Study on the OSMU (One-Source Multi-Use) Management for Smart Devices

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Abstract

There has been a surge in the intelligent content services in the broadcasting and communication sectors as the convergence between the contents of various industries and highly-advanced IT is gathering momentum. As a result, the users can conveniently save, distribute, and disseminate the converged contents using the smart devices that have independent platform. However, there is technical limit in achieving the continuous replay after freely converting the single content via the independent devices. Furthermore, children and adolescents are easily exposed to violent and explicit contents amid the growing distribution of smart devices. In this paper, we suggests the OSMU (One-Source Multi-Use) management framework that ensures the fast and convenient use of one single content via the heterogeneous device and the integrated content management that enables the distribution of contents by grade.

Keywords: *Content Control, OSMU (One-Source Multi-Use), Authorization, Flexible*

1. Introduction

The advancement of digital technology has led to the changes in the attributes of contents and service types, and is creating new opportunities for the growth of contents industry as the convergence among the devices, industries, and services is achieved on the basis of IT (Information Technology) [1]. Recently, there has been a soaring demand for creative and intelligent contents along with the emergence of the convergence and complex services using the new device such as WiBro, IPTV, Smart device, and others [2, 3]. The size of domestic content market is expected to grow from KRW 1.5 trillion in 2011 to KRW 2 trillion and 932.9 billion in 2014 [4]. With the supply of contents rising sharply, the users can download and access the contents using the device anytime and anywhere. The device distribution nationwide stood at 7.01 million persons in 2010, 15.1 million persons in 2011, and 24.72 million persons in 2014, growing at an annual average rate of 13%, and is expected increase steadily [4]. In this situation, the users demand the OSMU (One-Source Multi-Use), service that enables free sharing and distribution of single content via the smart device that they have. In addition, it is urgent to find a resolution to the problem of unhealthy use and management of contents among the children and adolescents, considering that the contents are easily accessible by them.

2. Issue in Smart Media Convergence Environment

There is a demand among the users for the sharing of the independent content via all devices as the smart devices and smart contents are increasing sharply. However, the problem of compatibility must be addressed to ensure continuous replay of single

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content via independent devices due the unique features of each heterogeneous devices. If such problem is not addressed, the time and cost of content production may increase although the contents may be designed in a dual way so as to suit each independent platform. Furthermore, children and adolescents are easily exposed to the unhealthy contents as they can access the sexually explicit and violent contents amid the increased distribution of smart devices recently.

- Increased time and cost of reproducing the contents via the devices that have independent characteristics
- Technical constraint in reproducing single content continuously without disruption via the independent devices
- Growing risk of exposure to the sexually explicit and violent contents easily accessible by the children and adolescents via the device

3. Framework of OSMU (One-Source Multi-Use) Management

The Figure 1 shows the smart content transaction system infrastructure that enables the management of the integrated contents and the distribution and dissemination of the integrated contents via the heterogeneous device (Smart Phone, CCTV, PC, IPTV etc.) using the multi-box. This system consists of the large-scale content transmission system, content transmission client, web server, content management server and others to provide the contents through IPTV and Web.

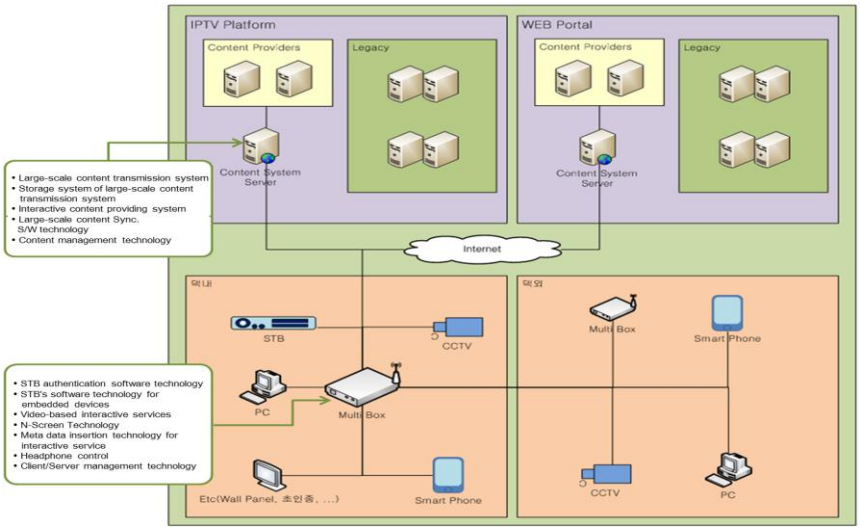


Figure 1. Consolidated Content Management Modeling Infrastructure

3.1 Multi-Box

Multi-Box function is required to ensure the two-way transmission of the large-capacity contents – which are classified by grade - using the heterogeneous device. Multi-Box converts the contents and transmits the processed contents to the users, and supports the functions necessary to use the contents requested by the users. Multi-Box is composed of 6 modules: 1) The visualization module provides the support to the resources offered by means of the data and web browser, regardless of the user's device to be connected, such as PC, TV, and Smartphone. As a result, the function is provided that enables the conversion and

transmission of the image through a web-like form, thus increasing the data speed. 2) The Automata module supports various input functions in the TV that has limited input devices. 3) VOD processing module supports various auxiliary services and information while the user is using the contents. 4) The streaming processing module supports the use of real-time contents through the streaming service. 5) The image processing capture module supports high-speed service of contents through various heterogeneous devices when the user is using the streamed contents. 6) Walled Garden module recognizes the user who log in and the terminal, and provides the contents which are classified by grade, depending on the user.

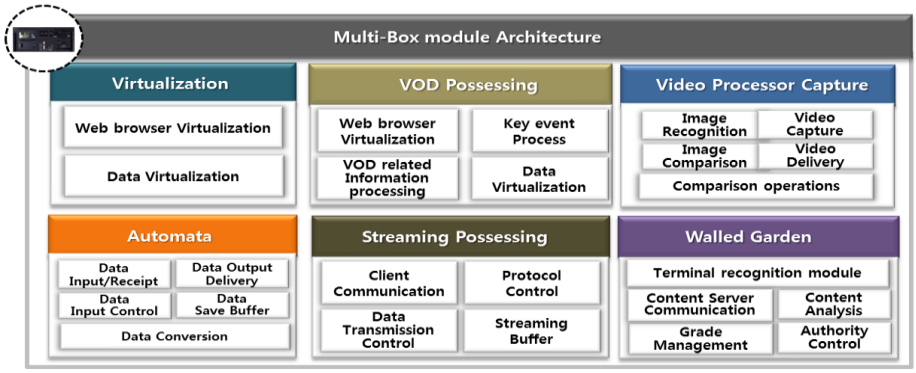


Figure 2. Multi-Box based Consolidated Content Management Architecture

3.1.1 Smart Content Grades Management Module

After the user and terminal are recognized for the heterogeneous device connecting to the network via the multi-box, the users are allowed to access the contents which are classified into 4 different grades as shown below. Therefore, the access to the proper contents and their management can be ensured for each user.

Table 1. The Classification of Content by Grade

classification	Sexuality	Violence	Word (speech)	Horror	Etc. (Drinking/ Smoking/Drug)
Level 3	**Entire body exposure** - Concretely expression of body exposure and sexual contact	**Murder** - Killing (humans, animals, etc.) - Plainly expression of high-intensity violence	**Violent Vulgarism** - Excessively stimulating and disgusting representation	**Shocking horror** - Concretely expressed to induce fear - Mental shock expression	**Expression of illicit drugs** - Concretely expression of illicit drugs
Level 2	**Partial exposure** - Parts of the body exposed	**Injury** - Vandalize stuff - Society - unacceptable expression	**Rough Vulgarism** - Trying to belittle the other party - Looking down expression	**Highly charged horror** - Elements that cause horror, but it does not seem to stimulate the youth	**Limited expression of drug** - Not to instigate the drinking or smoking
Level 1	**Exposure Dress** - Natural exposure - Express the sexual contact briefly	**Simple Violence** - Express the violence concisely - Light violence	**Ordinary Vulgarism** - Innocent remarks - Slang level that can be used to the interpersonal relationships	**Some Horror** - Elements that cause a little horror, but it can be a concise expression	**Some Smoking/Drinking** - Express the smoking or drinking briefly
Level 0	**No Exposure** - Must not use sexual expression	**No Violence** - Must not use violence expression	**No Vulgarism** - Express the vulgar language weakly	**No Horror** - Must not use scare expression	**No Smoking/Drug (etc.)** - Must not use drinking or smoking expression

3.1.2 Smart Content Conversion Module

The flow chart is presented, which enables the contents to be distributed to the users regardless of the independent characteristics of various devices. The Fig. 3 below is the flow chart to read the imaging information, using the content imaging capture module, via heterogeneous contents. The changed image is captured through the comparison module based on the previous image and the image that will be changed. And the changed image is transmitted to the streaming server.

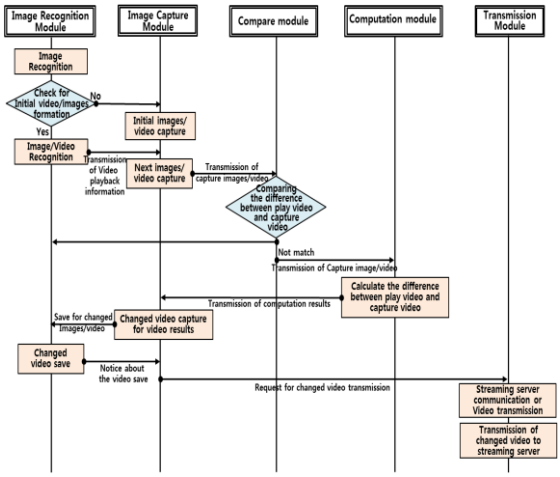


Figure 3. Flow Chart of Content Capture Processing

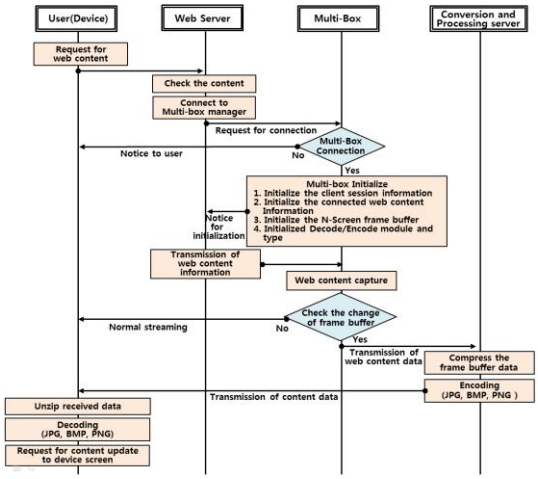


Figure 4. Flow Chart of Encoding/decoding

Figure 4 is the flow chart to distribute the image- which is changed by the image capture module – to the users through the multi-box. The content conversion and the processing server compress the converted data and encode such data through various extensions. The encoded contents are transmitted to the device of user, and the transmitted data is updated and replayed on the screen of user immediately after the compression is released.

3.1.3 Smart Device Conversion Module

This is the flow chart that enables the image to be replayed continuously after the user stops the replay of the image displayed on the device of user and shifts to other device that he/she has. The multi-box sends the request signal to the trans-code system for the valid extension and content information of the device that the user wants to change. The trans-code system transmits the contents to the multi-box after it encoded the contents, using the metadata system based on the extension and content information. The multi-box applies the image processing capture module to the contents which were transmitted to it, and then transmit the contents to the user.

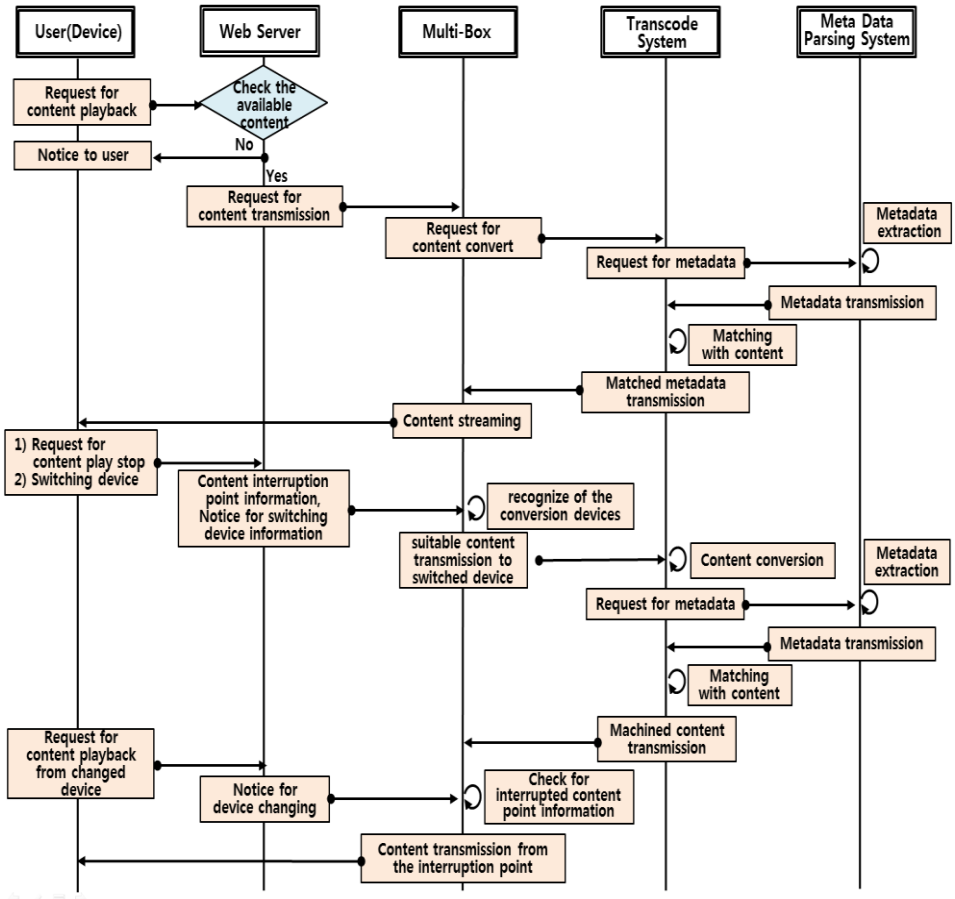


Figure 5. Flow Chart of Device Switching

4. Implementation and Performance Test

4.1 Implementation

Figure 6 shows that the contents underwent the image capturing through the multi-box and are being replayed on iPhone. In addition, the user can request the device change, using the pop-up menu, when he/she shifts the contents, which are replayed on the iPhone, to other devices and attempts the continuous viewing. The Figure 8 shows that the user can view the image continuously even after he/she requested the image conversion by changing the device from iPhone to Android phone.

Figure 6. Content Playback Screen in iPhone

Figure 7. Switching Device Screen to Other Device in iPhone

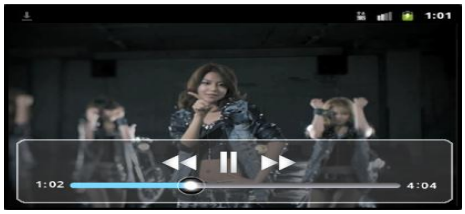


Figure 8. Content Playback Screen in Android Phone

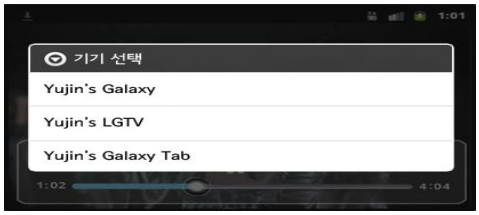
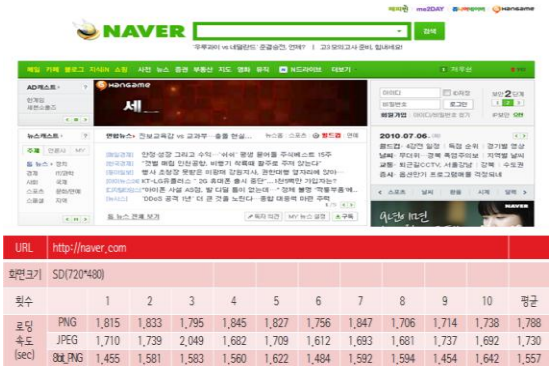


Figure 9. Switching Device Screen to other Device in Android Phone

4.2 Performance Test

Figure 10 illustrates the screen of the content loading speed test based on the image type when the web service and web contents are transmitted via the smart device using the image processing capturing module provided by the multi-box. As shown on the screen, there is a slight difference in the content loading speed based on the image type. This test was used to collect the image type information as the image converted via each independent smart device – which requests the contents – can be transmitted in the fastest manner.



URL	http://naver.com											
화면크기	SD(720*480)											
회수		1	2	3	4	5	6	7	8	9	10	평균
로딩 속도 (sec)	PNG	1,815	1,833	1,795	1,845	1,827	1,756	1,847	1,706	1,714	1,738	1,788
	JPEG	1,710	1,739	2,049	1,682	1,709	1,612	1,693	1,681	1,737	1,692	1,730
	8bit PNG	1,455	1,581	1,583	1,560	1,622	1,484	1,592	1,594	1,454	1,642	1,557

Figure 10. Result of Web Content (NAVER) Transmission Speed Processing between Device and Multi-box

URL	http://naver.com											
화면크기	HD(960*540)											
회수		1	2	3	4	5	6	7	8	9	10	평균
로딩 속도 (sec)	PNG	1,847	1,345	1,694	1,319	1,288	1,301	1,290	1,322	1,382	1,295	1,408
	JPEG	1,343	1,243	1,249	1,294	1,207	1,262	1,214	1,378	1,306	1,219	1,272
	8bit PNG	1,278	1,001	1,041	0,986	0,991	1,081	1,263	1,1648	1,294	1,304	1,140

Figure 11. Result of Web Content(Seoul Traffic Information) Transmission Speed Processing between Device and Multi-box

5. Conclusion and Future Work

This paper presents the OSMU (One-Source Multi-Use) management framework that enables the quick sharing and management of contents, classified into different grades, via the heterogeneous device using the multi-box. In addition, this paper provided a detailed presentation of multi-box functions that enable the continuous viewing when a request was made to shift the single content to the heterogeneous device using the screen capture method. Moreover, multi-box presented the method to control and manage the access of children and adolescents to the harmful contents by restricting the access to the contents classified into different grade levels. The future studies will focus on the method to provide reliable services when the contents are requested and consumed using the sensitive information within the contents.

Acknowledgments

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