

Standardization Trends in W3C Relating to Next-generation Content Distribution Services

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Abstract

The prices of liquid crystal displays and touch panels are continuing to decrease, and accordingly, the popularity of devices that use web browsers is increasing. These devices include smartphones, tablets, televisions, car navigation systems, e-book readers, and digital signage systems. There is also a growing transition towards open platforms that use web browser technology to further expand business activities and popularize services. This article introduces services designed for use with devices newly equipped with web browser functions, and reviews trends in the World Wide Web Consortium (W3C), which is the de facto standardization organization for web browser specifications.

1. Introduction

There are two main flows of standardization related to the use of networks to deliver content. One flow involves the expansion from telecommunication services into Internet-related services, and the other involves the expansion of broadcasting services. Telecommunication services began with audio only and then expanded to Internet protocol television (IPTV), which includes video, audio, and text.

Similarly, broadcasting started with radio broadcasts and then expanded to black and white TV, color TV, digital TV, and Hi-Vision TV. Recently, the two types of services have been combined in IPTV.

The principal devices for IPTV are TV displays that can handle full Hi-Vision. The market share of these TVs is expanding for products that have the same pixel count as personal computer (PC) displays. Some of the functions of TVs and PCs have begun to merge, whereas in the past, they were considered to be completely different products. As a result, volume efficiency has driven down the prices of full Hi-Vision liquid crystal panels, which are increasingly being used for purposes other than TVs or PCs.

2. Objectives and timing of standardization

As a general tendency, businesses must continuously reduce prices in order to maintain profits. Conventionally, even products that ensured a company's profits through the use of proprietary technology had to decrease in price annually for that company to retain its competitive edge. Incidentally, even products in which more generic components are combined are losing their competitive edge.

A strategy that is sometimes effective for companies that want to survive in the market is to actively participate in efforts to standardize specifications within their business field. They can generally improve productivity by adopting those specifications, which enables them to continue to secure profits. The relationship between market expansion and the lapse of time is shown as a hypothetical model of individual proprietary techniques and standard specification techniques in **Fig. 1**. Progress is not necessarily limited to this model; it depends on factors such as the market share of each business. However, this is seen to be an age in which the trend toward open sourcing is transitioning from individual proprietary techniques to standard specification techniques. Note

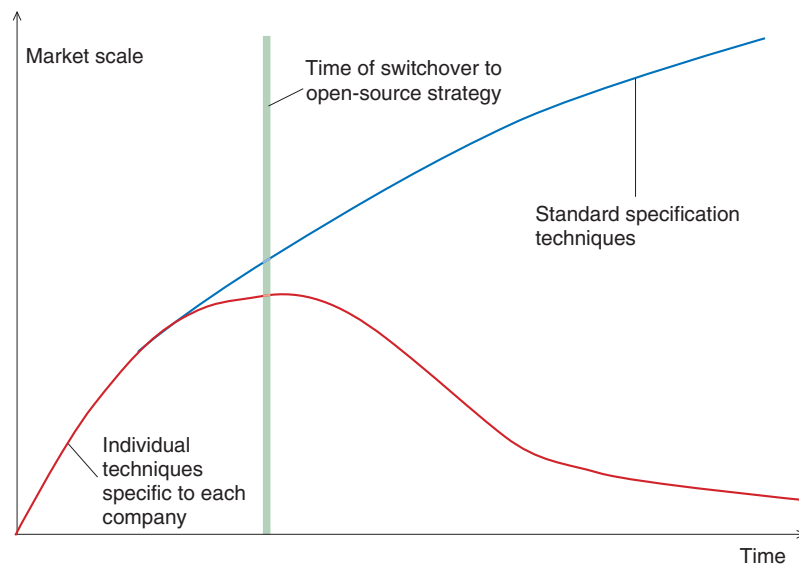


Fig. 1. Model of relationship between market expansion and time, focusing on open sourcing.

that since standardization has been necessary from the earliest days for services in which mutual connectivity between different companies' products is essential, e.g., telephones and data communications, this model does not apply to them.

Standardization can be divided into three main categories: *de jure standards* that give equality to the participating organizations of each country that contributes to standardization efforts. This category covers standards that are prescribed by international standardization organizations and requires basic compliance with recommendations. Another category consists of *de facto standards*, where organizations and businesses having the same standardization objectives have met together and generally agreed on standards, with the result that methods that have won acceptance through open competition make up a large share of the market. The third category is *alliances*, where a few companies have met together to maximize market share,

The World Wide Web Consortium (W3C) aims to draw up common specifications for web browsers [1]; it fits in the second category of a de facto standardization organization and currently has over 380 entities participating in it. NTT is actively promoting standardization relating to services for promoting content distribution and of browsers and communication functions installed in devices used for such services.

We comment below on trends in W3C based on

their relevance to the content distribution market.

3. Initiative towards W3C standardization challenges related to content distribution

The prices of liquid crystal displays and touch panels have continued to drop recently as a result of the volume efficiency of digital TVs and computer displays with touch panels. Consequently, smartphones, tablets, and e-book readers that can be directly operated by touch, without keyboards or remote controllers, are rapidly becoming popular. Other examples of display devices equipped with touch sensors are car navigation systems and electronic advertising media (digital signage) systems in locations such as large shopping malls and transportation stations. The capabilities of these devices in addition to their inherent basic functions can be expected to expand when browsers are installed in them.

At the time the W3C was launched, the main target for standardization was browsers used in PC displays. However, the use of browsers is spreading to the following communication devices [2]:

- Smartphones and tablets
- TVs with web browsers
- Car navigation systems
- e-Book readers
- Digital signage (electronic advertising media)

The HTML5 (hypertext markup language, fifth

Table 1. Standardization topics related to content distribution.

Standardization Group	Main standardization details
Device APIs WG	Web Intents etc. to implement interaction between a number of devices
CSS WG	Style sheets for implementing the representation of a variety of writing styles, including vertical writing etc.
SVG WG	SVG to implement the compression and expansion of high-quality images etc.
Geolocation WG	Use of position information from GPS
Web RTC WG	Handling from web application data from sensor devices such as cameras and microphones, and use of data communications between host and other terminals
NFC WG	Communication between devices using proximity ICs

API: application programming interface
 CSS: cascading style sheets
 IC: integrated circuit
 NFC: near-field communications

RTC: real-time communications
 SVG: Scalable Vector Graphics
 WG: Working Group

revision) framework is also progressing to enable users to browse web pages, even when using platforms from different browser developers. It is thought that the use of a common rendering feature in browsers will bring about changes even in business formats that provide and use content.

To cope with this trend, the W3C established a place where relevant personnel such as service providers could exchange opinions and viewpoints concerning required browser functions, including those related to the aforementioned business schemes, instead of just drawing up standardization specifications centered on specialist technicians, as was done in the past. Approximately two years ago, a study began on the implementation of TV services on TV displays that have browser functions [3].

Another study that started in April 2012 concerning the application of TV displays for electronic advertising display apparatuses is investigating the possibility of such applications from business use cases [4].

4. Standardization topics relevant to communications services

We give an overview here of the effects of W3C’s browser specifications on devices having the previously described communication functions, and we explain the current investigation status in W3C.

Browser functions are new additions to devices that already had their own inherent functions (such as telecommunication functions in smartphones). No special synergistic effect will be achieved by simply having the browser functions and the functions inherent to the devices acting as independent services. It will be possible to implement expanded and novel

fusion services by adding functions that enable interaction between the inherent functions and the browser functions. A number of W3C standardization topics that are relevant to content distribution are listed in **Table 1**.

Let us take smartphones as an example; applications running on the Android operating system (OS) and on iOS (Apple’s mobile OS, previously known as iPhone OS) are not compatible, but certain advantages are enabled when the service providers collaborate in developing functions that run on web browsers. If it becomes possible for a browser to make use of the positional information from a GPS (global positioning system), which is a function provided in many smartphones, as a web browser function, we can expect to achieve synergistic effects that could not be obtained with the telecommunications function alone. For example, the user could acquire the current position of a shop of interest by using such positional information and could then phone that shop. The points of standardization for each type of device provided with communications functions are given below.

4.1 Smartphones and tablets

The greatest feature of smartphones and tablets is that they can be used in various locations both indoors and outdoors. For example, they can be used while the user is at home, at school or the office, or while out walking, which makes them extremely accessible communication devices. Functionally, they can handle communication in the form of video, audio, and data.

The use of smartphones has increased significantly in just the past few years, and as a result, the use of

browsers in devices other than PCs has also greatly increased. In particular, liquid crystal screens with built-in touch sensors have made it possible to specify a location on the screen and to use software keyboards. This helps to achieve an operating feel close to that of a PC, enables a flexible screen layout, and ensures that many of the input functions that can be used with a PC can also be used on a smartphone. This means that the browser functions that were originally designed primarily for PCs can be implemented in smartphones and tablets, allowing users to easily carry and use them outside. This makes it easy for users to search for information in the vicinity of their current location.

Discussions in the W3C have been expanded to include non-PC browsers and are currently intensifying and becoming more specific. Other devices that are expected to interact with TVs or the like, as described later, are also becoming very important devices in this field.

4.2 TVs equipped with web browsers

TVs equipped with web browsers are designed to receive video services of TV broadcasts and IPTV services in the home. To ensure that functions that previously required hardware such as TV receivers or dedicated reception boards can be handled in a browser, it is necessary to modify the user interface. This requires an interface that differs from the traditional TV remote control. There are also other challenges to meet such as content protection and replacing functions that once used hardware with browsers or software that interacts with them, based on delivery techniques that differ from multicast protocols on the web.

4.3 Car navigation systems

The use of car navigation systems is expected to expand greatly in the future. It is becoming possible to make use of communications functions and position information notification functions related to the functions for route-searching and congestion information notification that are the main purposes of car navigation systems. These functions have the potential to provide not only guidance on traffic and retail premises in the vicinity of the current travel location, but also to display travel safety information and the results of information processing from multiple sensors. For example, these sensors might be installed in GPS devices and cameras in order to determine the state of the road surface and of other traffic; collecting their data would complement driver performance.

It is thought that setting and installing a screen display layout for each of these functions and using a browser with generic display functions will be effective for implementing these functions.

In November 2012, a workshop was held to investigate methods of using in-vehicle displays in the future and was centered on major international automobile manufacturers [5]. The work of the discussion group from this workshop has started in earnest.

4.4 e-Book readers

In the field of book publishing, an expansion and shift toward the e-book reader market is predicted. Book readers that have been released up to the present have been dedicated devices from each manufacturer. However, Wi-Fi functions and browsers are now being installed as additional functions in e-book readers, and browser access functions are beginning to appear. This suggests that the barrier between e-book readers and tablet PCs will eventually cease to exist.

In addition, the vertical writing and kanji-reading text include ruby markup (called furigana in Japan) that are often seen in printed matter in Japan could not be displayed in browsers in the past. However, since it is hoped that e-book readers will be able to handle such text, they are increasingly being included in compliant browser specifications.

4.5 Digital signage (electronic advertising media)

One side effect of the drop in prices of liquid crystal TVs that can handle Hi-Vision is that digital signage using TV displays is starting to increase in outdoor advertising and guidance displays. Currently, animation and audio can be used on electronic signboards created from arrays of multiple TV displays in tile form or kiosk terminals. In the future, it will be possible to use a browser to implement functions equivalent to content that was once created for individual systems, by using functions such as those for communicating with portable devices or the like. Browser-based signage systems will also simplify the reciprocal use of content and can be expected to reduce the cost of producing content [6].

5. Future developments

As liquid crystal displays and touch panels drop in price, the trend towards implementing web browsers in devices continues to grow. These devices are not limited to PCs but include other devices and services such as smartphones, tablets, TV services, car

navigation systems, e-book readers, and digital signage systems.

It will be important in the future to plan transition timing to an open-sourcing strategy and create an accompanying standardization framework beforehand. The NTT Group is actively promoting the standardization of services that use communication functions tailored to open-source browser platforms or to browser functions used in devices.

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