Aiming to Build a New Service Mashup Platform on the Next-generation Web

Takashi Oka, Katsuhiko Kawazoe, Hideo Suzuki, and Hisashi Ibaraki

Abstract

A variety of services is available over the Internet, and these services have become a fundamental part of our life. The use of mobile terminals has exploded in the last few years, and ever wider arrays of services are being introduced throughout the world. HTML5 (hypertext markup language, fifth revision), the standard specification for next-generation web browsers, has been gaining much attention. These Feature Articles discuss the business impact of HTML5 and introduce examples of related NTT Group company activities and R&D initiatives.

1. Introduction

Over the past 10 years, telecommunications operators have expanded the content distribution business on their own networks. The NTT Group has provided many services in order to increase the value of the network for their customers. For example, the i-mode service provides digital content for cell phones via the i-mode network. The IPTV (Internet protocol television) service lets people enjoy broadcasts and movies on their home TV by connecting a set-top box (STB) to NTT's content delivery network (CDN). Thus, the content distribution business has grown as a value-added aspect of communication carrier networks ((a) in **Fig. 1**).

Today, however, the advances and spreading use of Internet technology have led to new businesses entering the content distribution market. For example, YouTube and Netflix distribute video over the Internet and have captured a large share of the market. These services, called over-the-top (OTT) video services, do not require their own network and, can therefore be easily used by anyone who has a device connected to the Internet. In recent years, the exponential increase in the number of mobile devices connected to the Internet, for example, smartphones and

tablets, has led to a new business area that involves selling the numerous applications created to run on those mobile devices. Companies such as Apple, Google, and Amazon are building their own vertically integrated business models by launching their own mobile devices and/or operating systems to execute the applications they sell ((b) in Fig. 1).

These OTT video services and mobile application services have changed the business model for content distribution services that had initially been led by the telecommunications operators. As mentioned above, the telecommunications operators provided those services as a value-added aspect of their networks. However, the OTT service companies and mobile application service companies do not need their own network and are taking the initiative in the content distribution market. This has changed the business model of telecommunications operators to one in which the operators are only able to provide network functions and are deprived of the added-value that other services bring by the OTT service companies. This kind of business model the telecommunications operators are experiencing is known as the *dumb pipe* model.

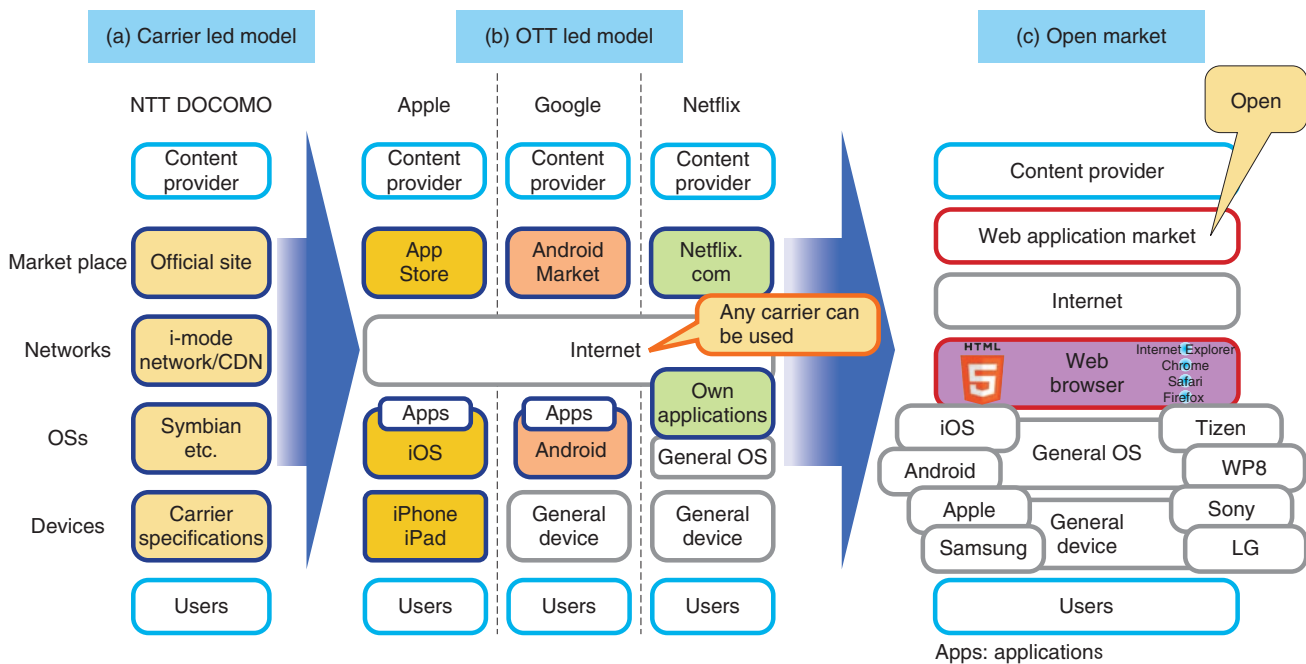Under these circumstances, many industries, not only the telecom industry but also the consumer

Fig. 1. Changes in content distribution resulting from HTML5.

electronics industry, broadcasters, publishers, and advertisers, are focusing their attention on the standardization of HTML5 (hypertext markup language, fifth revision) since this new standard has the potential to disrupt the current vertically integrated content distribution business model and to create a new market for content distribution on the next-generation web ((c) in Fig. 1).

2. Open Web Platform

HTML5 is the newest standard specification for next-generation web browsers and is being developed by the World Wide Web Consortium (W3C). The last version the W3C recommended was 4.01 in 1999, so HTML5 will be the first update in over a decade. The web platform was originally designed for sharing text documents over the Internet. The main purpose of standardizing HTML5 is to evolve the web platform to enable it to share a wider variety of applications over the Internet. To accomplish this, W3C is standardizing not just the markup language itself, which is the set of rules for handling text documents, but also functions for drawing graphics, playing multimedia files, communicating, and for accessing terminal devices (cameras, GPS (global positioning system), etc.) on a web browser (**Fig. 2**). When we

hereafter refer to HTML5, we mean all of these functions covered by the W3C standardization process.

In addition, W3C envisions the installation of HTML5-compliant web browsers not only in personal computers and mobile devices but also in a wide variety of other devices such as automobiles and home appliances. To achieve this, they selected the functions to be standardized in HTML5. Further, through these HTML5 standardization activities, the W3C is aiming to make the web browser an open platform for distributing content and applications. This *Open Web Platform* will make it easy to share a single content file on multiple types of devices (one-source multi-use), to use content by linking multiple devices (multi-device), and to overwhelmingly increase the number of customers that receive the content and applications (**Fig. 3**).

For example, applications that are currently provided for smartphones cannot be used on other devices such as personal computers (PCs). In the future, however, if an application is provided for a web browser on a smartphone, then it will be possible to use it on any device, for example, a tablet, PC, or TV installed with a web browser. This will not only reduce the effort required to adapt the content to each type of device, but will also greatly increase the market scale for supplying the content. From the user's
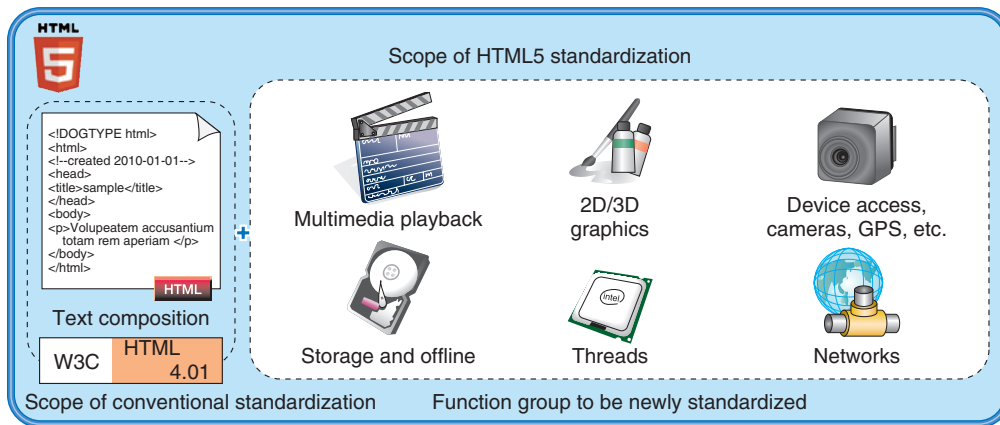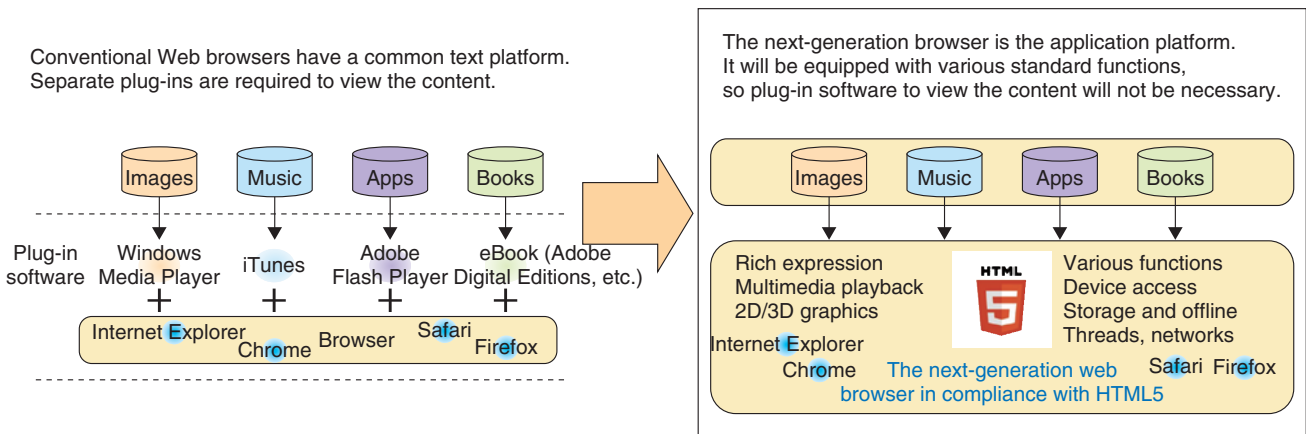
Fig. 2. Scope of HTML5 standardization.

perspective, this will improve the convenience of using the content since the users can enjoy it on any device desired. It is also expected to offer a new user experience where the users receive the content through multiple devices linked over the web.

3. Impact of HTML5

Achieving the Open Web Platform will weaken the vertically integrated business model, where OTT businesses have their own devices or operating systems; this will subsequently open up the content distribution market (Fig. 1(c)). Many companies around the world are focusing on this new platform as a new business opportunity and have begun undertaking new initiatives. In particular, telecommunications operators throughout the world have announced new projects to turn their business model around from a dumb pipe to a smart pipe model. For example,

AT&T announced it will establish a marketplace where applications created using HTML5 will be sold for any type of device. In addition, they opened up some of their proprietary technology such as network functions for billing and authentication, cloud functions for storage, voice recognition, etc., for applications developers to use for their applications. Their objective is to attract many users by improving the attractiveness of their marketplace by offering many desirable applications. Other companies are also undertaking a variety of activities in anticipation of the next-generation web with the objectives of establishing their own market on the Open Web Platform and creating new business opportunities.

In addition, the Open Web Platform will also greatly change the style of viewing conventional media such as TV. If next-generation web browsers are installed in both TVs and mobile devices, then it is expected to be easy to not only link multiple devices
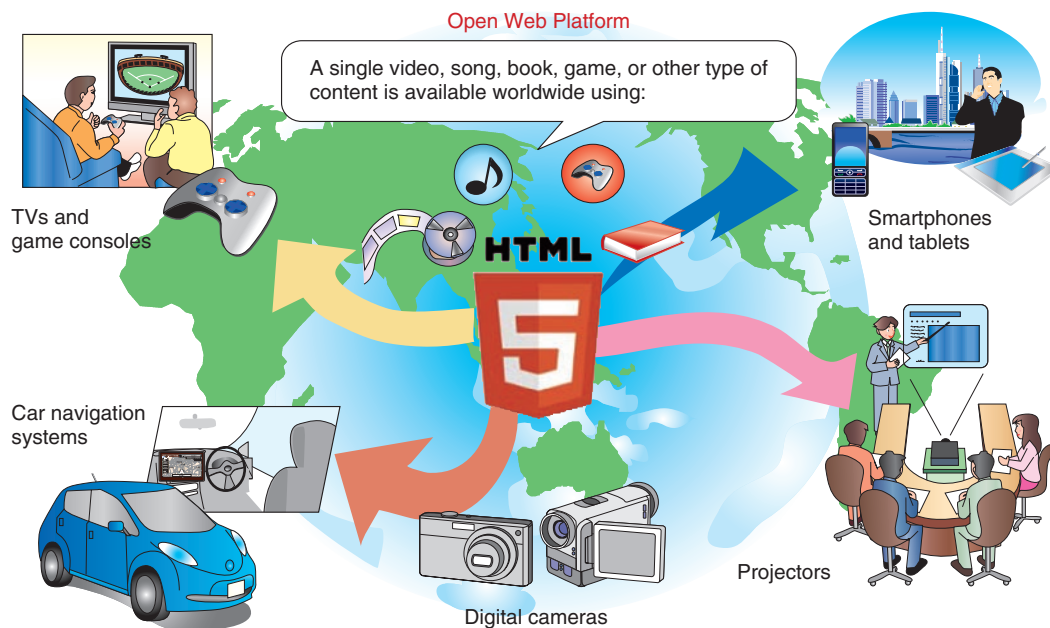
Fig. 3. The world of the Open Web Platform envisioned by W3C.

but also to link various types of content on the TV and on the web to create a new user experience. The technology for mobile devices has evolved a great deal recently, and very small, stick-shaped STBs have been introduced. Such technology will accelerate the installation of next-generation web browsers in TV terminals. This will in turn strengthen the impact that HTML5 makes on conventional media.

4. Building a new service mashup platform over the next-generation web

For the next-generation web, we think the NTT Group, as a telecommunications operator, will need to increase its presence in the open market to escape the dumb pipe business model, so we are suggesting three major policies to accomplish this. In this feature article, we introduce some examples of NTT Group activities in accordance with the respective policies.

4.1 Strengthen fundamental technology

The first policy is to strengthen the fundamental technology related to the distribution of content and applications over the next-generation web. We think this will require distinctive functions that other companies do not have. The development of the Open Web Platform will make it easy to link multiple devices or to mash up content and applications and thus make it possible to provide a more diverse range of services. However, it will make it more difficult from the user's perspective to find the desired services from among the huge number of services and devices existing on a single platform. Consequently, we need to establish appropriate links to the various devices and services and provide functions to users that match their preferences and circumstances (**Fig. 4**). If we realize this function, the user will be able to find the appropriate service via the appropriate device. In addition, the service providers will also be able to reach a large number of users via a wide range of devices, which will increase the value of the service as a platform.

NTT's R&D (research and development) laboratory group (NTT R&D) is already developing several elemental technologies in preparation for improving services on the next-generation web distribution infrastructure. For example, a *device-linking server system* can provide a new user experience where, for example, a smartphone can be used as a TV remote control. This system uses WebSocket, a function of HTML5, and enables multiple devices to be linked in real-time over the web. A *cross recommendation system* can provide the user with suitable suggestions gleaned from the massive number of services and products available on the web platform. When using a video distribution service, for example, users can
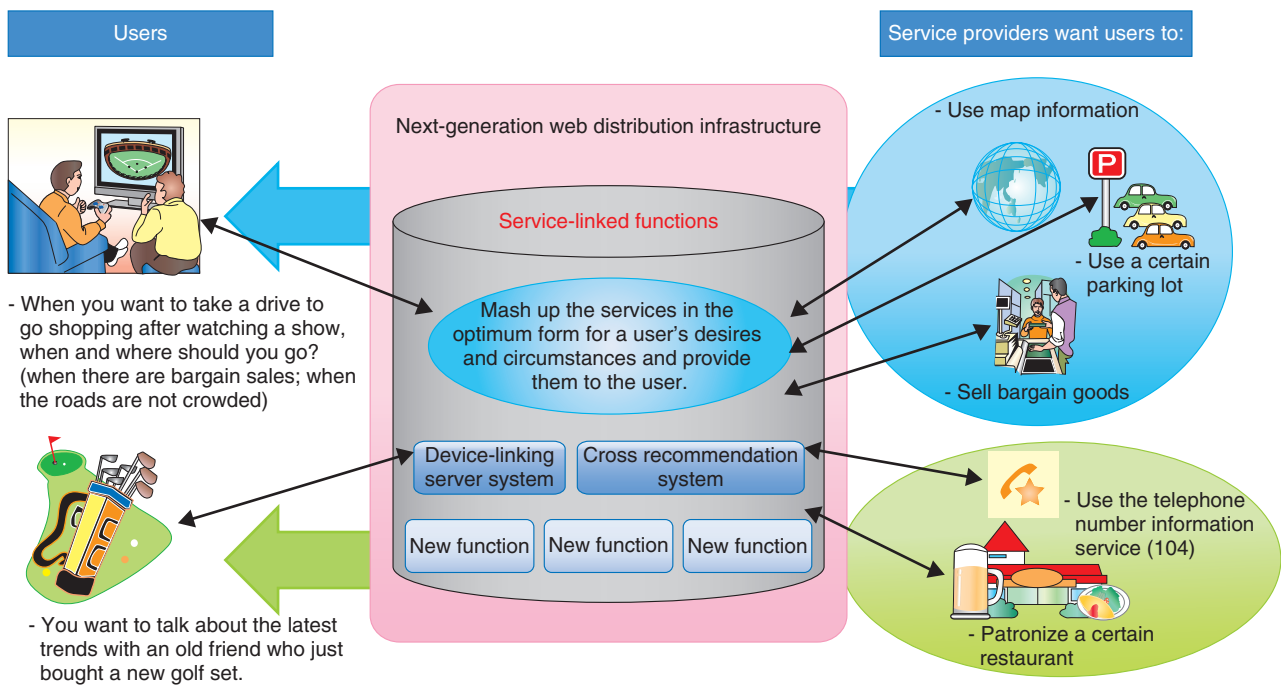
Fig. 4.   Illustration of the next-generation web distribution infrastructure.

get recommendations of products from an electronic commerce site linked to the videos the users are viewing, or they can receive notifications of applicable new services based on their service use history or web viewing history. In parallel with this, NTT is proceeding with more advanced elemental technologies. We introduce some of these research themes in the feature article in this issue entitled "Personal Information Style" [1].

4.2   Expand market share of consumer services

The second policy is to utilize the characteristics of the next-generation web in order to expand the market share of the various consumer services offered by the NTT Group. The NTT Group provides high-quality services such as a content distribution service for mobile devices and a video distribution service for fixed networks. We think the experience gained in operating these services and the expanded customer infrastructure resulting from these services will result in NTT becoming a major competitive force in the next-generation web. In addition, the merits of scale possessed by the next-generation web will lead to improvements in services and expansion of the market size. The article entitled "HTML5-related Activites of NTT Group" [2] gives specific examples of some of the activities NTT Group companies are

undertaking for the next-generation web.

4.3   Realize the Open Web Platform

The third policy is to create an open content distribution market that is easy to use for both the service users and the content and application providers. To do so, the Open Web Platform envisioned by W3C should be realized. The W3C standardization utilizes the method called a consortium standard where progress is made through the agreement of participating companies. In addition, this standardization process utilizes the proving ground concept where the web browser functions covered by the standardization are expected to be implemented in the market before they are recommended by the W3C as standard functions. Therefore, a wide range of participating companies should cooperate in order to achieve the open content distribution market. NTT has also participated in W3C standardization and has offered its opinions as a telecommunications operator regarding the standard functions. It should continue its activities aimed at realizing an open content distribution market. The article entitled "Standardization Trends in W3C Relating to Next-generation Content Distribution Services" [3] introduces examples of NTT R&D activities in the W3C.

5. Conclusion

HTML5 standardization exceeds the boundary of web browser technology specifications and will have a major impact on the content distribution market. We are focusing on this major development as a huge business opportunity, and as a telecommunications operator, we are working to enhance our presence in the content distribution market.

References

[1] S. Seko, M. Motegi, M. Ihara, T. Kobayashi, and R. Kataoka, "Personal Information Style," NTT Technical Review, Vol. 11, No. 4, 2013.
https://www.ntt-review.jp/archive/ntttechnical.php?contents=ntr201304fa4.html

[2] K. Yasunaga, S. Matsuno, and A. Matsuda, "HTML5-related Activities of NTT Group," NTT Technical Review, Vol. 11, No. 4, 2013.
https://www.ntt-review.jp/archive/ntttechnical.php?contents=ntr201304fa5.html

[3] S. Ishii, T. Watanabe, M. Ihara, and T. Kobayashi, "Standardization Trends in W3C Relating to Next-generation Content Distribution Services," NTT Technical Review, Vol. 11, No. 4, 2013.
https://www.ntt-review.jp/archive/ntttechnical.php?contents=ntr201304fa6.html

Takashi Oka
Chief Producer, R&D Produce Group, NTT Research and Development Planning Department.
Since joining NTT in 1991, he has been engaged in corporate planning, corporate sales and marketing, and developing technologies, etc. He assumed his present position in 2012 and has been engaged in producing services in the content field.

Katsuhiko Kawazoe
Executive Producer, R&D Produce Group, NTT Research and Development Planning Department.
He received the B.E. and M.E. degrees in engineering from Waseda University, Tokyo, in 1985 and 1987, respectively. Since joining NTT in 1987, he has mainly been engaged in R&D of radio communication systems, satellite communication systems, and the personal handy-phone system (PHS). His specialty is forward error correction systems. He is currently a co-chairman of the ARIB Working Group for Broadcasting Systems based on a Home Server. He received the Young Engineer's Award from the Institute of Electronics, Information and Communication Engineers (IEICE) in 1995. He is a member of IEICE. He moved to his current department in July 2008.

Hideo Suzuki
Executive Research Engineer, Supervisor, NTT Service Evolution Laboratories.
He received the B.E. and M.E. degrees in material engineering from Tohoku University, Miyagi, in 1984 and 1986, respectively. After joining NTT Communication and Information Processing Laboratories in 1986, he was engaged in R&D of optical information processing and a web-based collaborative learning system. From 2004 through 2006, he was a Senior Manager in the R&D Center of NTT EAST. In 2006, he joined NTT Network Service Systems Laboratories, where he was involved in an NGN service trial. He is currently engaged in R&D of a metadata platform system for IPTV and multimedia broadcasting services.

Hisashi Ibaraki
Director of NTT Service Evolution Laboratories.
He received the B.E. and M.E. degrees in electrical and electronics engineering from Kobe University, Hyogo, in 1982 and 1984, respectively. He received the D.E. degree in electrical engineering from the University of Tokyo in 1996. In 1984, he joined the Electrical Communication Laboratories, Nippon Telegraph and Telephone Public Corporation (now NTT), Kanagawa, where he has been engaged in R&D of still image and video coding, video communication systems, networked appliances. He is a member of IEICE, the Institute of Image Information and Television Engineers, and the Institute of Image Electronics Engineers of Japan.