

## Recent Activities of the TV-Anytime Forum

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### Abstract

The TV-Anytime Forum is a standardization organization that is specifying open standards for global content distribution services in which broadcasting and telecommunications work together to enable the viewer to watch programs anytime and anywhere. This article describes recent activities of the TV-Anytime Forum and its specifications, which have recently been adopted by the European Telecommunications Standards Institute.

### 1. Introduction

Hard-disk drives (HDDs) have been growing ever larger and their market prices ever lower. In 2000, a 10-GB HDD (able to store approximately 4 hours of 6-Mbit/s content) sold for \$100, but in 2005 the same price gave consumers an HDD that could store 100 hours of 6-Mbit/s content. HDD size has been doubling every ten months, so a simple extrapolation predicts that in 2010, \$100 should buy a 16-TB HDD that can store all the TV programs on 7 channels, 24 hours a day for a whole month. Such a massive HDD will require a correspondingly huge-capacity network to deliver the content. Under these circumstances, it is irrelevant to the viewer whether he/she is watching programs in real time via broadcasting or on-demand content delivered either via a video-on-demand service or from storage. One can view TV programs anytime one wants.

### 2. What is the TV-Anytime Forum?

The TV-Anytime Forum [1] is an international consortium dedicated to specifying technical standards for new TV broadcasting services within the context of the convergence between broadcasting and telecommunications. The Forum started as a successor to DAVIC (Digital Audio Visual Council), which

was an industry standardization organization specifying protocols and interfaces for multimedia interactive service, such as video on demand. The Forum's goal for standardization has been to specify standards for interoperable distribution of multimedia content in broadcasting and communications based on large-volume storage and the Internet.

The current members include broadcasters such as the European Broadcasting Union, the BBC, NHK, NTV, TBS, FujiTV, and BSkyB; media companies like Disney, Nielsen, Dentsu, and Hakuhodo; manufacturers such as Sony, Panasonic, Toshiba, Sharp, Samsung, LG, Philips, Thomson, and Motorola; and computer/communications companies like Microsoft, NTT, and France Telecom. Membership hit a high of more than 200 companies, and there are currently about 60 paid-up member companies.

The Forum produces not only specifications for systems based on storage functions, but also for system models covering the whole value-chain including content creation, transmission, the delivery network, and integrated receiver terminals. It aims to provide standards for general content distribution services that integrate, using storage capability, broadcasting and telecommunications, allowing users to enjoy content anytime, anywhere. One of the Forum's policies is to create open standards for a horizontal market. For that purpose, the Forum takes interoperability with other standardization bodies very seriously, and it has liaison relationships with various organizations, such as MPEG (Moving Picture Experts Group), SMPTE (Society of Motion Picture and Tele-

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vision Engineers), and ARIB (Association of Radio Industries and Businesses) for video-and-broadcasting-related standards, as well as W3C (World Wide Web Consortium), OASIS (Organization for the Advancement of Structured Information Standards), and the Liberty Alliance.

### 3. Activities of the TV-Anytime Forum

After its formation in 1999, the TV-Anytime Forum set up its Memorandum of Understanding and its policy on intellectual property, acquired a not-for-profit organization status in the state of Delaware in the USA in December 2001, and established the governing body of the Forum.

The standardization work is conducted in the following groups. The governing board decides on the direction of the Forum as a whole. The service requirements and business models are specified by the Business Models Working Group. The Systems, Transport Interfaces and Content Referencing Working Group specifies the reference model of the TV-Anytime system and guidelines for implementation and operation. The Metadata Working Group specifies metadata to be used in the TV-Anytime system. The Rights Management and Protection Working Group defines the content protection mechanism and the rightful use of content. In addition to these working groups, a task force group is working with IETF (Internet Engineering Task Force) to register the TV-Anytime in IETF so that the specifications will be incorporated into the general framework of the Internet.

In 2002, in order to release specifications in a timely manner, the Forum froze its Phase 1 specifications, which mainly concern the broadcasting (unidirectional) aspects of the standards. At the same time, the first calls for requirements for the Phase 2 specifications were made in March 2002, followed by calls for technical contributions in August 2002, which further advanced the specification activities. The final version of the Phase 2 specifications was published in August 2005, and the Forum now is moving ahead to the next phase.

### 4. Specifications of TV-Anytime Forum

The TV-Anytime Forum has been concentrating on three main areas that are important for anytime viewing of programs. One is standardized metadata (syntax and semantics) for both broadcast and Internet content. The second is specifications for content ref-

erencing that allows uniform management and resolution of identifiers and locations in broadcasting and Internet content. The third is Rights Management and Protection (RMP) technology that provides secure content delivery. These technologies are important for TV-Anytime Forum's policy that its specifications should enable interoperability in a network-transparent manner.

While Phase 1 is mainly devoted to unidirectional, broadcasting aspects of the TV-Anytime model, Phase 2 is more concerned with broader aspects such as bidirectional services, interactivity, rich content (including *karaoke*), and mobile services. Since the TV-Anytime Forum, as an industrial consortium, is not a suitable organization for maintaining specifications for a long period of time, it proposed its Phase 1 specification to the European Telecommunications Standards Institute (ETSI) [2], which adopted it as its technical specification entitled "Broadcast and Online Services: Search, select, and rightful use of content on personal storage systems (TV-Anytime)" (ETSI TS 102 822). The ETSI specifications are listed in **Table 1**.

### 5. Relationships with other standardization bodies

Besides ETSI, the DVB (Digital Video Broadcasting) Project, which is a European standardization organization for digital television, has also adopted the TV-Anytime Forum specifications in its various standards. In Japan, ARIB adopted the TV-Anytime specification in February 2004 and published it as ARIB-STD-B38 "Coding, Transmission and Storage Specification for Broadcasting System Based on Home Servers", the standard for home-server-based broadcasting.

The TV-Anytime Forum has also been working with IETF, and as a result, the prefix "tva" is currently registered as a namespace in IETF. The string "crid", which stands for "content reference identification" [4], has also been registered as one of its URI (uniform resource identifier) schemes, on a par with http, ftp, and others [5].

### 6. Real services based on TV-Anytime specifications

The broadcasters and manufacturers in the UK and some other European countries set up in 2004 a consortium called "TV-Anytime Testbed" that experiments with the implementation of the DVB flavor of the TV-Anytime specifications. Since then, it has been

Table 1. ETSI specifications for TV-Anytime.

1	ETSI TS 102 822-1	Benchmark Features
2	ETSI TS 102 822-2	System Description
3	ETSI TS 102 822-3-1	Metadata: Metadata Schemas
4	ETSI TS 102 822-3-2	Metadata: System Aspects in a Uni-directional Environment
5	ETSI TS 102 822-3-3	Metadata: Phase 2 Extended Metadata Schemas
6	ETSI TS 102 822-3-4	Metadata: Interstitial Metadata
7	ETSI TS 102 822-4	Content Referencing
8	ETSI TS 102 822-5-1	Rights Management and Protection (RMP): RMP Information for Broadcast Applications
9	ETSI TS 102 822-5-2	Rights Management and Protection (RMP): Binding of Rights Management and Protection Information
10	ETSI TS 102 822-6-1	Delivery of Metadata over a Bi-directional Network: Service and Transport
11	ETSI TS 102 822-6-2	Delivery of Metadata over a Bi-directional Network: Service Discovery
12	ETSI TS 102 822-6-3	Delivery of Metadata over a Bi-directional Network: Exchange of Personal Profile
13	ETSI TS 102 822-7	Bi-directional Metadata Delivery Protection
14	ETSI TS 102 822-8	Interchange Data Format
15	ETSI TS 102 822-9	Remote Programming

actively testing various aspects of the specifications in order to ascertain its viability. Actual services are expected to start in 2007. In response to this, Germany and Scandinavian countries are also working toward actual services. In Japan, major broadcasters and manufacturers have set up a consortium that will define the implementation specification for the deployment of TV-Anytime services, i.e., server-based broadcasting, which is targeted at the year 2007.

### 7. Activities of NTT

NTT has been active in the Forum since its early days and has been playing an influential role. In both Phase 1 and Phase 2, NTT took the initiative in specifying some of the documents. In Phase 2 in particular, the document "Exchange of Personal Profile" (ETSI TS 102 822-6-3) is based on a proposal that NTT contributed through the liaison relationship with the Liberty Alliance [6]. This specification is also based on the Liberty Alliance and is an important standard from the standpoint of interoperability between broadcasting and communications. Moreover, NTT contributed much, through documents and leadership, throughout Phase 2, and this was recognized by the Forum, which gave awards to the mem-

bers from NTT in 2005.

### 8. TV-Anytime Forum from now on

Now that the specifications of Phase 1 and Phase 2 have been completed, the focus of TV-Anytime activities is shifting to more regionalized activities, including implementations and businesses based on the specifications in various regions. In Europe, the TV-Anytime European Users Group has officially been organized and is very active in its preparation for the deployment of the specifications and in promotion efforts and negotiations concerning the licensing of the TV-Anytime specifications. These negotiations are open to members from other areas. Elsewhere, members from Japan and Korea organized a preparatory meeting for TV-Anytime Asia-Pacific in Tokyo in October 2005. Some of the issues expected to be actively discussed in the TV-Anytime Asia-Pacific included regionally relevant topics such as characters and languages as well as adaptation to various cultures. Moreover, because of the rapid growth of mobile and broadband services in this region, the profiling of the specifications to meet the needs of these specific services is deemed important and urgent.

## References

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- [1] <http://www.tv-anytime.org>
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After joining in 1989 the Information Science Laboratory, NTT Basic Research Laboratories, he has worked in research areas such as artificial intelligence, language processing, and interactive agents using speech recognition. His current research areas are media delivery for broadcasting and broadband communications, metadata and rights language, and the convergence of mobile and fixed communications services. Since 2000, he has been the leader of the Metadata Task Group of the Business Working Group for Broadcasting Systems based on a Home Server, the Association of Radio Industries and Businesses (ARIB), which has been instrumental in specifying ARIB-STD-B-38. He is also a convener of the TV-Anytime Forum, chairing the Metadata Working Group.

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