

# The Gap between What a Service Provider Shows Off and What Users Really Watch

Dongjin Kim<sup>1</sup> and Jaehyun Choi<sup>2</sup>

<sup>1</sup> UX Development Center, LG U<sup>+</sup>, Seoul, Republic of Korea  
danielkim@lguplus.co.kr

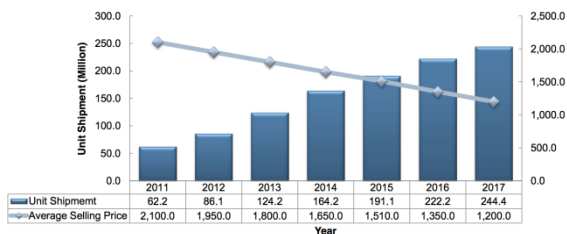
<sup>2</sup> U2 System, Gyung-gi do, Republic of Korea  
choi2000@u2system.co.kr

**Abstract.** We identified watching behaviors on the first IPTV established with Google OS in the world. Log analysis method was taken because actual usage behaviors could be understood. Log data that forty eight users used the IPTV service were collected by the application embedded in the IPTV. As a result of the log data analysis, the frequency of zapping channels by channel up & down button was more than that of changing channels by recommendation or searching. It was indicated that users did not access VOD contents by recommendation. However, a search was used to find Youtube contents.

**Keywords:** watching behavior, IPTV, U<sup>+</sup> tv G, Google OS, log analysis.

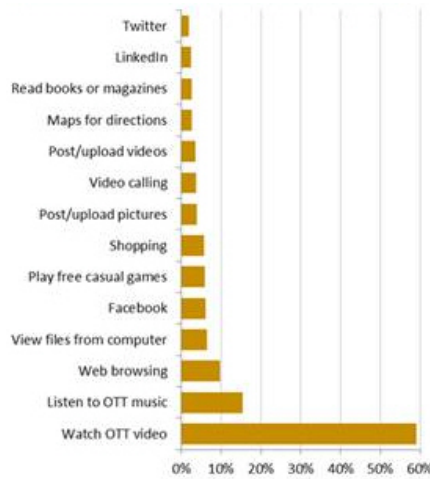
## 1 Introduction

There are several ways to define “Smart TV”, but generally it is either a television set with integrated internet capabilities or a set-top box for television that offers more advanced computing ability and connectivity than a contemporary basic television set [1]. At the beginning that smart TV had been launched, there was full of optimistic outlook for it as an innovative service followed by smart phone. Approximately 2 million units of smart TV would be shipped in 2015 (Figure 1). Also smart TV was predicted as a main demanding channel of SNS like Facebook [2]. Besides, smart TV alliance by LG Electronics Inc., TP Vision and Toshiba was founded in 2012 for expanding ecosystem of smart TV [3]. Lately, android or web OS has emerged as a main platform, which affects as a factor to strengthen the ecosystem of smart TV.



**Fig. 1.** Smart TV segment – unit shipment and ASP forecast (Source: Frost & Sullivan, 2012)

In reality, however, the usage behavior on smart TV doesn't correspond to an optimistic outlook anticipated in the beginning. It shows that the ecosystem of smart TV doesn't have a powerful influence compared to that of smart phone. According to data from NPD group, usage rate of most contents has stayed under 10%, except watching OTT video contents like Netflix or Hulu (Figure 2). In case of Korea, it is clear that usage frequency of unique function of smart TV is very low except watching a broadcast program [4] (Table 1). There are various interpretations about this status. For example, they are lack of contents, absence of smart UI, failure of differentiation, limitation as a lean back viewing condition.



**Fig. 2.** TV screen application usage (Source: NPD Group, 2012)

**Table 1.** Comparison of share of time to use contents by each of smart devices (Source: KISDI, 2013)

	Smart phone	Tablet PC	Smart TV
TV/Radio broadcast program	1.8%	40.7%	99.6%
Movie/Music/Picture	6.2%	5.0%	0.3%
Newspaper/Book/Magazine	1.6%	15.9%	0.0%
Call/Message/email	79.0%	4.6%	0.0%
Online search/SNS/commerce	8.3%	15.5%	0.1%
Game	2.9%	6.2%	0.0%
Document/Graphic work	0.1%	12.1%	0.0%

Nonetheless, there is little research which grasps usage behaviors on smart TV and finds out why the main function of smart TV doesn't appeal to consumers. Wilfinger et al. evaluated an interaction concept in the field but overall behaviors to use interactive TV were not investigated [5]. Vinayagamoorthy et al. conducted the user experience research for connected TV but quantitative data are not enough to reveal actual usage behaviors on connected TV [6].

This research analyzes actual usage behaviors on smart TV through a log analysis on U<sup>+</sup> tv G which loads Google OS first in the world, and suggests points to be considered when designing an user experience of smart TV from the result. Smart TV and IPTV can be differentiated in composition of hardware and software. However, in this research a log analysis on IPTV service was conducted since the definition of smart TV is included to the definition of IPTV and these are judged as a similar service in researching a usage pattern.

## 2 The Introduction of U<sup>+</sup> TV G

### 2.1 Google Search

Because the device equipped with Google OS supports Google search function, users can search live TV program, VOD contents, Youtube contents and web page, etc altogether at a time by pressing ‘search’ button on remote control (Figure 3).



Fig. 3. Remote controller of U<sup>+</sup> tv G

### 2.2 TV Application

Youtube service optimized for the condition of watching TV is supported and people can use an internet on TV through chrome browser. Also, they can use some of the applications used in smartphone or tablet PC on TV.

### 2.3 The Rest of Services

In the living room, it is difficult for users to watch the TV program they would like to without handling remote control. Using ‘2<sup>nd</sup> TV’ service gives a solution to this shortcoming. Users can watch some of live TV program or VOD contents wherever they want in the house by tagging their smartphone on U<sup>+</sup> tv G NFC sticker or using ‘2<sup>nd</sup> TV’ application. Users can watch contents by ‘phone to TV’ service on TV screen in

case that they want to see contents on big screen, not on smartphone. Family members can share their pictures, videos at smart phone as well as at TV by ‘Family Album’ service.

### 3 Evaluation of Usage Behavior

#### 3.1 Subject

It was analyzed on usage behaviors of forty eight families who used U<sup>+</sup> tv G. Subjects were recruited according to criteria which included styles from a single household to a family of four and to have economically productive members in family or not, etc. The violation of privacy was prevented in advance by getting subjects’ consent to provide personal information.

**Table 2.** Subjects

Number of members	Type	Number
1	Male	4
	Femail	2
2	Couple	5
	Father & son	1
3	Couple with child	12
	Couple with a twenties	5
	Mother with two twenties	1
4	Couple with two children	8
	Couple with teenager and twenties	2
	Couple with two twenties	8

#### 3.2 Log Analysis

Although there are many ways to evaluate usage behaviors of a service, it is easy to analyze usage frequency and has an advantage to collect detail usage behaviors automatically if log analysis is utilized [7]. In this research, log analysis is used to evaluate actual behaviors of TV viewers. After registering subjects to log analysis system who would participate in this evaluation, the application to collect log data was delivered via Gmail. Subjects accessed Gmail through chrome browser in U<sup>+</sup> tv G and installed the application delivered. Then, the data of usage behaviors from each family were delivered to data server automatically. The application was installed as an embedded type to prevent subjects from the application. By monitoring the application on a regular basis, the data server restored it immediately even if the problem had been occurred (Figure 4).

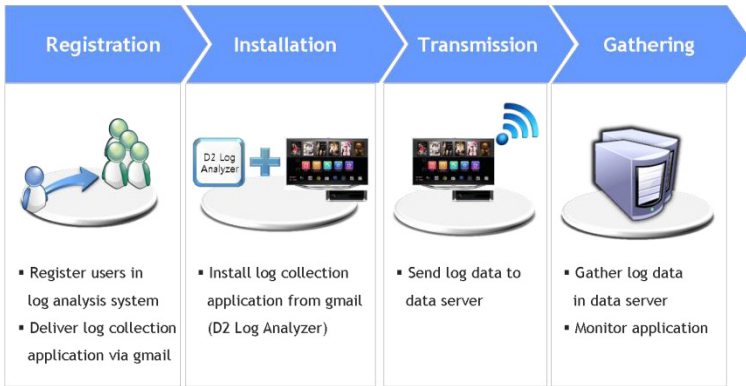


Fig. 4. The system of analysis

### 3.3 FGD (Focus Group Discussion)

The advantage of log analysis is to figure out service use pattern objectively. However, it is hard to understand the cause of usage pattern. Because of this, FGD was conducted for systematical research (Figure 5).

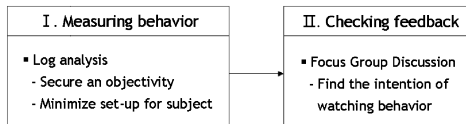


Fig. 5. Research system

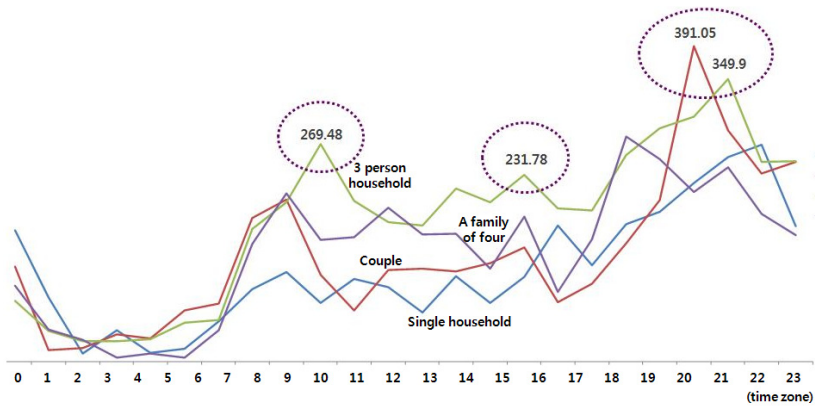
### 3.4 Period of an Evaluation

From March 31th to April 16th in 2013, log data that subjects had used U+ tv G service were collected from forty-eight houses. And FGD was conducted from eight houses among forty eight houses for May 28th and 29th to understand the intent of their usage behaviors.

## 4 Results

The time to watch U+ tv G was increased after getting up in the morning and also increased after coming from work until about 9:00 p.m. Considering a number of household members, three members household had more time to watch U+ tv G than another household (Figure 6).

The type of contents was classified to live TV program, VOD contents, and TV applications and the time to watch live TV program was much more than others. The time to view VOD contents like drama or movie, and TV application like Youtube or Google service accounted for thirteen percent (Table 3).

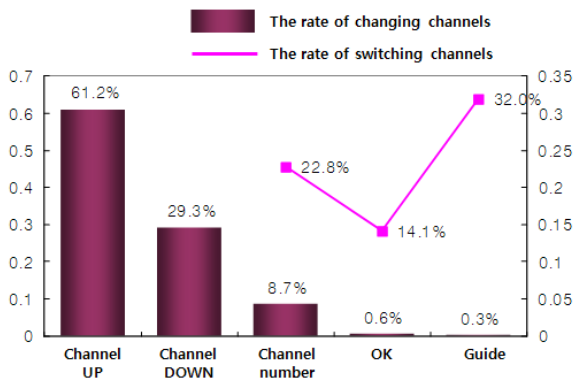


**Fig. 6.** Average watching time by the type of household

**Table 3.** The rate of viewing time by the type of content

Type of content	Rate
Live TV program	87.0%
VOD contents	8.0%
TV applications	5.0%

Users usually changed channels by channel UP, DOWN or number button on a remote control when watching live TV program (Figure 7). Though a channel could be changed by smart EPG (Electronic Program Guide) (Figure 8) after OK button had been selected, OK button was not used frequently. The case of guide button was similar to that of OK button. Users were able to change channels by selecting one of buttons on on-screen-display (OSD) after pressing OK or guide button. Therefore, in case of OK or guide button, the rate to switch channels could be calculated. The rate of switching channels by guide button was relatively higher than others like number or OK button.



**Fig. 7.** The rate of changing and switching channels by each of buttons



Fig. 8. Smart EPG

After access to home menu screen by pressing home button on remote control, users could get various contents through upper recommendation area or middle category area on screen (Figure 9). There were five category menus that contained EPG and VOD contents which were ‘EPG’, ‘replaying TV program’, ‘movies/animation’, ‘kids/education’, and ‘documentary’. Users were able to have an access to detail screen from home menu screen after they had controlled to move screens between menu depths. They could get a content to select “watch immediately”. The rate of access to contents and the conversion rate to get contents could be calculated based on this usage flow. There were few times for users to have an access to detail screen and nothing to get contents from upper recommendation area (Figure 10).



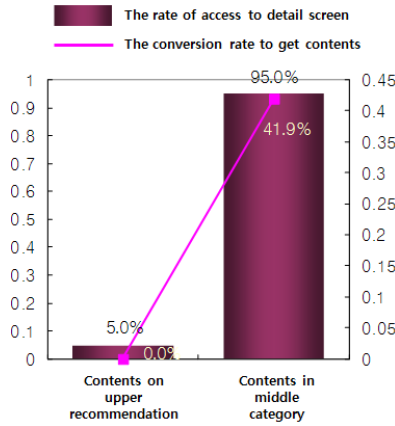
Fig. 9. Home menu screen

There were many routes to access to VOD contents. For example, if users pressed ‘replaying TV program’ on remote control or selected ‘replaying TV program’ button on home menu screen, they could get ‘replaying TV program’ contents on ‘replaying TV program’ menu screen. The conversion rate to get contents of ‘replaying TV program’ was slightly higher when users got contents from home menu screen than by pressing ‘replaying TV program’ (Figure 11). The conversion rate to get contents of ‘kids/education’ was considerably high.

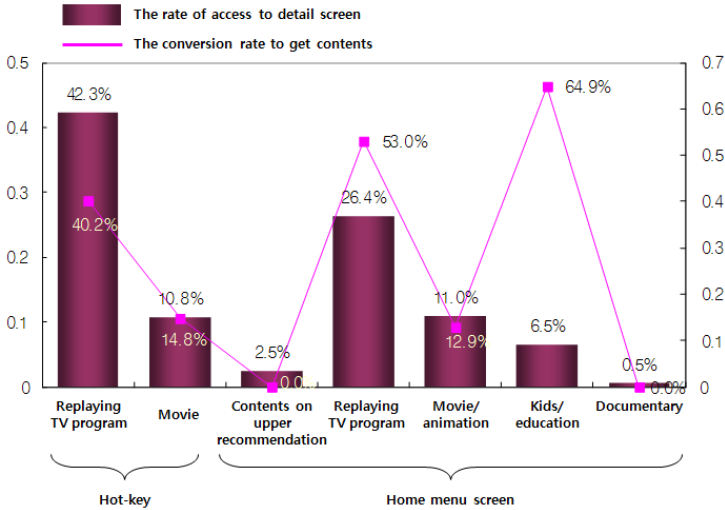
Users got VOD content through various routes because of many attributes in content. For example, “I live by myself” was one of entertainment and amusement programs broadcasted on MBC, Friday. So, users were able to get content through flow (1) as well as flow (2).

‘Replaying TV program’ > ‘Entertainment and amusement’ > ‘Weekly entertainment’ (1)

‘Replaying TV program’ > ‘MBC’ > ‘Entertainment and amusement’ (2)



**Fig. 10.** The access and conversion rate from contents on upper recommendation and middle category



**Fig. 11.** The access and conversion rate from hot-keys and home menu screen

It was possible for users to reach LG U<sup>+</sup> or Google service by selecting one of icons or ‘all applications’ icon on launcher bar at the bottom of home menu screen. Among these, users spent most time to watch Youtube service (Figure 12). They could watch contents from the list after they entered keyword, or to have an access to menu like ‘recommended’. It was dominant to watch Youtube service by predictive input (Table 4).



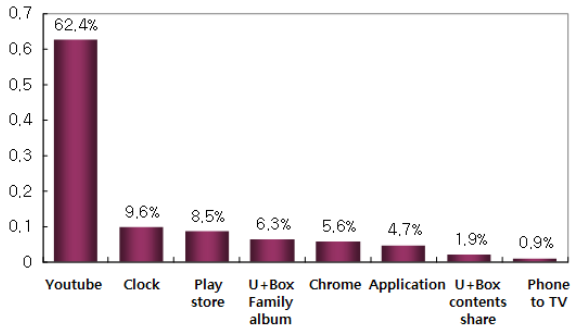


Fig. 12. The rate of time of using TV applications

Table 4. The rate of time of watching contents by searching methods

Methods	Rate
Predictive input	96.8%
Best menu	2.8%
Recommended menu	0.3%
Fully input	0.1%

## 5 Discussion

Since families with three members were almost just a couple with an infancy, VOD contents for kids were mostly seen at noon by housewife and her kid, and news was seen at night by housewife and her husband mostly. In other words, it was three members family who turned on the TV with longest hours and that might be the reason why their watching time was at the highest level.

Even though U<sup>+</sup> tv G provided many contents like Youtube or TV applications from Google play, users watched live TV program mostly. This is similar with the result of research which found out that even with smart TV, what people mainly use was to watch live TV program [8]. Users changed channels simply though there were many different ways to search it. Although channel recommendation on EPG which could be reached by OK button was supported for users, usage frequency of it was not much. It could be understood as a feature of lean back viewing condition.

According to log analysis, users changed channels for thirteen times on average and switched channels for three times except with channel UP or DOWN button. Channels on U<sup>+</sup> tv G are divided by each of genre such as terrestrial broadcast from five to thirteen, news from twenty three to twenty seven, movie from twenty nine to thirty eight, and sport from fifty to fifty nine. So, it could be deduced that users controlled to move a channel by number button and then switch channels for three times with channel UP or DOWN button. This was verified by FGD (3).

“Since sport channels are from number fifty to fifty nine, I first reach there and then search channels up and down.” (3)

Users did not concentrate on recommended contents on upper area of home menu screen. In case of contents of 'replaying TV program', they had already set to watch content before searching it. This was also checked by FGD (4).

"I have already set to watch a soap opera, so the important thing is to be sure what the last episode is." (4)

It might be right decision to provide various routes to access to VOD contents because the route of VOD content that each of users recognized was different.

People used to choose Youtube contents from the list after predictive input had been worked. It seems that this has no big difference with the case of smartphone. However, once a user had chosen content from the list, it kept showing next content automatically after chosen one had been over. This could be considered that user experience had been designed to optimize viewing contents on TV. Anyway, users spent most time to watch Youtube contents among whole services except live TV program and VOD contents.

From the result of research, some of the guidelines were drawn to consider designing user interface on the viewpoint of users. First, it was considered for users to change channels easier than before. With the list of start channels by genres, users could control to go to a channel in one of genres without pressing number button. Then, they were able to control to change channels easily by pressing channel UP or DOWN button. Second, it would be needed to replace contents on upper recommendation area of home menu screen because users had already set VOD contents in their mind and recommended contents was not noticeable to them.

## 6 Conclusion

This study has focused on viewer's usage behavior through log analysis on U<sup>+</sup> tv G. Although it was an IPTV which has attributes of smart TV, the time to watch live TV program accounted for ninety percent of total watching time approximately. Users just tried to change channels by pressing channel UP or DOWN button even though there were various ways to transfer channels by recommendation. People had an access to home menu screen after they had already set to view VOD contents and reached content in various routes. As a result, there were few cases to get contents on upper recommendation area of home screen. Users spent most time to watch Youtube contents except live TV program and VOD contents. And they searched contents by predictive input.

In this study, there is a limitation to comprehend viewers' actual usage behavior as the study was conducted for only nine days. However, the problem was supplemented by utilizing log analysis and FGD systematically. Additional research will be needed to find actual usage behavior for longer period by a qualitative research approach.

## References

1. Wikipedia, [http://en.wikipedia.org/wiki/Smart\\_TV](http://en.wikipedia.org/wiki/Smart_TV)
2. Thomas, N.: Making TV social. In: *The future of TV: Strategies for Becoming Connected, Social, and in the Cloud*, pp. 13–15. IP&TV World Forum (2012)

3. Smart TV Alliance, <http://www.smarttv-alliance.org/default.aspx>
4. Kim, M.: Comparison of usage pattern of contents by each of smart devices, KISDI stat report (2013)
5. Wilfinger, D., Pirker, M., Bernhaupt, R., Tscheligi, M.: Evaluating and investigating an iTV interaction concept in the field. In: Euro ITV 2009, pp. 175–178 (2009)
6. Vinayagamoorthy, V., Hammond, M., Allen, P., Evans, M.: Researching the user experience for connected TV - A case study. In: CHI 2012, pp. 589–604 (2012)
7. Nielsen, J.: Usability engineering. Morgan Kaufmann, San Francisco (1993)
8. Park, Y., Kim, M., Lee, K.: Analysis of proof of smart device usage behavior, Basic research. Korea Information Society Development Institute (2011)