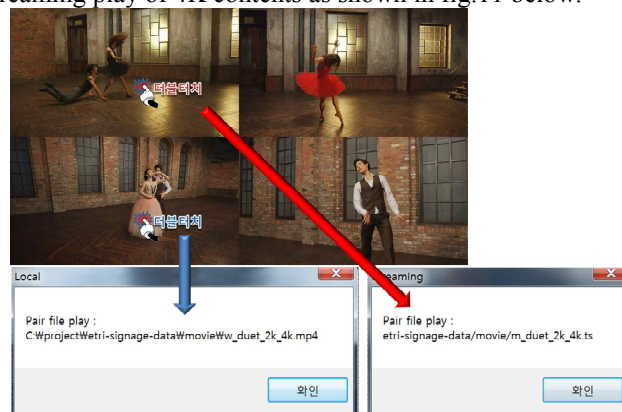


Figure 11. 4K streaming and download play

In case of playing four 2K contents, each quadrant contains the user interaction such as fig. xx. For example, if you double touch the first quadrant, 4K content connected with the content of the first quadrant. 4K streaming service is possible with the bandwidth of 30Mbps.

IV. CONCLUSIONS

We designed 4K digital signage system that was able to transmit and display 4K contents. It is composed of the

production and display system. The production system has functions such as 4K contents encoding, 4K streaming and downloading, project & schedule and so on. The display system is able to play 4K contents located in local or remote system (the production system). We expect that the proposed system can be applied to various industrial fields such as advertisement, broadcasting, disaster alarm, digital cinema and etc.

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