

Standardization Trends Relating to Smart TV

Kiyoshi Tanaka

Abstract

Smart TV (television), which implements advanced TV services, has been receiving a lot of attention throughout the world recently. Standardization of smart TV as technology relating to receivers and services is underway by both the International Telecommunication Union and the World Wide Web Consortium. These standardization trends are explained in this article.

Keywords: smart TV, IPTV, Web and TV

1. Introduction

Smart TV (television) has recently become a popular topic with electrical appliance retailers and in the media such as newspapers and magazines. It is instinctively understood that smart TV is an enhanced version of what we call TV, but the emphasis depends on the standpoint as to whether TV receivers themselves should be enhanced or whether TV broadcast services should be enhanced. In other words, the former standpoint is mainly held by TV receiver manufacturers who sell their own smart TVs. It concerns the addition of functions to TV receivers by installing a variety of applications in them, similar to the way smartphones are enhanced mobile phones. The latter standpoint tries to diversify program delivery services by combining broadcast services and communication services, for example, Hybridcast^{*1}, a broadcast service that started in Japan in September 2013.

What does Internet Protocol TV (IPTV), which implements broadcast services on IP networks, have to do with smart TV? According to the definition of IPTV given by the International Telecommunication Union (ITU) [1], IPTV is defined as “multimedia services such as television/video/audio/text/graphics/data delivered over IP based networks managed to provide the required level of QoS/QoE (quality of service/quality of experience), security, interactivity and reliability.” On the basis of this definition, the services that will implement smart TV are expected to

be handled the same way IPTV services are handled. That is why there have been discussions at the ITU on the relevance to IPTV of the standardization of smart TV.

A recent development is the increasing use of web technology to provide video delivery services over the Internet in response to the conversion of access lines to broadband and the increasing speeds of the Internet. In June 2012, the basic strategy towards the promotion of smart TV [2] was published by the Ministry of Internal Affairs and Communications to promote smart TV as a new service that combines broadcasting and the web. The objectives are to fulfill three basic functions: combining broadcasting and the web, providing a wide range of applications and content, and establishing links between terminals, and also to exploit these basic functions to the maximum extent in order to increase user-friendliness and broaden user options, and to expand the market. However, the key to all this is thought to be web technology, starting with HTML5 (Hypertext Markup Language, 5th revision). From these viewpoints, attention is drawn to web technology relating to HTML5, and its standardization is centered on the World Wide Web Consortium (W3C).

We will now introduce trends in standardization

^{*1} Hybridcast: TV service that brings together broadcasting and broadband networks; standards are being drawn up by the IPTV Forum in Japan.

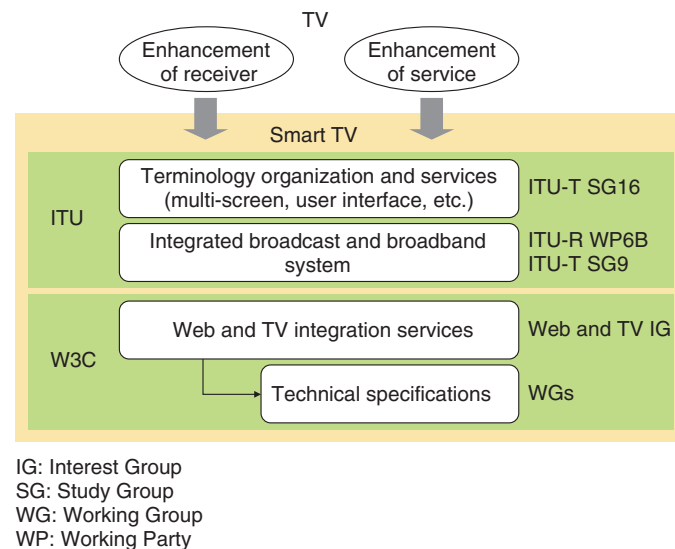


Fig. 1. Standardization of smart TV.

relating to smart TV in the ITU and W3C (see **Fig. 1**).

2. Standardization relating to smart TV by ITU

2.1 Studies by leading IPTV groups

In the ITU-Telecommunication Standardization Sector (ITU-T) Study Group (SG) 16 (multimedia coding, systems, and applications), investigations relating to IP-based TV-related multimedia services, including smart TV, were added to the Terms of Reference of question Q13/16, which concerns multimedia application platforms and end systems for IPTV, in the new session that began with a meeting in January 2014. To that end, Q13/16 prompted the start of investigations of terminology, since many services that resemble smart TV are provided around the world.

The ITU-T draft technical paper HSTP.IPTV-Gloss^{*2} is a technological document that was drawn up with the purpose of clarifying and compiling terminology, and section 7.2 covers smart TV. In the current description, features such as “a new hybrid terminal device reflecting the current trend of applying Internet and Web 2.0 technologies to television sets and set-top boxes” and “social networking, games, interactive advertising, and IPTV as well as traditional broadcast TV channels” appear, but the parts relating to terminals and services are seen as expansions of IPTV.

Note that with Q13/16, recommendations for IPTV multimedia services are created in harmony with

ISDB-T^{*3} (Integrated Services Digital Broadcasting-Terrestrial) standards. The upstream activities of specifications of the IPTV Forum in Japan have been achieved by Japanese participants who are playing a central role. This means that the ITU-T standards have been developed with a strong correlation with the broadcast standards of Japan. Recently, a Q13/16 discussion has shifted to work items related to multi-screen, multi-device services focused on by China, and to enhanced user interfaces such as voice recognition, gesture inputs, and touchpad controls other than remote controls, focused on by South Korea. However, there are calls for an assessment of future trends from the viewpoints of conformity with Japanese standards and the effects on new services.

2.2 Standardization from the broadcast viewpoint

When smart TV is viewed with a focus on broadcasting, its aspect as an integrated service of broadcast and broadband networks becomes stronger. From that viewpoint, recommendations relating to the Integrated Broadcast-Broadband digital television system (IBB system) are in progress in Working Party (WP) 6B (Broadcast service assembly and access) under

*2 HSTP.IPTV-Gloss: Technical Paper: Glossary and terminology of IP-based TV-related multimedia services.

*3 ISDB-T: Terrestrial digital TV broadcast standards drawn up by the Association of Radio Industries and Businesses (ARIB), which is used in terrestrial digital broadcasting within Japan and other countries.

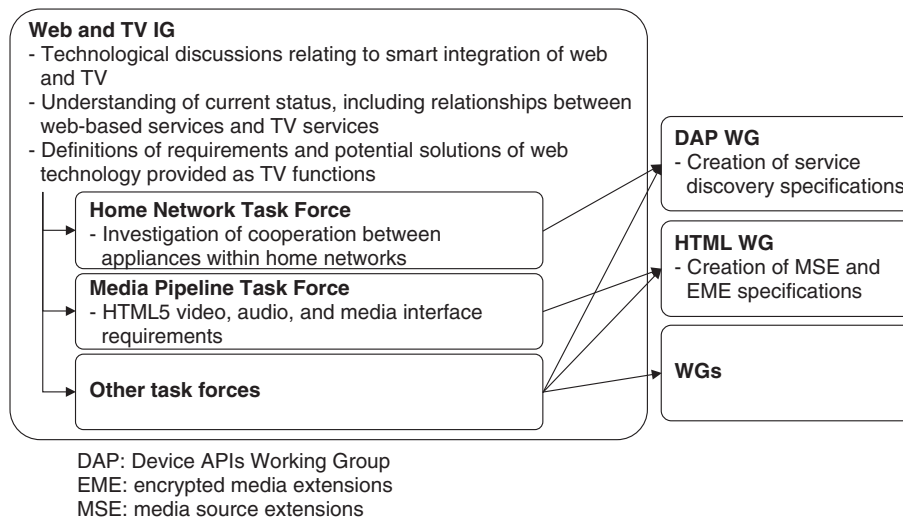


Fig. 2. Relationships between Web and TV IG and WGs.

SG6 (Broadcasting service) of the ITU-Radio Communication Sector (ITU-R) and ITU-T SG9 (Broadband cable and TV). In ITU-T SG9, ITU Recommendation J.205 on the system requirements was consented in January 2012, and ITU-T Recommendation J.206, related to architecture, was consented in January 2013. In ITU-R WP6B, a draft new recommendation for the requirements of an IBB system corresponding to ITU-T recommendation J.205 was drawn up, and at a meeting in October 2012, information related to various IBB systems was collected, and a work item toward a new report was drawn up. At a meeting in April 2013, a proposal from Japan to include Hybridcast services in the report was submitted and it was included in the report ITU-R BT.2267 together with information on the Broadcast Markup Language (BML) Type 2, which is used in Japanese terrestrial digital broadcasting. This was issued in August 2013.

3. Discussions relating to smart TV in W3C

3.1 Web and TV

W3C discussions relating to smart TV were vigorous in the first workshop held in Tokyo in September 2010; these discussions concerned studies related to services that integrate the web and TV. The participants at this meeting were stakeholders with various standpoints such as telecom operators, broadcasters, and manufacturers. The constitution of a Web and TV Interest Group (IG) for the discussion of technologi-

cal requisites and the relationships between web-based services and TV services was agreed upon. As a result of this constitution, the second workshop was held in Berlin in February 2011, where it became clear that it was necessary to investigate areas such as cooperation between appliances within home networks, adaptive bit rate streaming, and content protection. The third workshop was held in Hollywood in September 2011, where content providers and service providers mingled, selected topics from their own viewpoints, and pitched their implementation through demo sessions. Through these workshops, task forces (TFs) were set up within the group, and studies into use cases and requirements proceeded (Fig. 2).

3.2 Investigations

Details of the main investigations conducted by TFs are introduced as follows.

(1) Home Network Task Force (HNTF)

Multi-screen scenarios involving the use of a number of screens within the home, for example, TVs and tablets, have been studied, but it is still necessary to discover and manage devices and services within local home networks. Since gap analysis of existing technology is required, the HNTF has been discussing various use cases in consideration of factors such as Universal Plug and Play (UPnP)^{*4} and APIs

^{*4} UPnP: Protocol for cooperation between network devices, established by the UPnP forum.

specified by CableLabs, a non-profit research and development consortium. During this time, they studied topics including the discovery of services and content, the control of content players and recorders, content protection, and security and privacy, and a requirements document [3] was drawn up. Since the IG of the W3C only implemented requisite investigations, the drawing up of concrete specifications was implemented by a working group (WG), but discussions relating to these requirements, such as an investigation of service discovery APIs by the Device APIs WG (DAP WG), have continued.

(2) Media Pipeline Task Force (MPTF)

This task force was set up with the objectives of investigating the requirements for HTML5 video, audio, and media interfaces, and proposing APIs for them, in order to implement services that bring together the web and TV. The MPTF discussed studies concerning the insertion of advertisements, event synchronization, and requirements such as audio sub-channels and closed captioning, in order to implement each country's regulations and also transfer the existing TV services required by consumers onto HTML5 browsers. They also collected the requirements for adaptive bit rate streaming [4] and content protection [5] to ensure that content can be delivered

stably and securely, even on networks that cannot guarantee reliability, such as the Internet. These requirements are linked to discussions of specifications such as those of media source extensions (MSE) and encrypted media extensions (EME) by the HTML WG.

4. Future expansion

As the standardization relating to smart TV in the ITU and W3C continues, it seems that interest in smart TV will increase throughout the world. In Japan, the provision of full-fledged smart TV services is expected in the near future.

References

- [1] Recommendation ITU-T Y.1901: "Requirements for the Support of IPTV Services," Geneva, Jan. 2009.
- [2] News release of the Ministry of Internal Affairs and Communications (MIC) (in Japanese).
http://www.soumu.go.jp/main_sosiki/joho_tsusin/hyojun/smart.html
- [3] W3C, Requirements for Home Networking Scenarios.
<http://www.w3.org/TR/hnreq/>
- [4] W3C, MPTF Requirements for Adaptive Bit Rate Streaming.
<https://dvcs.w3.org/hg/webtv/raw-file/tip/mpreq/adbreq.html>
- [5] W3C, MPTF Requirements for Content Protection.
<https://dvcs.w3.org/hg/webtv/raw-file/tip/mpreq/cpreq.html>



Kiyoshi Tanaka

Senior Research Engineer, Supervisor, Service Harmonization Project, NTT Service Evolution Laboratories.

He received the B.E., M.E., and Ph.D. in communication engineering from Osaka University in 1992, 1994, and 2005, respectively. He joined NTT in 1994 and since then has been engaged in research on video-on-demand systems and metadata-related interactive video systems and services, especially those related to IPTV systems and services. His current interests include standardization of IPTV, digital signage, and multimedia broadcasting for mobile devices. He joined the standardization efforts of ARIB STD-B38 (v2.1, 2.2, and 2.3), STD-B45 (v2.0), and TR-B33 as an editor. He has also contributed to ITU-T's international standardization efforts, mainly in ITU-T SG16 and IPTV-GSI. He is a member of W3C Web and TV IG, the Institute of Electronics, Information and Communication Engineers, and the Human Interface Society in Japan.