

IPTV Interoperability Events at ITU-T

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Abstract

This article reports the results of the first Conformance and Interoperability Testing event for IPTV (Internet protocol television) hosted by ITU-T (International Telecommunication Union, Telecommunication Standardization Sector) in Geneva (July 2010), the second event in Singapore (September 2010), and the third event in Pune, India (December 2010).

1. Background

IPTV (Internet protocol television) is expected to become a promising service and global standardization is making progress. IPTV standards produced by ITU-T (International Telecommunication Union, Telecommunication Standardization Sector) are based on various services including NTT Plala's Hikari TV service, which started in March 2008. Many Japanese companies, including NTT, are participating in ITU-T's IPTV-GSI (Global Standards Initiative), which is contributing greatly to the global standardization of IPTV. This was much appreciated by ITU, which decided to hold events that would promote conformance to Recommendations and interoperability among the implementations of those Recommendations in order to enhance the quality of ITU-T's IPTV standards. This is a remarkable decision in ITU-T's long history of standardization, and the first Interop event was considered especially significant. This article reports the results the first Conformance and Interoperability Testing (CIT) event for IPTV hosted by ITU-T in Geneva (July 2010), the second event in Singapore (September 2010), and the third event in Pune, India (December 2010).

At the World Telecommunication Standardization Assembly (WTSA), held in October 2008 in Johannesburg, the Republic of South Africa, a resolution was proposed and adopted as Resolution 76 "Studies related to conformance and interoperability testing, assistance to developing countries, and a possible future ITU Mark Program" at the request of the

developing countries. It states that ITU-T Study Groups should develop the necessary conformance testing Recommendations for telecommunication equipment as soon as possible and that ITU-T Recommendations to address interoperability testing shall proceed as quickly as possible. On the basis of this resolution, Japan proposed to develop a draft Recommendation for CIT. This contribution was discussed in Study Groups SG11, SG13, and SG16 and resulted in the creation of Joint Coordination Activities of Conformance and Interoperability Testing (JCA-CIT). Following this move, during the IPTV-GSI events, Question 13 of SG16 (Q13/16) drafted CIT Recommendations. At the IPTV-GSI event held in January 2010, it was agreed that the first CIT event (called Interop) would be held in July 2010 in Geneva. At the IPTV-GSI event in May 2010, companies were invited to participate in the upcoming event. To prepare for the first Interop event, Q13/16 had an electronic meeting almost every week until July 2010 to facilitate progress on the CIT Recommendations.

2. 1st Interop in Geneva

After six months of preparation, the first Interop event for testing conformance and interoperability for IPTV Recommendations was held on July 20 to 23, 2010, as scheduled, at the ITU headquarters building in Geneva, Switzerland (**Photo 1**). This was the first ever interoperability event organized by ITU, and much attention was paid to this *historic event*, as it was called by Malcolm Johnson, the Director of ITU-T's Telecommunication Standardization Bureau (TSB).

The Interop event itself consisted of two parts: the

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first two days were devoted to conformance and interoperability testing (CIT event). This testing was not open to the public, but only to those companies that registered as event participants. The remaining two days were an open showcasing event, to which many individuals and companies were invited to witness the implementations of ITU-T IPTV Recommendations. Special provision was made for regulators and government agencies that had requested and registered beforehand for one-on-one discussions with the presenters at the showcasing event to enable them to have a special tour of the showcased solutions. NTT participated in the closed CIT event as well as the open showcasing event.

2.1 Conformance and interoperability testing (CIT event)

The Recommendations tested in Geneva are listed in **Table 1**.

H.721 is a Recommendation for IPTV terminal devices, initiated by an official contribution from Japan and based on specifications for IPTV terminals



Photo 1. “Dr. Hamadoun Touré, ITU Secretary-General, addressing at the first ITU-T Interop event on IPTV in ITU Headquarters”.

actually implemented and deployed for IPTV services in Japan. It defines the requirements for the basic IPTV services, which include video on demand, Linear IPTV (also known as channel service), and interactive applications (IPTV portal).

H.750 specifies metadata. Many of the metadata elements defined in this Recommendations are already used in Japan. H.750 also includes metadata specified by ATIS (Alliance for Telecommunication Industry Solutions) IPTV Interoperability Forum (IIF).

H.762 (Lightweight Interactive Multimedia Environment; LIME) is a Recommendation in the MAFR (Multimedia Application Framework) series, which enables interactive applications and IPTV portals. This Recommendation was also based on contributions from Japan. The technology defined in H.762 is currently used in Hikari TV, NTT’s IPTV service.

H.770 specifies how an IPTV terminal device can discover service providers and services, an essential mechanism for a standard IPTV service. It was initiated by contributions from Europe, but many contributions were also made by Japanese and Korean companies. As a result, H.770 is harmonized with service discovery specifications of IPTV Forum Japan and ATIS-IIF as well as those of digital video broadcasting (DVB).

At the first CIT event, Sumitomo Electric Networks, OKI, NEC, Mitsubishi Electric, and NTT were represented. These companies tested conformance to the requirements of the abovementioned Recommendations and interoperability among the implementations of those Recommendations on the basis of those Recommendations themselves and the newly created CIT Recommendations. Although the Japanese companies simply brought servers and terminals that are already deployed in Japan and implement those Recommendations for IPTV, the results of the conformance testing were excellent and interoperability was well proven. This shows the accuracy of their implementations as well as the quality of their

Table 1. Recommendations tested at the Interop event in Geneva.

	Recommendation title	Rec. no.	Approving SG	Completion date
1	Content delivery error recovery for IPTV services	H.701	SG16	Jan. 2008
2	IPTV terminal devices: Basic model	H.721	SG16	Jan. 2008
3	High-level specification of metadata for IPTV services	H.750	SG16	Mar. 2009
4	Lightweight Interactive Multimedia Environment for IPTV service (LIME)	H.762	SG16	Nov. 2009
5	Mechanisms for service discovery and selection for IPTV services	H.770	SG16	Aug. 2009

products. It also shows the maturity of the Recommendations themselves. Sumitomo Electric Networks, in particular, stood out in testing its products against all of the abovementioned Recommendations and achieving excellent results. This was truly a remarkable feat.

The checklists used in the testing were collected and made into test templates, which in turn will be used to improve the quality of Recommendations, as deemed necessary. Some of the abovementioned Recommendations were amended on the basis of the results of the first CIT event. This shows that CIT events are not just a showcase, but also an important part of the standardization process, which ensures the quality of standards, as well as providing the practical benefits of a test center.

2.2 Showcasing event

The remaining days, July 22 and 23, were dedicated to the showcasing and exhibition of IPTV products based on ITU-T standards to publicize and promote the general understanding of what ITU is doing with respect to IPTV standardization.

In addition to the previously mentioned Japanese companies, Cisco System (USA), TVSTORM (South Korea), and the Pontifical University of Rio de Janeiro (Brazil) participated in the showcasing event.

Photographers and TV crews at the Interop event site recorded the event and provided promotional content on YouTube.

Government agencies as well as companies from China, Japan, Indonesia, Singapore, Kenya, India, Turkey, Tunisia, Cote d'Ivoire, Italy, France, Germany, Australia, etc. around the globe came to see the demonstrations of standards-based IPTV. Interest among the developing countries was especially impressive. European companies, for whom it was the first time ever to see ITU-T's IPTV standards, were also impressed by the demonstrations, so much so that some of them started discussing how to deploy IPTV services using the showcased products.

On July 22, we had the honor of receiving Dr Hamadou Touré, the Secretary General of ITU, who made the welcome address to all the participants and visitors at the event. During the address, he emphasized ITU's seriousness concerning CIT events in general, stating that this IPTV Interop event was a historic occasion, being the first event of its kind, and will be followed by CIT events for the Next Generation Network (NGN) and other topics.

One of the most important things to note about this IPTV Interop event is that many international organi-



Photo 2. LIME application for e-health on ITU-T IPTV showcased by NTT (copyright: I²R and NTT).

zations, some part of the United Nations, were invited. Especially significant was the participation of the Deputy Director of the European Broadcasting Union (EBU) and the Director of Intellectual Property at the World Intellectual Property Organization (WIPO). EBU is influential in various matters, including standardization, regarding the broadcasting world of Europe, and the fact that EBU recognized ITU-T's Recommendations as the first global standard on IPTV gives them considerable weight. With this event, EBU and ITU-T have agreed to even closer collaboration, which resulted in the joint workshop on accessibility for IPTV in November 2010. WIPO is a United Nations agency that is influential in copyright management, and it was very significant that WIPO recognized for the first time ITU-T IPTV as a legitimate medium for broadcast content.

NTT demonstrated interactive content created in cooperation with the Institute for Infocomm Research (I²R) in Singapore and compliant with H.762 (LIME) on an H.721-compliant TV set already available on the market. This was the first time ever for an application complying with H.762 (LIME), which was approved in 2009, to be demonstrated in Europe, where digital TV sets with IP connections are not yet popular. Since there is no standard interactive platform widely used in Europe, LIME applications (**Photo 2**) were received with interest. Moreover, many observers from developing countries were impressed with LIME, which they saw for the first time.

The guest visitors were all impressed by the level of implementations, especially those of the Japanese participating companies, and it was truly significant

Table 2. Newly created CIT documents based on Interop results.

	Document title	No.	Approving SG	Completion date
1	Technical Paper: Conformance Testing Specification for H.721 (formerly H.IPTV-CONF.2)	HSTP.CONF-H721	SG16	July 2010
2	Technical Paper: Conformance Testing Specification for H.721 (formerly H.IPTV-CONF.6)	HSTP.CONF-H762	SG16	July 2010
3	Technical Paper: Conformance Testing Specification for H.770 (formerly H.IPTV-CONF.7)	HSTP.CONF-H770	SG16	July 2010

that the companies participating in the CIT event were able to demonstrate the maturity of ITU-T Recommendations for IPTV as well as the high quality of the implementations from an international viewpoint, in Geneva, one of the major centers in Europe.

2.3 Relationship between Interop event and Recommendations

The Geneva Interop results will be reflected in the CIT documents for Recommendations H.721, H.762, and H.770 and in those Recommendations themselves (**Table 2**). The changes to the Recommendations received consent at the SG16 Plenary meeting on July 30, 2010. Thus, the CIT event has been instrumental in improving the quality of current Recommendations for IPTV, a point that was well emphasized by ITU-T.

3. 2nd Interop in Singapore

3.1 Overview

The second IPTV Interop event took place on September 20 through 27, 2010, in Singapore as part of the IPTV-GSI event. The venue was provided by I²R, which belongs to the Agency for Science, Technology and Research (A*STAR) at Fusionopolis next to Biopolis, which is famous as the center of Bioscience research in Singapore. Conformance testing took place there on September 23 and 24, while the 27th was dedicated to an open showcasing.

Fusionopolis and Biopolis were created by A*STAR with the aim of making Singapore into a global hub for research on information, telecommunications, sciences (such as physics, chemistry, and biology), and engineering. Biopolis and Fusionopolis are world-renowned research institutes, as witnessed by the fact that they have been featured in an NHK TV program. The venue was in the academic center of Singapore. Biopolis is next to the National University of Singapore and the Nanyang Technical University, while Fusionopolis is next to the Singapore campus

of INSEAD, a famous European business school. More and more developments are expected in this area, which will certainly become the *brains* of Singapore. NTT R&D laboratories have been engaged in collaborative research with A*STAR, and the result of the joint work was also demonstrated at the Interop event.

The Singaporean government expressed strong interest in this event and gave essential support. At the open showcasing event on September 27, Leong Keng Tai, Director-General (Telecoms and Post) of the Infocomm Development Authority (IDA), welcomed participants and took a tour of the exhibition and observed the quality of ITU-T Recommendations for IPTV. This tour was also joined by Philip Heah, who heads the work on Next Generation Nationwide Broadband Network (NGNBN), and Raymond Lee, who is in charge of standardization at IDA.

Participants in this Interop event included Sumitomo Electric Networks, OKI, NEC, Mitsubishi Electric, and NTT from Japan, Panasonic Singapore and two other companies from Singapore, and two Korean companies.

Testing was conducted mainly on H.721 (IPTV terminal devices: Basic model) and H.701 (Content delivery error recovery for IPTV services). All the Japanese companies performed very well, showing their high quality. One Korean company also participated in the testing for the first time, in testing for H.770 (Mechanisms for service discovery and selection for IPTV services).

The main purpose of this Interop event was quality of experience (QoE) for IPTV services. Sumitomo Electric Networks, who led the discussion on H.701, the basic Recommendation for QoE, showed an end-to-end solution for IPTV service. They especially emphasized the high quality of Hikari TV IPTV service. Mitsubishi Electric also showed high-definition content. In Singapore, there is currently strong interest in the quality of content, as can be seen from the articles in newspapers that daily report on the quality

of service of their current IPTV service. The Interop event and its stress on quality was very relevant and well received by the guests to the event, including the government.

NTT demonstrated LIME content again, this time choosing an e-health application on the ITU-T IPTV platform. In the demonstration, data collected by devices for measuring body weight and blood pressure through the FLET's Phone as a gateway was graphed on the fly by the LIME application on an IPTV compliant with ITU-T standards. These measuring devices are already available on the market, and the participants from the Singaporean government seemed to be impressed with the demonstration. As the Singapore government has been emphasizing the importance of e-government, and IPTV in particular is considered to provide the user interface for such services, it was good for NTT to be able to demonstrate such a solution by using retail products. The fact that this demonstration was also based on collaborative work between NTT and A*STAR made it more meaningful to the local audience.

3.2 Results

As a result of the Interop event in Singapore, H. IPTV-CONF.1, the conformance and interoperability document based on H.701 was updated.

4. Third Interop Event in Pune, India

The third Interop event was held in Pune, near Mumbai, in India on December 15–17, 2010. It was co-located with ITU-T Kaleidoscope and IPTV-GSI. It was partially supported by the Indian government. Important representatives from major companies in

India, such as the chairman of BNSL and representatives from Bollywood studios, came to the open showcasing event on December 17 and saw ITU-T's standard IPTV in action. The event was videoed by Bloomberg TV and broadcast to more than a million subscribers. It was notable that during the event the representative of the Indian government stated that they are considering ITU-T Recommendations as the national standard for IPTV in India.

5. Conclusion

ITU, led by TSB Director, Malcolm Johnson, has been vigorously working on conformance and interoperability testing, and Interop events have become important activities, as can be seen from the many references made to them in the news media. As we have seen, the CIT results will be reflected in the existing Recommendations, and participating companies can list products confirmed to be compliant with the Recommendations in the CIT database on the ITU-T website. Companies that want to purchase IPTV products compliant with ITU-T Recommendations can go to the database and easily find suitable vendors.

In 2011, several countries, including Brazil and the United Arab Emirates, expressed interest in hosting Interop events. ITU-T is also planning to promote LIME (H.762) and other application platforms by hosting an Application Contest Event, along with an Interop event, during this year's ITU Telecom.

NTT R&D will not only actively participate in those events, but also proactively lead their management, thereby promoting international standards based on contributions based on NTT technologies.



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He joined NTT Laboratories in 1989. He has worked in research areas such as artificial intelligence, language processing, and interactive agents using speech recognition. His current research area is metadata and rights language, media delivery for broadcasting and broadband communications with special emphasis on IPTV, and the convergence of fixed and mobile communications services. Since 2000, he has been the leader of the Metadata Task Group of the Association of Radio Industries and Businesses (ARIB) Working Group for Broadcasting Systems based on a Home Server. He is involved in IPTV standardization work in ITU-T and is the Rapporteur of Q13/16 and the IPTV-GSI TSR Coordinator.
