

International Telecommunication Union

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

J.302

(10/2016)

SERIES J: CABLE NETWORKS AND TRANSMISSION
OF TELEVISION, SOUND PROGRAMME AND OTHER
MULTIMEDIA SIGNALS

Application for Interactive Digital Television – Part 2

System specifications of augmented reality smart television service

Recommendation ITU-T J.302



International
Telecommunication
Union
Documents

Document Sharing Hub

Copyright International Telecommunication Union/ITU Telecommunication Sector
Provided by IHS Markit under license with ITU-T
No reproduction or networking permitted without license from IHS

Recommendation ITU-T J.302

System specifications of augmented reality smart television service

Summary

Augmented reality (AR) technology is a kind of mixed reality in which 2D/3D graphics are integrated into the real world in order to enhance user experience and enrich information. Augmented reality smart television (AR-STV) is TV broadcasting using AR technology to blend augmented content (2D/3D graphic object) with broadcasting content in real-time on receiving terminals. The augmented content overlaid in the augmentation region is fixed statically or moves along the trajectory as if an AR-based location application shows path information on the real location from a smart-phone's camera. AR-STV provides that TV viewers can choose whether to turn on the augmented content or watch the original TV content only (without the augmented content).

Recommendation ITU-T J.302 specifies the related technologies that should be implemented for an augmented reality smart television system.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T J.302	2016-10-14	9	11.1002/1000/13054

Keywords

Augmented reality, augmented reality smart television.

* To access the Recommendation, type the URL <http://handle.itu.int/> in the address field of your web browser, followed by the Recommendation's unique ID. For example, <http://handle.itu.int/11.1002/1000/11830-en>.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications, information and communication technologies (ICTs). The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure, e.g., interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the Recommendation is required of any party.

INTELLECTUAL PROPERTY RIGHTS

ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

As of the date of approval of this Recommendation, ITU had received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at <http://www.itu.int/ITU-T/ipr/>.

© ITU 2017

All rights reserved. No part of this publication may be reproduced, by any means whatsoever, without the prior written permission of ITU.

Table of Contents

	Page
1 Scope.....	1
2 References.....	2
3 Definitions	2
3.1 Terms defined elsewhere	2
3.2 Terms defined in this Recommendation.....	2
4 Abbreviations and acronyms	2
5 Conventions	3
6 Signalling protocol for AR-STV	3
7 Synchronization scheme for AR-STV	5
8 Metadata specification for AR-STV	7
8.1 Initial instruction	8
8.2 Instruction.....	8
8.3 Augmented object.....	11
8.4 Environment info.....	11
8.5 User interaction	12
Appendix I – Syntax of XML-based AR-STV metadata.....	13
I.1 Namespace.....	13
I.2 Schema wrapper	13
I.3 Root element.....	13
I.4 Initial instruction	13
I.5 Instruction.....	14
I.6 Reference resource	14
I.7 Augmentation region	15
I.8 Augmented object.....	16
I.9 Environment info.....	16
I.10 User interaction	18
Appendix II – Use case example of haptic device	19
Bibliography.....	20

Copyright International Telecommunication Union/ITU Telecommunication Sector

Recommendation ITU-T J.302

System specifications of augmented reality smart television service

1 Scope

Figure 1 shows the reference architecture of the augmented reality smart television (AR-STV) system.

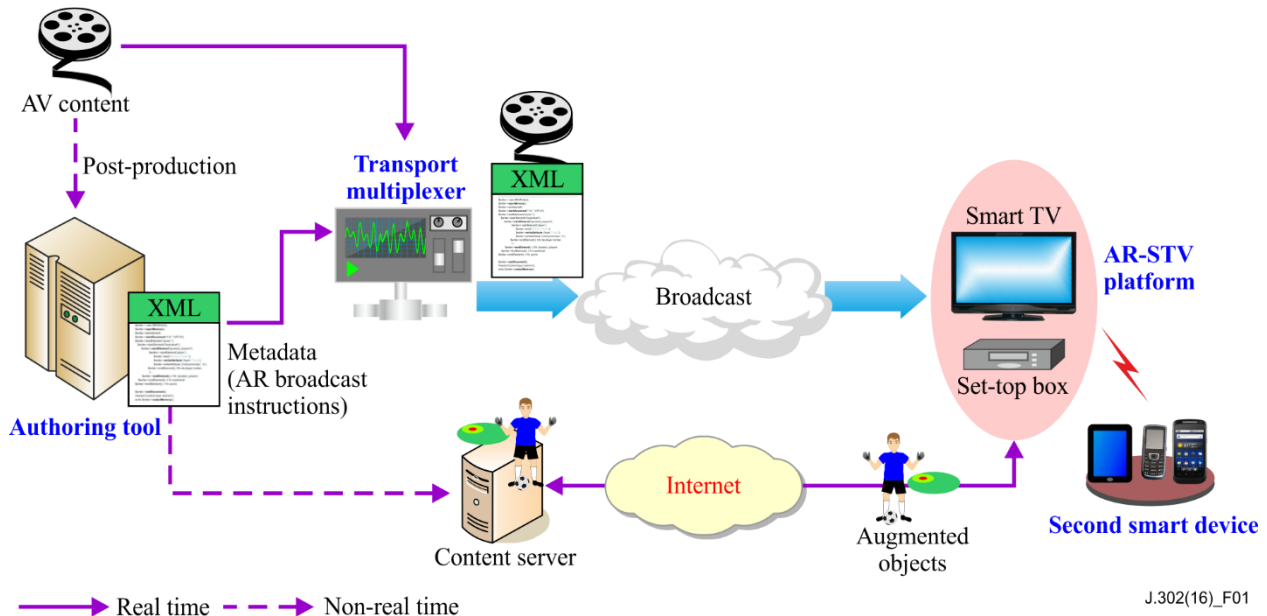


Figure 1 – System architecture of AR-STV

Augmented reality smart television (AR-STV) provides an AR-based TV broadcasting service to implement the mixed content of a broadcasting programme and augmented content at a targeted position (augmentation region) and time (augmentation time) in real-time on a receiving terminal such as a smart TV or set-top-box (STB). AR-STV overlays augmented contents provided by the broadcasting provider itself or by the content providers which are authorised by the broadcasting provider. When AR-STV is provided, the broadcasting signal includes the metadata which contains the permissions about timing and the area for the overlay. Authorisation information for an AR content provider is also provided in the broadcasting signal. This mechanism does not permit any illegal overlay.

The AR-STV is realized by the combination of a specific signal on the broadcasting programme, metadata, augmented content and terminal side synchronization. The terminal functionality can be implemented as the extension of the existing integrated broadcast-broadband (IBB) systems. The scope of this Recommendation comprises the following technologies to realize AR-STV:

- Synchronization scheme for AR-STV
- Metadata for AR-STV
- Signalling protocol for AR-STV

This Recommendation specifies three technologies for AR-STV, (1) synchronized representation between a broadcasting programme and augmented content, (2) metadata and (3) signalling protocol according to functional requirements defined in [ITU-T J.301].

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

[ITU-T J.301] Recommendation ITU-T J.301 (2014), *Requirements for augmented reality smart television systems*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 augmented broadcasting [ITU-T J.301]: Broadcasting service or programme to realize augmented reality smart television (AR-STV).

3.1.2 augmented content [ITU-T J.301]: A binary object, such as 2D images, 3D animated models or audio/video streaming files, to be augmented into a predefined augmentation region.

3.1.3 augmented reality (AR) [ITU-T J.301]: A type of mixed reality where graphical elements are integrated into the real world in order to enhance user experience and enrich information.

3.1.4 augmented reality smart television (AR-STV) [ITU-T J.301]: AR-based TV broadcasting service to implement the mixed content of a broadcast programme and augmented object at a targeted position and time in real time on a receiving terminal such as a TV or set-top box.

3.1.5 augmentation region [ITU-T J.301]: The targeted area to augment any object or region in a TV scene. It provides the parameters of a static or animated 2D region related to natural media.

3.1.6 augmentation time [ITU-T J.301]: The appointed time to augment any object or region in a TV scene. It provides the parameters of start presentation time and time duration for augmented content.

3.2 Terms defined in this Recommendation

This Recommendation defines the following term:

3.2.1 reference image: A resource to be referenced in the tracking process of acquiring coordinates generated by a particular region's movement in the video scene.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

ABM	Augmented Broadcasting Metadata
AR	Augmented Reality
AR-STV	Augmented Reality Smart Television
EIT	Event Information Table
FoV	Field of View
IBB	Integrated Broadcast-Broadband
MPEG	Moving Picture Experts Group

PMT	Program Map Table
PSI	Program Specific Information
PSIP	Program and System Information Protocol
STB	Set-Top-Box
TS	Transport Stream
VCT	Virtual Channel Table

5 Conventions

In this Recommendation:

The keywords "is required to" indicate a requirement which must be strictly followed and from which no deviation is permitted if conformance to this document is to be claimed.

The keywords "is recommended" indicate a requirement which is recommended but which is not absolutely required. Thus this requirement need not be present to claim conformance.

The keywords "is prohibited from" indicate a requirement which must be strictly followed and from which no deviation is permitted if conformance to this document is to be claimed.

The keywords "can optionally" indicate an optional requirement which is permissible, without implying any sense of being recommended. This term is not intended to imply that the vendor's implementation must provide the option and the feature can be optionally enabled by the network operator/service provider. Rather, it means the vendor may optionally provide the feature and still claim conformance with the specification.

In the body of this document and its annexes, the words *shall*, *shall not*, *should* and *may* sometimes appear, in which case they are to be interpreted, respectively, as *is required to*, *is prohibited from*, *is recommended* and *can optionally*. The appearance of such phrases or keywords in an appendix or in material explicitly marked as *informative* are to be interpreted as having no normative intent.

6 Signalling protocol for AR-STV

The real-time broadcast stream to be provided to the receiving terminal should include signalling and metadata for the AR-STV service. The receiving terminal may determine whether to provide an AR-STV service by checking an AR-STV descriptor contained in the program initialization information of the broadcast stream. Table 1 illustrates an example of the syntax of an AR-STV descriptor including *descriptor_tag*, *descriptor_length* and *augmented_broadcasting_service_type*. More specifically, the *descriptor_tag* is information that identifies an associated descriptor as an AR-STV descriptor. *Descriptor_length* indicates the total length of the descriptor. The *ARSTV_app_type* is to distinguish application types of AR-STV service. *ContentProvider_Info* includes content providers' information. The descriptor may be located in a table of a section packet, such as a virtual channel table (VCT) or event information table (EIT) of program and system information protocol (PSIP) and/or a program map table (PMT) of program specific information (PSI) in MPEG-2 TS. Table 1 shows the ARSTV descriptor syntax.

Copyright International Telecommunication Union/ITU Telecommunication Sector
 Provided by IHS Markit under license with ITU-T
 No reproduction or networking permitted without license from IHS
 Full document details: ITU-T J.302 2016