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| ITU‑T Study Group 9 |
| Television and sound transmission and integrated broadband cable networks |
| Report of ITU-T SG9 to the World Telecommunication Standardization Assembly (WTSA-20), Part I: GENERAL |

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| **Abstract:** | This contribution contains the report of ITU-T Study Group 9 to WTSA-20 concerning its activities during the 2017-2021 study period. |
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Note by the TSB:

The report of Study Group 9 to the WTSA-20 is presented in the following documents:

Part I: **Document 7** – General

Part II: **Document 8** – Questions proposed for study during the study period 2022-2024

**CONTENTS**

|  Page |
| --- |
| [1 Introduction 3](#_Toc92726487)[2 Organization of work 6](#_Toc92726488)[3 Results of the work accomplished during the 2017-2021 study period 14](#_Toc92726489)[4 Observations concerning future work 15](#_Toc92726490)[5 Updates to the WTSA Resolution 2 for the 2022-2024 study period 16](#_Toc92726491)[ANNEX 1 List of Recommendations, Supplements and other materials produced or deleted during the study period 17](#_Toc92726492)[ANNEX 2 Proposed updates to the Study Group 9 mandate and Lead Study Group roles 24](#_Toc92726493) |

# 1 Introduction

## 1.1 Responsibilities of Study Group 9

Study Group 9 was entrusted by the World Telecommunications Standardization Assembly (Hammamet, 2016) with the study of 10 Questions in the area of:

• use of telecommunication systems for contribution, primary distribution and secondary distribution of television, sound programmes and related data services including interactive services and applications, extendable to advanced capabilities such as ultra-high definition, 3D, multiview and high-dynamic range television, etc.;

• use of cable and hybrid networks, primarily designed for television and sound-programme delivery to the home, as integrated broadband networks to also carry voice or other time‑critical services, video-on-demand (e.g. over-the‑top (OTT)), interactive services, multiscreen services, etc. to customer premises equipment (CPE) in the home or enterprise.

Annex A to WTSA-16 Resolution 2 states the following lead study group responsibilities for Study Group 9, Television and sound transmission and integrated broadband cable networks:

• *Lead study group on integrated broadband cable and television networks*

Annex B to WTSA-16 Resolution 2 defines the following responsibilities of SG9:

Within its general area of responsibility, ITU‑T Study Group 9 will develop and maintain Recommendations on:

• *the use of IP or other appropriate protocols and middleware to provide time‑critical services, services on demand or interactive services over cable or hybrid networks, in cooperation with other study groups where necessary;*

*• procedures for the operation of television and sound-programme networks;*

*• television and sound-programme systems for contribution and distribution networks;*

*• transmission systems for television, sound programmes and interactive services, including Internet applications on networks intended primarily for television;*

*• devices* *that terminate cable-TV access networks and that interface to home networks.*

Study Group 9 is responsible for coordination with the ITU Radiocommunication Sector (ITU‑R) on broadcasting matters.

Intersector rapporteur group activities of different Sectors and/or joint rapporteur group activities of different study groups (under a global standards initiative (GSI) or other arrangements) shall be seen as complying with the WTSA expectations for collaboration and coordination.

Annex C to WTSA-16 Resolution 2 defines the list of Recommendations under the responsibility of Study Group 9 in the 2017-2020 study period:

*• ITU‑T J-series, except those under the responsibility of Study Groups 12 and 15*

*• ITU‑T N-series*

## 1.2 Management team and meetings held by Study Group 9

Study Group 9 met seven times in Plenary and four times in Working Partiesin the course of the study period (see Table 1.1) under the chairmanship of Mr Satoshi Miyaji assisted by Vice-Chairmen Mr TaeKyoon Kim, Mr Blaise Mamadou and Mr Zhifan Sheng

In addition, many Rapporteurs’ meetings (including e-meetings) took place during the study period in different locations, see Table 1.2.

TABLE 1.1
Meetings of Study Group 9 and its Working Parties

|  |  |  |
| --- | --- | --- |
| **Meetings** | **Place, date** | **Reports** |
| Study Group 9 | Hangzhou, 24-31 May 2017 | SG9 – R1 to R3 |
| Study Group 9 | Geneva, 22-30 January 2018 | SG9 – R4 to R10 |
| Study Group 9 | Bogota, 21-28 November 2018 | SG9 – R11 to R13 |
| Study Group 9 | Geneva, 6-13 June 2019 | SG9 – R14 to R16 |
| Study Group 9 | E-Meeting, 16-23 April 2020 | SG9 – R17 |
| Working Party 1/9 & 2/9 | E-Meeting, 7 July 2020 | SG9 – R18 and R19 |
| Working Party 2/9 | E-Meeting, 25 November 2020 | SG9 – R20 |
| Working Party 1/9 | E-Meeting, 26 January 2021 | SG9 – R21 |
| Study Group 9 | E-Meeting, 19-28 April 2021 | SG9 – R22 to R24 |
| Study Group 9 | E-Meeting, 15-24 November 2021 | SG9 – R25 to R27 |

TABLE 1.2
Rapporteur meetings organized under Study Group 9 during the study period

| Dates | Place/Host | Question(s) | Event name |
| --- | --- | --- | --- |
| 21-26 February 2017 | Geneva, Switzerland/ITU | Q2/9 | Q2/9 Rapporteur meeting |
| 15 March 2017 | E-meeting | Q7/9 | Q7/9 Rapporteur e-meeting |
| 6 April 2017 | E-meeting | Q2/9 | Q2/9 Rapporteur e-meeting |
| 18-20 April 2017 | Geneva, Switzerland/ITU | Q7/9 | Q7/9 Rapporteur meeting |
| 13-14 July 2017 | Geneva, Switzerland/ITU | Q2/9 | Q2/9 Rapporteur meeting |
| 2 August 2017 | E-meeting | Q9/9 | Q9/9 Rapporteur e-meeting |
| 7 August 2017 | E-meeting | Q5/9 | Q5/9 Rapporteur e-meeting |
| 7-10 August 2017 | Geneva, Switzerland/ITU | Q7/9 | Q7/9 Rapporteur meeting |
| 2-6 November 2017 | Berlin, Germany | Q2/9 | Q2/9 Rapporteur meeting |
| 13-16 November 2017 | E-meeting | Q7/9 | Q7/9 Rapporteur meeting |
| 30 November 2017 | Beijing, China/ABS, China | Q5/9 | Q5/9 Rapporteur e-meeting |
| 22 December 2017 | E-meeting | Q5/9 | Continuation of Q5/9 Rapporteur meeting |
| 19 March 2018 | E-meeting | Q7/9 | Q7/9 Rapporteur meeting |
| 28 March 2018 | E-meeting | Q5/9 | Q5/9 Rapporteur meeting |
| 19 April 2018 | E-meeting | Q5/9 | Q5/9 Rapporteur meeting |
| 7 May 2018 | E-meeting | Q10/9 | Q10/9 Rapporteur meeting |
| 10 May 2018 | E-meeting | Q6/9 | Q6/9 Rapporteur e-meeting |
| 28-31 May 2018 | E-meeting | Q7/9 | Q7/9 Rapporteur e-meeting |
| 6 June 2018 | E-meeting | Q9/9 | Q9/9 Rapporteur meeting |
| 21 June 2018 | E-meeting | Q6/9 | Q6/9 Rapporteur e-meeting |
| 28 June 2018 | E-meeting | Q5/9 | Q5/9 Rapporteur meeting |
| 15-17 August 2018 | Shenzhen, China /Skyworth, China | Q1, 2, 5, 6, 7, 8, 9/9 | Joint Rapporteur's meetings of Q1, 2, 5, 6, 7, 8 and 9/9 |
| 10 October 2018 | E-meeting | Q5/9 | Q5/9 Rapporteur meeting |
| 23 October 2018 | E-meeting | Q7/9 | Q7/9 Rapporteur e-meeting |
| 11 January 2019 | E-meeting | Q7/9 | Q7/9 Rapporteur meeting |
| 14 January 2019 | E-meeting | Q9/9 | Q9/9 Rapporteur meeting |
| 23 January 2019 | E-meeting | Q5/9 | Q5/9 Rapporteur meeting |
| 6 March 2019 | E-meeting | Q9/9 | Q9/9 Rapporteur meeting |
| 6 March 2019 | E-meeting | Q2/9 | Q2/9 Rapporteur meeting |
| 7 March 2019 | E-meeting | Q7/9 | Q7/9 Rapporteur meeting |
| 15-17 April 2019 | Wuhan, China /Huawei | Q1, 2, 5, 6, 7, 9/9 | Joint Rapporteur Group meetings of Q1, 2, 5, 6, 7, 9/9, Wuhan |
| 4 September 2019 | Guangzhou, China /Synamedia | Q1, 2, 4, 5, 6, 7, 8, 9, 10/9 | Special session on WTSA-20 restructuring |
| 2-6 September 2019 | Guangzhou, China /Synamedia | Q1, 2, 5, 6, 7, 8, 9/9 | Joint Rapporteur Group meetings of Q1, 2, 5, 6, 7, 8, 9/9 |
| 31 October 2019 | E-meeting | Q7/9 | Q7/9 Rapporteur meeting |
| 4 November 2019 | E-meeting | Q2/9 | Q2/9 Rapporteur meeting |
| 4 December 2019 | E-meeting | Q5/9 | Q5/9 Rapporteur meeting |
| 10 December 2019 | E-meeting | Q2/9 | Q2/9 Rapporteur meeting |
| 15 January 2020 | E-meeting | Q2/9 | Q2/9 Rapporteur meeting |
| 5 February 2020 | E-meeting | Q2/9 | Q2/9 Rapporteur meeting |
| 10 February 2020 | E-meeting | Q2/9 | Q2/9 Rapporteur meeting |
| 18-19 February 2020 | E-meeting | Q1, 2, 4, 5, 6, 7, 8, 9, 10/9 | 2nd Special session on WTSA-20 restructuring |
| 26 February 2020 | E-meeting | Q5/9 | Q5/9 Rapporteur meeting |
| 2 March 2020 | E-meeting | Q1, 2, 4, 5, 6, 7, 8, 9, 10/9 | 2nd Special session on WTSA-20 restructuring |
| 27 May 2020 | E-meeting | Q5/9 | Q5/9 Rapporteur meeting |
| 15 June 2020 | E-meeting | Q8/9 | Q8/9 Rapporteur meeting |
| 7 July 2020 | E-meeting | Q2/9 | Q2/9 Rapporteur meeting |
| 9 July 2020 | E-meeting | Q6/9 | Q6/9 Rapporteur meeting |
| 7 September 2020 | E-meeting | Q8/9 | Q8/9 Rapporteur meeting |
| 19 October 2020 | E-meeting | Q11/9 | Q11/9 Rapporteur meeting |
| 20 October 2020 | E-meeting | Q1/9 | Q1/9 Rapporteur meeting |
| 22 October 2020 | E-meeting | Q5/9 | Q5/9 Rapporteur meeting |
| 23 October 2020 | E-meeting | Q6/9 | Q6/9 Rapporteur meeting |
| 10 November 2020 | E-meeting | Q6/9 | Q6/9 Rapporteur meeting |
| 16 November 2020 | E-meeting | Q8/9 | Q8/9 Rapporteur meeting |
| 17 November 2020 | E-meeting | Q9/9 | Q9/9 Rapporteur meeting |
| 19 November 2020 | E-meeting | Q5/9 | Q5/9 Rapporteur meeting |
| 21 December 2020 | E-meeting | Q8/9 | Q8/9 Rapporteur meeting |
| 5 January 2021 | E-meeting | Q7/9 | Q7/9 Rapporteur meeting |
| 15 January 2021 | E-meeting | Q1/9 | Q1/9 Rapporteur meeting |
| 20 January 2021 | E-meeting | Q1/9 | Q1/9 Rapporteur meeting |
| 26 January 2021 | E-meeting | Q11/9 | Q11/9 Rapporteur meeting |
| 02 February 2021 | E-meeting | Q6/9 | Q6/9 Rapporteur meeting |
| 22-24 February 2021 | E-meeting | [Q9/9](http://www.itu.int/net/itu-t/lists/rgmdetails.aspx?id=11786&Group=9) | Q9/9 Rapporteur meeting |
| 18 March 2021 | E-meeting | Q8/9 | Q8/9 Rapporteur meeting |
| 09 July 2021 | E-meeting | Q6/9 | Q6/9 Rapporteur meeting |
| 20 July 2021 | E-meeting | Q5/9 | Q5/9 Rapporteur meeting |
| 09 August 2021 | E-meeting | Q7/9 | Q7/9 Rapporteur meeting |
| 17 August 2021 | E-meeting | Q8/9 | Q8/9 Rapporteur meeting |
| 18 August 2021 | E-meeting | Q2/9 | Q2/9 Rapporteur meeting |
| 19 August 2021 | E-meeting | Q12/9 | Q12/9 Rapporteur meeting |
| 20 August 2021 | E-meeting | Q9/9 | Q9/9 Rapporteur meeting |
| 08 September 2021 | E-meeting | Q6/9 | Q6/9 Rapporteur meeting |
| 15 September 2021 | E-meeting | Q1/9 | Q1/9 Rapporteur meeting |
| 13-17 September 2021 | E-meeting | Q4/9 | Q4/9 Rapporteur meeting |
| 22 September 2021 | E-meeting | Q11/9 | Joint Q11/9 and Q26/16 Rapporteur meeting |
| 29 September 2021 | E-meeting | Q8/9 | Q8/9 Rapporteur meeting |
| 11 October 2021 | E-meeting | Q7/9 | Q7/9 Rapporteur meeting |
| 19 October 2021 | E-meeting | Q2/9 | Q2/9 Rapporteur meeting |

# 2 Organization of work

## 2.1 Organization of studies and allocation of work

**2.1.1** At its first meeting of the study period, Study Group 9 decided to establish two Working Parties: WP1 on “Video transport” and WP2 on “Cable-related terminals and applications”.

**2.1.2.1** Table 2.1 shows the number and title of each Working Party, together with the number of Questions assigned to it and the name of its Chairman until SG9 meeting (19-28 April 2021) which took note of the decisions of the precedent TSAG meeting on 11-18 January 2021, when TSAG has revised the structure of SG9 Questions holistically, taking into account the postponement of WTSA-20 (see item [2.1.2.2](#Bookmark1)). It should be noted that Question 11/9 is a new Question established by SG9 during the Study Period (See [Circular 253](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T17-TSB-CIR-0253)) and Questions 1/9, 4/9, 6/9 and 9/9 were revised during the Study Period (see Circulars [140](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T17-TSB-CIR-0140), [182](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T17-TSB-CIR-0182) and [253](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T17-TSB-CIR-0253)). Also, Question 3/9, originally assigned to WP1/9, was merged into Q1/9 during the Study Period (see [Circular 140](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T17-TSB-CIR-0140)) and therefore Q3/9 was deleted by SG9 (See [Circular 93](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T17-TSB-CIR-0093)).

TABLE 2.1
Organization of Study Group 9 (until 19 April 2021)

| Designation | Questions to be studied | Title of the Working Party | Chairmanand Vice-Chairmen |
| --- | --- | --- | --- |
| WP1/9 | Q1, 2, 4/9 | Video transport | Chairman: Mr Zhifan Sheng (NRTA, China)Vice-chairman: Mr Blaise Mamadou (Ministere des Postes et Télécommunications chargé des Nouvelle Technologies, Central African Rep.) |
| WP2/9 | Q5, 6, 7, 8, 9, 11/9 | Cable-related terminals and applications | Chairman: Mr TaeKyoon Kim (ETRI, Korea)Vice-chairman: Mr Eric Wang (Huawei, China) |
| PLEN | Q10/9 | Plenary | Chairman: Mr Satoshi Miyaji (KDDI Corporation, Japan) |

**2.1.2.2** Due to the postponement of WTSA-20, TSAG followed the *ITU-T work continuity plan until WTSA in 2022* (see Annex C of [TSAG-R11-R1](https://www.itu.int/md/T17-TSAG-R-0011/en)), and endorsed the set of Questions that were revised by SG9 in the draft proposal to WTSA-20 (as found in [TSAG Report 15](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T17-TSAG-R-0015)) at its meeting held online, 11-18 January 2021. These Questions became effective on 18 January 2021, for the remainder of the study period. See for more details [TSAG -CIR295](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T17-TSB-CIR-0295): Entrance in force of the updated set of Questions for all study groups following TSAG endorsement (18 January 2021).

Accordingly, in addition to the revision of some of the Questions texts and titles, a new Question 12/9, dedicated to AI in the context of integrated Cable TV, was also established:

– Q12/9 *“AI-enabled enhanced functions over integrated broadband cable network”*.

Accordingly, the SG9 meeting in April 2021 took note of TSAG decisions in January 2021 and agreed to revise the SG9 Working Party structure, considering the new set of SG9 Questions. Table 2.2 shows the current number and title of each Working Party, together with the number of Questions assigned to it and the name of its Chairman and Vice chairmen.

TABLE 2.2
Organization of Study Group 9 (after 19 April 2021)

| Designation | Questions to be studied | Title of the Working Party | Chairmanand Vice-Chairmen |
| --- | --- | --- | --- |
| WP1/9 | Q1, 2, 4, 6, 7/9 | Cable transport and terminals, including video and data | Chairman: Mr Zhifan Sheng (NRTA, China)Vice-chairman: Mr Blaise Mamadou (Ministere des Postes et Télécommunications chargé des Nouvelle Technologies, Central African Rep.) |
| WP2/9 | Q5, 8, 9, 11, 12/9 | Cable-related platforms and applications | Chairman: Mr TaeKyoon Kim (ETRI, Korea)Vice-chairman: Mr Eric Wang (Huawei, China) |
| PLEN | Q10/9 | Plenary | Chairman: Mr Satoshi Miyaji (KDDI Corporation, Japan) |

**2.1.3** Table 3 lists other groups and their current management team, which were created by (or associated as parent group to) Study Group 9 during the study period, namely two Intersector Rapporteur Groups (IRGs). SG9 was also taking part for some time in the Intersector Rapporteur Group on Audio Visual Quality (IRG-AVQA) but decided to cancel its participation during the Study Period, since there was no more interest in their activities.

TABLE 3
Other groups (if any)

| Title of the Group | Co-Chairman |
| --- | --- |
| IRG-AVA(Audiovisual Media Accessibility) | Pradipta Biswas (Indian Institute of Science, India) |
| IRG-IBB(Integrated Broadcast-Broadband systems) | Satoshi Miyaji (KDDI, Japan) |

PREAMBLE: WTSA Resolution 18 (Rev. Hammamet, 2016) and Resolution ITU-R 6-2 allow for ITU-R experts to jointly develop work with ITU-T experts in a group officially recognized by both ITU-R and ITU-T, named Intersector Rapporteur Group (IRG).

**2.1.3.1** The **Intersector Rapporteur Group on Audiovisual Media Accessibility (**[**IRG-AVA**](https://www.itu.int/en/irg/ava/Pages/default.aspx)**)** was established to study topics related to audiovisual media accessibility and aims at developing draft Recommendations for "Access Systems" that can be used for all media delivery systems, including broadcast, cable, Internet, and IPTV.

The IRG-AVA also addresses matters contributing to the coordination of the standardization work of the involved ITU-T and ITU-R groups and collaborates with other SDOs and other audiovisual media organizations (e.g., forums and consortia, research institutes and academia). ​

The terms of reference of the IRG-AVA are available online on IRG-AVA webpage: <https://www.itu.int/en/irg/ava/Pages/default.aspx>

**2.1.3.2** The **Intersector Rapporteur Group on Integrated Broadcast-Broadband systems (**[**IRG-IBB**](https://www.itu.int/en/irg/ibb/Pages/default.aspx)**)** was established to study topics related to Integrated Broadcast-Broadband (IBB) systems. An IBB system is based on the combination of the technologies of both broadband and various broadcasting including over-the-air and cable. Various multiple devices are used for effective presentation of content and user interactivity. Wide range of services are enabled by the IBB system.

**IRG-IBB concluded its activities on 18 November 2021** as it intended to conclude its activities by WTSA-20. The IRG-IBB participants agreed that the stream of work on the IBB was mature with a well stablished coordination and collaboration between the parent groups. More information are available in November 2021 meeting [report​](https://www.itu.int/ifa/c/irg/ibb/mgt/2021-11_e-meeting/IRG-IBB-2111-006.docx).​

IRG-IBB aimed at developing Recommendations, and other non-normative materials. The IRG also looked at contributing to the coordination of the standardization work of the involved ITU-T and ITU-R groups. It also intended to emphasize remote participation and co-located meetings (e.g., with a study group meeting, interim rapporteur meeting).

The terms of reference of the IRG-IBB were available online on IRG-IBB webpage: <https://www.itu.int/en/irg/ibb/Pages/default.aspx>

## 2.2 Questions and Rapporteurs

**2.2.1** WTSA-16 assigned to Study Group 9 the 10 Questions listed in Table 4.

**2.2.2** The Questions listed in Table 5.1 have been adopted during this period (new Questions).

**2.2.3** The Questions listed in Table 5.2 have been revised before April 2021.

**2.2.4** The Questions listed in Table 6 have been deleted during this study period.

**2.2.5** The Questions listed in Table 7 are the list of Questions of SG9 in force until April 2021.

**2.2.6** The Questions listed in Table 8 are the list of Questions of SG9 in force since April 2021, as endorsed by TSAG on 18 January 2021. SG9 has not revised further its Question texts.

TABLE 4
Study Group 9 – Questions assigned by WTSA-16 and Rapporteurs

| Questions | Title of the Questions | WP | Rapporteur |
| --- | --- | --- | --- |
| Q1/9  | Transmission of television and sound programme signal for contribution, primary distribution and secondary distribution  | 1/9 | Mr Tomoyuki Shimizu(KDDI Corporation, Japan) |
| Q2/9 | Methods and practices for conditional access, protection against unauthorized copying and against unauthorized redistribution ("redistribution control" for digital cable television distribution to the home) | 1/9 | Mr Han-Seung Koo(ETRI, Korea)Associate Rapporteur :Mr Kenji Obata(Japan Cable Laboratories, Japan)Mr Qiang Wang(Academy of Broadcasting Science (ABS), China) |
| Q3/9 | Digital programme delivery controls for multiplexing, switching and insertion in compressed bit streams and/or packet streams  | 1/9 | Mr Tomoyuki Shimizu(KDDI Corporation, Japan) |
| Q4/9 | Guidelines for implementations and deployment of transmission of multichannel digital television signals over optical access networks | 1/9 | Mr Tatsuo Shibata(Japan Cable Laboratories, Japan)Associate Rapporteur :Mr Blaise Mamadou(Ministere des Postes et Télécommunications chargé des Nouvelle Technologies, Central African Rep.) |
| Q5/9 | Software components application programming interfaces (APIs), frameworks and overall software architecture for advanced content distribution services within the scope of Study Group 9 | 2/9 | Mr Heming Wang(Huawei, China)Associate Rapporteur:Mr Shinya Takeuchi(NHK, Japan) |
| Q6/9 | Functional requirements for residential gateway and set-top box for the reception of advanced content distribution services | 2/9 | Mr Shizhu Long(Shenzhen Skyworth Digital Technology Co. Ltd, China) |
| Q7/9 | Cable television delivery of digital services and applications that use Internet protocol (IP) and/or packet-based data over cable networks | 2/9 | Mr TaeKyoon Kim(ETRI, Korea)Associate Rapporteur:Mr Feng Ouyang(Academy of Broadcasting Science (ABS), China) |
| Q8/9 | The Internet protocol (IP) enabled multimedia applications and services for cable television networks enabled by converged platforms | 2/9 | Mr Sung-kwon Park(Ministry of Information and Communication, Korea) |
| Q9/9 | Requirements, methods, and interfaces of the advanced service platforms to enhance the delivery of sound, television, and other multimedia interactive services over cable television network | 2/9 | Mr Eric Wang(Huawei, China)Associate Rapporteur :Mr Soonchoul Kim(ETRI, Korea) |
| Q10/9 | Work programme, coordination and planning | PLEN | Mr Hongjun Jia(Academy of Broadcasting Planning (ABP), China)Associate Rapporteur :Mr TaeKyoon Kim(ETRI, Korea) |

TABLE 5.1
Study Group 9 – New Questions adopted and Rapporteurs

| Questions | Title of the Questions | WP | Rapporteur |
| --- | --- | --- | --- |
| Q11/9 | Accessibility to cable systems and services | 2/9 | Mr Pradipta Biswas(Indian Institute of Science, India) |
| Q12/9 | AI-enabled enhanced functions over integrated broadband cable network | 2/9 | Mr Yanbin (Evan) Sun(Huawei Technologies, China) |

TABLE 5.2
Study Group 9 – Questions revised and Rapporteurs (until April 2021)

| Questions | Title of the Questions | WP | Rapporteur |
| --- | --- | --- | --- |
| Q1/9 | Transmission and delivery control of television and sound programme signal for contribution, primary distribution and secondary distribution | 1/9 | Mr Kei Kawamura(KDDI Corporation, Japan) |
| Q4/9 | Guidelines for implementations and deployment of transmission of multichannel digital television signals over optical access networks and Hybrid Fibre-Coaxial (HFC) | 1/9 | Mr Tatsuo Shibata(Japan Cable Laboratories, Japan) |
| Q6/9 | Functional requirements for residential gateway and set-top box for the reception of advanced content distribution services | 2/9 | Mr Shizhu Long (Shenzhen Skyworth Digital Technology Co. Ltd, China) |
| Q9/9 | Requirements, methods, and interfaces of the advanced service platforms to enhance the delivery of sound, television, and other multimedia interactive services over integrated broadband cable networks | 2/9 | Mr Eric Wang (Huawei, China) |

TABLE 6
Study Group 9 – Questions deleted

| Questions | Title of Questions | Rapporteurs | Results |
| --- | --- | --- | --- |
| Q3/9 | Digital programme delivery controls for multiplexing, switching and insertion in compressed bit streams and/or packet streams | Mr Tomoyuki Shimizu(KDDI Corporation, Japan) | The work of this Question was distributed to the Question 1/9 *“Transmission of television and sound programme signal for contribution, primary distribution and secondary distribution”* |

TABLE 7
Study Group 9 – List of Questions and Rapporteurs in force until April 2021

| **Questions** | **Title of the Questions** | **WP** | **Rapporteur** |
| --- | --- | --- | --- |
| Q1/9 | Transmission and delivery control of television and sound programme signal for contribution, primary distribution and secondary distribution | 1/9 | Mr Kei Kawamura (KDDI Corporation, Japan) |
| Q2/9 | Methods and practices for conditional access, protection against unauthorized copying and against unauthorized redistribution ("redistribution control" for digital cable television distribution to the home) | 1/9 | Mr Han-Seung Koo(ETRI, Korea)Associate Rapporteur :Mr Zhijian Liang(Huawei, China)Mr Kenji Obata (Japan Cable Laboratories, Japan) |
| Q4/9 | Guidelines for implementations and deployment of transmission of multichannel digital television signals over optical access networks and Hybrid Fibre-Coaxial (HFC) | 1/9 | Mr Tatsuo Shibata(Japan Cable Laboratories, Japan)Associate Rapporteur :Mr Blaise Mamadou (Ministere des Postes et Télécommunications chargé des Nouvelle Technologies, Central African Rep.) |
| Q5/9 | Software components application programming interfaces (APIs), frameworks and overall software architecture for advanced content distribution services within the scope of Study Group 9 | 2/9 | Mr Haifeng Yan (China)Associate Rapporteur:Mr Masayoshi Onishi (NHK, Japan) |
| Q6/9 | Functional requirements for residential gateway and set-top box for the reception of advanced content distribution services | 2/9 | Mr Shizhu Long (Shenzhen Skyworth Digital Technology Co. Ltd, China) |
| Q7/9 | Cable television delivery of digital services and applications that use Internet protocol (IP) and/or packet-based data over cable networks | 2/9 | Mr TaeKyoon Kim(ETRI, Korea)Associate Rapporteur:Mr Feng Ouyang (NRTA, China)Mr Evan Sun(Huawei, China) |
| Q8/9 | The Internet protocol (IP) enabled multimedia applications and services for cable television networks enabled by converged platforms | 2/9 | Mr Steven Epstein (Synamedia, Israel) |
| Q9/9 | Requirements, methods, and interfaces of the advanced service platforms to enhance the delivery of sound, television, and other multimedia interactive services over integrated broadband cable networks | 2/9 | Mr Eric Wang (Huawei, China)Associate Rapporteur:Mr Soonchoul Kim (ETRI, Korea) |
| Q10/9 | Work programme, coordination and planning | PLEN | Mr Zhongzhao Li (China)Associate Rapporteur:Mr Satoshi Miyaji (KDDI Corporation, Japan) |
| Q11/9 | Accessibility to cable systems and services | 2/9 | Mr Pradipta Biswas(Indian Institute of Science, India) |

TABLE 8
Study Group 9 – Final list of Questions and Rapporteurs since April 2021 (currently in force)

| Questions | Title of the Questions | WP | Rapporteur |
| --- | --- | --- | --- |
| Q1/9 | Transmission and delivery control of television and sound programme signal for contribution, primary distribution and secondary distribution | 1/9 | Mr Kei Kawamura (KDDI Corporation, Japan) |
| Q2/9 | Methods and practices for conditional access and content protection | 1/9 | Mr Han-Seung Koo(ETRI, Korea)Associate Rapporteur:Mr Zhijian Liang(Huawei, China)Mr Kenji Obata (Japan Cable Laboratories, Japan) |
| Q4/9 | Guidelines for implementations and deployment of transmission of multichannel digital television signals over optical access networks and Hybrid Fibre-Coaxial (HFC) | 1/9 | Mr Tatsuo Shibata(Japan Cable Laboratories, Japan)Associate Rapporteur:Mr Blaise Mamadou (Ministere des Postes et Télécommunications chargé des Nouvelle Technologies, Central African Rep.) |
| Q5/9 | Software components application programming interfaces (APIs), frameworks and overall software architecture for advanced content distribution services within the scope of Study Group 9 | 2/9 | Mr Haifeng Yan (China) |
| Q6/9 | Functional requirements for terminal devices of the integrated broadband cable network | 1/9 | Mr Shizhu Long (Shenzhen Skyworth Digital Technology Co. Ltd, China) |
| Q7/9 | Transmission control and interfaces (MAC layer) for IP and/or packet-based data over integrated broadband cable networks | 1/9 | Mr TaeKyoon Kim(ETRI, Korea)Associate Rapporteur:Mr Feng Ouyang (NRTA, China)Mr Evan Sun(Huawei, China) |
| Q8/9 | The Internet protocol (IP) enabled multimedia applications and services for cable television networks enabled by converged platforms | 2/9 | Rapporteur:Mr Dajiang Zhang(Alibaba, China) |
| Q9/9 | Requirements, methods, and interfaces of the advanced service platforms to enhance the delivery of audiovisual content, and other multimedia interactive services over integrated broadband cable networks | 2/9 | Mr Eric Wang (Huawei, China)Associate Rapporteur :Mr Soonchoul Kim (ETRI, Korea) |
| Q10/9 | Work programme, coordination and planning | PLEN | Rapporteur:Ms Jingyi Xue(ABP, NRTA, China)Associate Rapporteur:Mr Satoshi Miyaji (KDDI Corporation, Japan) |
| Q11/9 | Accessibility to cable systems and services | 2/9 | Mr Pradipta Biswas(Indian Institute of Science, India) |
| Q12/9 | AI-enabled enhanced functions over integrated broadband cable network | 2/9 | Mr Yanbin (Evan) Sun(Huawei Technologies, China) |

# 3 Results of the work accomplished during the 2017-2021 study period

## 3.1 General

During the study period, (As of 25 November 2021), Study Group 9 examined 195 contributions and generated a large number of TDs and liaison statements. It also:

– drew up 66 (new/revised) Recommendations. Among them, seventeen revised Recommendations, one Amendment and two Corrigenda;

– developed seven (new/revised) Supplements, of which five new and two revised;

– developed four technical papers and one Implementer's guide.

## 3.2 Highlights of achievements

In this Study Period SG9 developed a strategy to grow SG9 business, identifying and realizing strategic objectives. To this end, a series of Workshops on the “Future of TV” in various regions of the world were organized on SG9 initiative and in collaboration with the three Sectors of the ITU and the regional offices. This way SG9 activities were promoted to the existing membership of the ITU, who were interested in television business from various perspectives (broadcasting, broadband and cable). In fact, ITU-T SG9 collaborates extensively with ITU-T SG16 and especially ITU-R SG6 on several topics, including integrated broadband broadcast; audio visual accessibility; augmented and virtual reality, etc. Taking into account that SG9 meetings are easy to be hosted outside Geneva, giving the flexibility and number of delegates of the group, SG9 developed a strategy to meet in the regions in colocation with the series of Workshops on the Future of TV. As results, SG9 meetings plus workshops were hosted in China (2017); Geneva (2018); Colombia (2018); Geneva (2019); and ITU-T received proposals to host SG9 meeting from various Member States, and meetings were eventually planned in Japan and Gambia in 2020 to complete the cycle. Unfortunately, the pandemic did not allow the last two meetings to take place physically, although TSB received invitations to host SG9 from both Japan and Gambia administrations. Eventually the following meetings were held fully virtually as all the other ITU-T SG meetings during the pandemic.

Having SG9 meetings outside Geneva is in line with SG9's objectives to promote rollout of cable television in developing countries. In this regard, SG9 has established a dedicated Question (Q4/9) and received proposals to make Recommendations and supplements that meet the requirements of developing countries and produced a couple of related deliverables during this Study Period.

SG9 strategy proved very effective and resulted in increased participation and contributions to SG9 and most importantly, nine new members joined ITU-T to attend SG9 either as Sector members, Associate or Academia members: (Synamedia, Cox Communication, CableLabs, Sky Group, Skyworth Digital, JiShi HuiTong, MovieLabs, Indian Institute of Science, and Huazhong University).

To be noted that SG9 renewed collaboration with CableLabs after more than 10 years of absence from ITU. Cablelabs is a fundamental partner of SG9 in development of cable television related technologies, particularly for cable modem systems standardization (a.k.a. DOCSIS), which was abruptly interrupted after its 3rd generation. SG9 succeeded in filling the gap on the subsequent generations of DOCSIS standards, so all the missing specifications were endorsed as ITU-T Recommendations until the most recent version.

Also, SG9 has been working on exploitation of artificial intelligence (AI) to optimize and enhance capability of cable television networks. The first outcome of SG9 is ITU-T Recommendation J.1600 “Premium cable network platform - Framework” approved in 2019, where cloud-based AI is introduced to facilitate intelligent network operation and maintenance. ITU-T J.1600 is also the first ITU-T Recommendation that introduces AI. To emphasize and accelerate the study area related to AI, SG9 established a new Question 12/9, “*AI-enabled enhanced functions over integrated broadband cable network,*” which was endorsed by TSAG at their January 2021 meeting.

SG9 has started a new series of Recommendations (J.1200-J.1209) on Smart TV operating system (TVOS) over integrated broadcast and broadband cable networks. The Recommendations for this smart TV operating system cover functional requirements, architecture, security and application programming interfaces (APIs). During this study period, five TVOS related Recommendations were developed and approved. Also, SG9 had close collaboration with ITU-T SG16 and ITU-R SG6 WP6B on this topic, through IRG-IBB.

The main results achieved on the various Questions assigned to Study Group 9 are given in a synoptic table in Annex 1 of this report.

## 3.3 Report of lead study group activities, JCAs and regional groups

### 3.3.1 Lead study group activities on integrated broadband cable and television networks

SG9 has been entrusted the Lead study group on integrated broadband cable and television networks by WTSA-16.

Accordingly, SG9 has developed a number of lead Study Group activities reports which were timely submitted to TSAG for review. All SG9 Lead SG Activity reports are summarised below and can be seen at the related URLs:

[TSAG-TD150](https://www.itu.int/md/T17-TSAG-180226-TD-GEN-0150/en) (Geneva, 26 February - 2 March 2018)

[TSAG-TD303](https://www.itu.int/md/T17-TSAG-181210-TD-GEN-0303/en) (Geneva, 10-14 December 2018)

[TSAG-TD480](https://www.itu.int/md/T17-TSAG-190923-TD-GEN-0480/en) (Geneva, 23-27 September 2019)

[TSAG-TD719](https://www.itu.int/md/T17-TSAG-200210-TD-GEN-0719/en) (Geneva, 10-14 February 2020)

[TSAG-TD800](https://www.itu.int/md/T17-TSAG-200921-TD-GEN-0800/en) (Virtual, 21-25 September 2020)

[TSAG-TD923](https://www.itu.int/md/T17-TSAG-210111-TD-GEN-0923/en) (Virtual, 11-18 January 2021)

[TSAG-TD1042](https://www.itu.int/md/T17-TSAG-211025-TD-GEN-1042/en) (Virtual, 25-29 October 2021)

[TSAG-TD1196](https://www.itu.int/md/T17-TSAG-220110-TD-GEN-1196/en) (Virtual, 10-17 January 2022)

### 3.3.2 JCA

None.

### 3.3.3 Regional Group

None.

### 3.3.4 Focus Group

None.

# 4 Observations concerning future work

Study Group 9 has revised its mandate, which is proposed to be included in the next version of ITU‑T Resolution 2 “ITU-T study group responsibility and mandates” for next Study Period.

In ANNEX 2 to this report, a revision marked version, as compared with the current Resolution 2 text is provided. Briefly, the changes update the mandate to reflect advances in the cable industry. For example, adding the use of cloud computing, artificial intelligence (AI) and other advanced technologies, to enhance audiovisual content contribution and distribution as well as integrated broadband services over the cable networks.

SG9 also plans to study the use of accessibility services (like captioning, audio caption) and new interaction technologies (like haptic, gesture, eye tracking and so on) to enhance accessibility of audiovisual content and related data services for people with different range of abilities within integrated cable TV networks.

# 5 Updates to the WTSA Resolution 2 for the 2022-2024 study period

Annex 2 contains the updates to WTSA Resolution 2 proposed by Study Group 9 concerning the general areas of study, title, mandate, lead roles and points of guidance for the next study period.

ANNEX 1

List of Recommendations, Supplements and other materials produced or deleted during the study period

The list of new and revised Recommendations approved during the study period is found in Table 9.

The list of Recommendations determined/consented at the last meeting of Study Group 9 is found in Table 10. They were all approved on 13 January 2022.

The list of Recommendations deleted by Study Group 9 during the study period is found in Table 11.

The List of Recommendations submitted by Study Group 9 to WTSA-20 for approval is found in Table 12.

Tables 13 through Table 16 lists other publications approved and/or deleted by Study Group 9 during the study period.

TABLE 9
Study Group 9 – Recommendations approved during the study period

| **Recommendation** | **Approval** | **Status** | **TAP/AAP** | **Title (English)** |
| --- | --- | --- | --- | --- |
| [J.1](http://handle.itu.int/11.1002/1000/13833) | 2019-01-13 | Superseded | AAP | Terms, definitions and acronyms for television and sound transmission and integrated broadband cable networks |
| [J.1](http://handle.itu.int/11.1002/1000/14275) | 2020-05-29 | In force | AAP | Terms, definitions and acronyms for television and sound transmission and integrated broadband cable networks |
| [J.1012](http://handle.itu.int/11.1002/1000/13573) | 2020-04-23 | In force | TAP | Embedded common interface for exchangeable CA/DRM solutions; CA/DRM container, loader, interfaces, revocation |
| [J.1013](http://handle.itu.int/11.1002/1000/13574) | 2020-04-23 | In force | TAP | Embedded common interface for exchangeable CA/DRM solutions; The virtual machine |
| [J.1014](http://handle.itu.int/11.1002/1000/13575) | 2020-04-23 | In force | TAP | Embedded common interface for exchangeable CA/DRM solutions; Advanced security – ECI-specific functionalities |
| [J.1015](http://handle.itu.int/11.1002/1000/13576) | 2020-04-23 | In force | TAP | Embedded common interface for exchangeable CA/DRM solutions; The advanced security system - Key ladder block |
| [J.1015.1](http://handle.itu.int/11.1002/1000/13837) | 2020-04-23 | In force | TAP | Embedded common interface for exchangeable CA/DRM solutions; The advanced security system - Key ladder block: Authentication of control word-usage rules information and associated data 1 |
| [J.1020](http://handle.itu.int/11.1002/1000/13286) | 2017-10-22 | In force | AAP | Service model and architecture of downloadable mobile multi-CA/DRM solutions for delivering CA/DRM client software to secondary devices |
| [J.1026](http://handle.itu.int/11.1002/1000/13972) | 2019-07-29 | Superseded | AAP | Downloadable conditional access system for unidirectional networks – Requirements |
| [J.1026](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=17254) | 2022-01-13 | In force | AAP | Downloadable conditional access system for unidirectional networks - Requirements |
| [J.1027](http://handle.itu.int/11.1002/1000/13973) | 2019-07-29 | Superseded | AAP | Downloadable conditional access system for unidirectional networks – System architecture |
| [J.1027](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=17255) | 2022-01-13 | In force | AAP | Downloadable conditional access system for unidirectional networks - System architecture |
| [J.1028](http://handle.itu.int/11.1002/1000/13974) | 2019-07-29 | Superseded | AAP | Downloadable conditional access system for unidirectional networks – Terminal system |
| [J.1028](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=17256) | 2022-01-13 | In force | AAP | Downloadable conditional access system for unidirectional networks - Terminal system |
| [J.1031](http://handle.itu.int/11.1002/1000/14280) | 2020-05-29 | In force | AAP | Downloadable conditional access system for bidirectional networks – Requirements |
| [J.1032](http://handle.itu.int/11.1002/1000/14355) | 2020-08-13 | In force | AAP | Downloadable conditional access system for bidirectional networks – System architecture |
| [J.1033](http://handle.itu.int/11.1002/1000/14356) | 2020-08-13 | In force | AAP | Downloadable conditional access system for bidirectional networks – The terminal |
| [J.1106](http://handle.itu.int/11.1002/1000/13287) | 2017-07-29 | In force | AAP | Requirement for radio over IP transmission system |
| [J.1107](http://handle.itu.int/11.1002/1000/13564) | 2018-03-16 | In force | AAP | Architecture and specification for radio over IP transmission systems |
| [J.1108](http://handle.itu.int/11.1002/1000/13838) | 2019-01-13 | In force | AAP | Transmission specification for radio over IP transmission systems |
| [J.1109](http://handle.itu.int/11.1002/1000/13839) | 2019-01-13 | In force | AAP | Requirement for in-band full-duplex in a HFC based network |
| [J.1110](http://handle.itu.int/11.1002/1000/14646) | 2021-06-13 | In force | AAP | Functional requirements specification for self-interference cancellation function of in-band full-duplex in a HFC based network |
| [J.1111](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16966) | 2022-01-13 | In force | AAP | Requirements for Advanced IP-based Digital Video Convergence Service |
| [J.1201](http://handle.itu.int/11.1002/1000/13840) | 2019-01-13 | Superseded | AAP | Functional requirements of a smart TV operating system |
| [J.1201](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16958) | 2022-01-13 | In force | AAP | Functional requirements of a smart TV operating system |
| [J.1202](http://handle.itu.int/11.1002/1000/13975) | 2019-07-29 | Superseded | AAP | The architecture of a smart TV operating system |
| [J.1202](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16959) | 2022-01-13 | In force | AAP | The architecture of a smart TV operating system |
| [J.1203](http://handle.itu.int/11.1002/1000/14281) | 2020-05-29 | Superseded | AAP | The specification of a smart TV operating system |
| [J.1203](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16960) | 2022-01-13 | In force | AAP | The specification of a smart TV operating system |
| [J.1204](http://handle.itu.int/11.1002/1000/14357) | 2020-08-13 | Superseded | AAP | The security framework of a smart TV operating system |
| [J.1204](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16961) | 2022-01-13 | In force | AAP | The security framework of a smart TV operating system |
| [J.1205](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=14924) | 2022-01-13 | In force | AAP | The hardware abstract layer API of a smart TV operating system |
| [J.1210](http://handle.itu.int/11.1002/1000/13976) | 2019-07-29 | In force | AAP | Requirements of IP video broadcast (IPVB) for cable TV networks |
| [J.1211](http://handle.itu.int/11.1002/1000/14282) | 2020-05-29 | In force | AAP | Specifications of IP video broadcast (IPVB) for cable TV networks |
| [J.1301](http://handle.itu.int/11.1002/1000/14585) | 2021-01-13 | In force | AAP | Specification of cloud-based converged media service to support Internet protocol and broadcast cable television – Requirements |
| [J.1302](http://handle.itu.int/11.1002/1000/14647) | 2021-06-13 | In force | AAP | Specification of a cloud-based converged media service to support Internet protocol and broadcast cable television – System architecture |
| [J.1302 Cor.1](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=17257) | 2022-01-13 | In force | AAP | Specification of a cloud-based converged media service to support Internet protocol and broadcast cable television – System architecture – Corrigendum 1 |
| [J.1303](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16526) | 2022-01-13 | In force | AAP | The specification of cloud-based converged media service to support IP and Broadcast Cable TV – System specification on collaboration between production media cloud and cable service cloud |
| [J.1304](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=14931) | 2022-01-13 | In force | AAP | Functional requirements for service collaboration between cable television operator and OTT service provider |
| [J.1401](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=14182) | 2022-01-13 | In force | AAP | Television Content Distribution Platforms: Requirements for Open Access and Signal Quality |
| [J.1600](http://handle.itu.int/11.1002/1000/13977) | 2019-10-07 | In force | AAP | Premium cable network platform – Framework |
| [J.1611](http://handle.itu.int/11.1002/1000/14586) | 2021-01-13 | In force | AAP | Functional requirements for a smart home gateway |
| [J.1612](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16554) | 2022-01-13 | In force | AAP | The Architecture for Smart Home Gateway |
| [J.1631](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=15171) | 2021-11-24 | In force | AAP | Functional requirements of E2E network platform to enhance the delivery of cloud-VR services over integrated broadband cable networks |
| [J.198.1](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16965) | 2022-01-13 | In force | AAP | Functional requirements for third-generation HiNoC |
| [J.207](http://handle.itu.int/11.1002/1000/13561) | 2018-03-16 | Superseded | AAP | Specification for an integrated broadcast and broadband digital television application control framework |
| [J.207](http://handle.itu.int/11.1002/1000/13968) | 2019-07-29 | In force | AAP | Specification for an integrated broadcast and broadband digital television application control framework |
| [J.208](http://handle.itu.int/11.1002/1000/14584) | 2021-01-13 | In force | AAP | Harmonization of integrated broadcast-broadband ditial television application control framework |
| [J.216](http://handle.itu.int/11.1002/1000/13969) | 2019-07-29 | Superseded | AAP | Second-generation modular headend architecture in systems for interactive cable television services - IP cable modems |
| [J.216](http://handle.itu.int/11.1002/1000/14276) | 2020-05-29 | In force | AAP | Second-generation modular headend architecture in systems for interactive cable television services - IP cable modems |
| [J.224](http://handle.itu.int/11.1002/1000/13970) | 2019-07-29 | Superseded | AAP | Fifth-generation transmission systems for interactive cable television services - IP cable modems |
| [J.224](http://handle.itu.int/11.1002/1000/14277) | 2020-05-29 | In force | AAP | Fifth-generation transmission systems for interactive cable television services - IP cable modems |
| [J.225](http://handle.itu.int/11.1002/1000/14278) | 2020-05-29 | In force | AAP | Fourth-generation transmission systems for interactive cable television services - IP cable modems |
| [J.288](http://handle.itu.int/11.1002/1000/13971) | 2019-07-29 | In force | AAP | Encapsulation of type length value (TLV) packet for cable transmission systems |
| [J.297](http://handle.itu.int/11.1002/1000/13053) | 2016-11-06 | Superseded | AAP | Requirements and functional specification of cable set-top boxes for 4K ultra-high definition television |
| [J.297](http://handle.itu.int/11.1002/1000/13562) | 2018-03-16 | In force | AAP | Requirements and functional specification of cable set-top box for 4K ultra high definition television |
| [J.298](http://handle.itu.int/11.1002/1000/13834) | 2019-03-22 | In force | AAP | Requirements and technical specifications of a cable TV hybrid set-top box compatible with terrestrial and satellite TV transport |
| [J.299](http://handle.itu.int/11.1002/1000/14279) | 2020-05-29 | Superseded | AAP | Functional requirements for remote management of cable set-top-box by auto configuration server |
| [J.299](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16963) | 2022-01-13 | In force | AAP | Functional requirements for remote management of cable set-top-box by auto configuration server |
| [J.302 (2016) Amd. 1](http://handle.itu.int/11.1002/1000/13835) | 2019-01-13 | In force | AAP | System specifications of augmented reality smart television service: Amendment 1 |
| [J.382](http://handle.itu.int/11.1002/1000/13563) | 2018-03-16 | In force | AAP | Advanced digital downstream transmission systems for television, sound and data services for cable distribution |
| [J.383](http://handle.itu.int/11.1002/1000/13836) | 2019-01-13 | In force | AAP | Conversion of type length value packet and transport stream for advanced cable transmission systems |
| [J.481](http://handle.itu.int/11.1002/1000/14601) | 2021-04-29 | In force | AAP | Cable network requirements for RF and IP secondary distribution of television programmes |
| [J.482](http://handle.itu.int/11.1002/1000/14602) | 2021-03-01 | In force | AAP | Requirements of a radio frequency (RF)/Internet protocol (IP) video switching system |
| [J.482 Cor.1](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=17253) | 2022-01-13 | In force | AAP | Requirements of a radio frequency (RF)/Internet protocol (IP) video switching system - Corrigendum 1 |
| [J.483](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16854) | 2022-01-13 | In force | AAP | Architecture and Functional Specifications of a radio frequency (RF)/Internet protocol (IP) video switching system |

TABLE 10
Study Group 9 – Recommendations consented/determined at the last meeting

The following table provides the list of 18 Recommendations consented at the latest SG9 e-meeting, held 15-24 November 2021. They were all approved on 13 January 2022, so they are also included in TABLE 9 above.

| **Recommendation** | **Consent** | **Status** | **TAP/AAP** | **Title** |
| --- | --- | --- | --- | --- |
| [J.198.1](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16965) | 2021-11-24 | New | AAP | Functional requirements for third-generation HiNoC |
| [J.299](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16963) | 2021-11-24 | Revised | AAP | Functional requirements for remote management of cable set-top-box by auto configuration server |
| [J.482 Cor.1](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=17253) | 2021-11-24 | Corrigendum | AAP | Requirements of a radio frequency (RF)/Internet protocol (IP) video switching system - Corrigendum 1 |
| [J.483](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16854) | 2021-11-24 | New | AAP | Architecture and Functional Specifications of a radio frequency (RF)/Internet protocol (IP) video switching system |
| [J.1026](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=17254) | 2021-11-24 | Revised | AAP | Downloadable conditional access system for unidirectional networks - Requirements |
| [J.1027](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=17255) | 2021-11-24 | Revised | AAP | Downloadable conditional access system for unidirectional networks - System architecture |
| [J.1028](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=17256) | 2021-11-24 | Revised | AAP | Downloadable conditional access system for unidirectional networks - Terminal system |
| [J.1111](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16966) | 2021-11-24 | New | AAP | Requirements for Advanced IP-based Digital Video Convergence Service |
| [J.1201](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16958) | 2021-11-24 | Revised | AAP | Functional requirements of a smart TV operating system |
| [J.1202](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16959) | 2021-11-24 | Revised | AAP | The architecture of a smart TV operating system |
| [J.1203](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16960) | 2021-11-24 | Revised | AAP | The specification of a smart TV operating system |
| [J.1204](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16961) | 2021-11-24 | Revised | AAP | The security framework of a smart TV operating system |
| [J.1205](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=14924) | 2021-11-24 | New | AAP | The hardware abstract layer API of a smart TV operating system |
| [J.1302 Cor.1](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=17257) | 2021-11-24 | Corrigendum | AAP | Specification of a cloud-based converged media service to support Internet protocol and broadcast cable television – System architecture – Corrigendum 1 |
| [J.1303](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16526) | 2021-11-24 | New | AAP | The specification of cloud-based converged media service to support IP and Broadcast Cable TV – System specification on collaboration between production media cloud and cable service cloud |
| [J.1304](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=14931) | 2021-11-24 | New | AAP | Functional requirements for service collaboration between cable television operator and OTT service provider |
| [J.1401](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=14182) | 2021-11-24 | New | AAP | Television Content Distribution Platforms: Requirements for Open Access and Signal Quality |
| [J.1612](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16554) | 2021-11-24 | New | AAP | The Architecture for Smart Home Gateway |

TABLE 11
Study Group 9 – Recommendations deleted during study period

| Recommendation | Last version | Withdrawal date | Title |
| --- | --- | --- | --- |
| None. |  |  |  |

TABLE 12
Study Group 9 – Recommendations submitted to WTSA-20

| Recommendation | Proposal | Title | Reference |
| --- | --- | --- | --- |
| None. |  |  |  |

TABLE 13
Study Group 9 – Supplements

| **Recommendation** | **Approval** | **Status** | **Title (English)** |
| --- | --- | --- | --- |
| [J Suppl. 7](http://handle.itu.int/11.1002/1000/14286) | 2020-04-23 | Superseded | Embedded common interface for exchangeable CA/DRM solutions; Guidelines for the implementation of ECI |
| [J Suppl. 7](http://handle.itu.int/11.1002/1000/14639) | 2021-04-28 | In force | Embedded common interface (ECI) for exchangeable CA/DRM solutions; Guidelines for the implementation of ECI |
| [J Suppl. 8](http://handle.itu.int/11.1002/1000/14287) | 2020-04-23 | Superseded | Embedded common interface for exchangeable CA/DRM solutions; Trust environment |
| [J Suppl. 8](http://handle.itu.int/11.1002/1000/14641) | 2021-04-28 | In force | Embedded common interface (ECI) for exchangeable CA/DRM solutions; Trust environment |
| [J Suppl. 9](http://handle.itu.int/11.1002/1000/14288) | 2020-04-23 | In force | Embedded common interface for exchangeable CA/DRM solutions; System validation |
| [J Suppl. 10](http://handle.itu.int/11.1002/1000/14289) | 2020-04-23 | In force | Correspondence between CableLabs DOCSIS Specifications and ITU-T J-series Recommendations |
| [J Suppl. 11](http://handle.itu.int/11.1002/1000/14640) | 2021-04-28 | In force | Guidelines for installing a digital television service for cable networks based on ITU-T Recommendations |

TABLE 14
Study Group 9 – Technical Papers

| Recommendation | Date | Status | Title |
| --- | --- | --- | --- |
| [JSTP-AFDI](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=14928) | 2020-04-23 | New | Analysis and Related Solutions for Full Duplex Interference |
| [JSTP-IBBDTV](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=14932) | 2020-04-23 | New | Integrated Broadcast-Broadband digital TV application cooperated with server for functional extension including functions of digital TV reception and processing |
| [JSTP-IPVB-ACC](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=14999) | 2021-11-24 | New | Analysis of the cost and complexity of IPVB technology |
| [JSTP-IPVB-UC](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=15169) | 2021-11-24 | New | Use cases and service scenario of IP Video Broadcast (IPVB) for CATV Networks |

TABLE 15
Study Group 9 – Technical Reports

| Recommendation | Date | Status | Title |
| --- | --- | --- | --- |
| None. |  |  |  |

TABLE 16
Study Group 9 – Implementers' guides

| Recommendation | Date | Status | Title |
| --- | --- | --- | --- |
| [IG-J.1012](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16954) | 2021-04-28 | New | Implementers' guide for Embedded common interface for exchangeable CA/DRM solutions; CA/DRM container, loader, interfaces, revocation |

ANNEX 2

Proposed updates to the Study Group 9 mandate and Lead Study Group roles

**(WTSA Resolution 2)**

The following are the proposed changes to the Study Group 9 mandate and Lead Study Group roles agreed at the last Study Group 9 meeting in this study period, based on the relevant portions of [WTSA-16 Resolution 2](https://www.itu.int/dms_pub/itu-t/opb/res/T-RES-T.2-2016-PDF-E.pdf). The relevant updates are recorded using the revision mark function of word.

Part 1 – General areas of study

...

**ITU‑T Study Group 9**

Audiovisual content transmission and integrated broadband cable networks

ITU T Study Group 9 is responsible for studies relating to:

– use of telecommunication systems for contribution, primary distribution and secondary distribution of audiovisual content, e.g. television programmes and related data services, including interactive services and applications, providing advanced capabilities, for example ultra-high definition and high-dynamic range, 3D, virtual reality, augmented reality, multiview, etc.;

– use of cable networks, e.g., coaxial cable, optical fibre, hybrid fibre coaxial (HFC), etc., to also provide integrated broadband services. The cable network, primarily designed for audiovisual content delivery to the home, also carries time critical services like voice, gaming, video-on-demand, interactive and multiscreen services, etc., to customer premises equipment (CPE) in the home or enterprise;

– use of cloud computing, artificial intelligence (AI) and other advanced technologies, to enhance audiovisual content contribution and distribution as well as integrated broadband services over the cable networks;

– use of accessibility services (like captioning, audio caption) and new interaction technologies (like haptic, gesture, eye tracking and so on) to enhance accessibility of audiovisual content and related data services for people with different range of abilities.

...

Part 2 – Lead ITU‑T study groups in specific areas of study

...

SG9 Lead study group on integrated broadband cable networks

 Lead study group on audiovisual content delivery over cable networks

...

Annex B
(to Resolution 2 (Rev. Hammamet, 2016))

Points of guidance to study groups for the development
of the post-2020 work programme

...

**ITU‑T Study Group 9**

Within its general area of responsibility, ITU-T Study Group 9 will develop and maintain Recommendations on:

– audiovisual content systems for contribution and distribution, including broadcasting, over cable networks, e.g., coaxial cable, optical fibre, or hybrid fibre coaxial (HFC), etc.;

– procedures for the operation of audiovisual content delivery over cable networks;

– the use of IP or other appropriate protocols, middleware and operating system to provide time critical services, services on demand or interactive services over cable networks;

– AI assisted delivery and transmission systems for audiovisual content and other data services over cable networks;

– cable network terminals and related interfaces (e.g., interfaces to the home network devices such as IoT devices, interfaces to the cloud);

– end-to-end integrated platforms for cable networks;

– advanced, interactive, time-critical and other services and applications over cable networks;

– cloud-based systems for audiovisual content services and control over cable networks;

– secured audiovisual content contribution and distribution, for example conditional access (CA) systems and digital rights management (DRM) over cable networks;

– accessibility applications to access audiovisual content over cable networks;

– common user profile and participation taxonomy for broadband cable TV accessibility.

ITU-T Study Group 9 will develop and maintain implementation guidelines to support deployment of audiovisual content contribution and distribution in developing countries.

Study Group 9 is responsible for coordination with the ITU Radiocommunication Sector (ITU-R) on broadcasting matters.

Intersector rapporteur group activities of different Sectors and/or joint rapporteur group activities of different study groups shall be seen as complying with the WTSA expectations for collaboration and coordination.

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Annex C
(to WTSA Resolution 2)

List of Recommendations under the responsibility of the respective
study groups and TSAG in the 2021-2024 study period

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**ITU‑T Study Group 9**

ITU‑T J-series, except those under the responsibility of Study Groups 12 and 15

ITU‑T N-series

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