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|  | February 2022 |
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| ITU‑T Study Group 16 |
| Multimedia coding, systems and applications |
| Report of ITU-T SG16 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 16 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 16 to the WTSA-20 is presented in the following documents:

Part I: **Document 17** – General

Part II: **Document 18** – Questions proposed for study during the study period 2022-2024

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# 1 Introduction

## 1.1 Responsibilities of Study Group 16

Study Group 16 was entrusted by the World Telecommunications Standardization Assembly (Hammamet, 2016) with the study of 12 Questions for studies relating to ubiquitous multimedia applications, multimedia capabilities for services and applications for existing and future networks. This included accessibility; multimedia architectures and applications; human interfaces and services; terminals; protocols; signal processing; media coding and systems (e.g., network signal processing equipment, multipoint conference units, gateways and gatekeepers)

## 1.2 Management team and meetings held by Study Group 16

Study Group 16 met eight times in Plenary and four times in Working Partiesin the course of the study period (see Table 1) under the chairmanship of Mr Noah Luo (China), assisted by vice-chairmen Mohannad El-Megharbel (Egypt), Marcelo Moreno (Brazil), Sarra Rebhi (Tunisia), Hideki Yamamoto (Japan), Charles Zoé Banga (Central African Republic), Malek Mohsen Ghommam (Tunisia), Heber Martinez (Argentina; till May 2021) and Khusan Isaev (Uzbekistan), He was also assisted by Seong-Ho Jeong (Rep. of Korea), Paul Coverdale (Huawei Technologies, China), Hideo Imanaka (NTT, Japan), Yuan Zhang (China Telecom, China) in working party leadership roles. Mr Simão Ferraz de Campos Neto was the Counsellor for ITUT SG16, assisted by Mrs Rosa Angeles Leon de Vivero and Ms Hiba Tahawi. Vice-chairman Malek Ghommam (Tunisia) was replaced by Ms Sarra Rebhi (Tunisia) in March 2019. Due to work changes, vice-chairmen Khusan Isaev (Uzbekistan) and Heber Martinez (Argentina) resigned in October 2019 and in May 2021, respectively.

In addition to the study group and working party meetings, many Rapporteurs' meetings (physical and virtual) took place during the study period in different locations; see Table 1-bis.

# 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 16 decided to establish three Working Parties.

**2.1.2** Table 2 shows the number and title of each Working Party, together with the number of Questions assigned to it and the name of its Chairman. Question 1/16 "Multimedia coordination" was allocated to the Plenary.

**2.1.3** Table 3 lists other groups created by Study Group 16 during the study period.

a) IRG-AVA (Intersector Rapporteur Group on Audiovisual Media Accessibility)

b) IRG-IBB (Intersector Rapporteur Group on Integrated Broadcast-Broadband)

c) FG-AI4AD (ITU-T Focus Group on artificial intelligence for autonomous and assisted driving)

d) FG-AI4H (ITU-T on artificial intelligence for health)

e) FG-VM (ITU-T Focus Group on Vehicular Multimedia)

f) CG-Metaverse (SG16 Correspondence group on Metaverse)

**2.1.4** During the study period, no Focus Groups were created, even though the study group had already the Focus Group on Audiovisual Media Accessibility that had been created in November 2009 (see [WTSA-12 Doc. 17](http://www.itu.int/md/T09-WTSA.12-C-0017/en)).

**2.1.5** Study Group 16 established no Regional Groups (as per WTSA-12 Resolution 54) during the study period.

## 2.2 Questions and Rapporteurs

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

**2.2.2** The Questions listed in Table 5 have been adopted during this period.

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

**2.2.4** 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 SG16 in the draft proposal to WTSA-20 (as found in [TSAG Report 20](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T17-TSAG-R-0020)) 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 [TSB Circular 295](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). The Questions listed in Table 6‑*bis* are the set of SG16 Questions as endorsed by TSAG on 18 January 2021.

TABLE 1
Meetings of Study Group 16 and its Working Parties

| Meetings | Place, date | Reports |
| --- | --- | --- |
| SG/WP16 | [Geneva, 16-27 January 2017](https://www.itu.int/md/meeting.asp?lang=en&parent=T17-SG16-170116) | [COM16-R1](https://www.itu.int/md/T17-SG16-R-0001/en) to [R4](https://www.itu.int/md/T17-SG16-R-0004/en) |
| SG/WP16 | [Macao, 16-27 October 2017](https://www.itu.int/md/meeting.asp?lang=en&parent=T17-SG16-171016) | [COM16-R5](https://www.itu.int/md/T17-SG16-R-0005/en) to [R8](https://www.itu.int/md/T17-SG16-R-0008/en) |
| WP2/16 | [Geneva, 16 February 2018](https://www.itu.int/md/meeting.asp?lang=en&parent=T17-SG16-180216) | [COM16-R9](https://www.itu.int/md/T17-SG16-R-0009/en) |
| SG/WP16 | [Ljubljana, 09-20 July 2018](https://www.itu.int/md/meeting.asp?lang=en&parent=T17-SG16-180709) | [COM16-R10](https://www.itu.int/md/T17-SG16-R-0010/en) to [R13](https://www.itu.int/md/T17-SG16-R-0013/en) |
| WP1/16 | [Geneva, 26 October 2018](https://www.itu.int/md/meeting.asp?lang=en&parent=T17-SG16-181026) | [COM16-R14](https://www.itu.int/md/T17-SG16-R-0014/en) |
| SG/WP16 | [Geneva, 19-29 March 2019](https://www.itu.int/md/meeting.asp?lang=en&parent=T17-SG16-190319) | [COM16-R15](https://www.itu.int/md/T17-SG16-R-0015/en) to [R18](https://www.itu.int/md/T17-SG16-R-0018/en) |
| WP2/16 | [Geneva, 14 June 2019](https://www.itu.int/md/meeting.asp?lang=en&parent=T17-SG16-190614) | [COM16-R19](https://www.itu.int/md/T17-SG16-R-0019/en) |
| SG/WP16 | [Geneva, 07-17 October 2019](https://www.itu.int/md/meeting.asp?lang=en&parent=T17-SG16-191007) | [COM16-R20](https://www.itu.int/md/T17-SG16-R-0020/en) to [R23](https://www.itu.int/md/T17-SG16-R-0023/en) |
| SG/WP16 | [Geneva, 22 June-03 July 2020](https://www.itu.int/md/meeting.asp?lang=en&parent=T17-SG16-200622) | [COM16-R24](https://www.itu.int/md/T17-SG16-R-0024/en) to [R27](https://www.itu.int/md/T17-SG16-R-0027/en) |
| SG/WP16 | [Online, 19-30 April 2021](https://www.itu.int/md/meeting.asp?lang=en&parent=T17-SG16-210419) | [COM16-R28](https://www.itu.int/md/T17-SG16-R-0028/en) to [R32](https://www.itu.int/md/T17-SG16-R-0032/en) |
| WP2/16 | [Online, 27 September 2021](https://www.itu.int/md/meeting.asp?lang=en&parent=T17-SG16-210927) | [COM16-R33](https://www.itu.int/md/T17-SG16-R-0033/en) to [R34](https://www.itu.int/md/T17-SG16-R-0034/en) |
| SG/WP16 | [Online, 17-28 January 2022](https://www.itu.int/md/meeting.asp?lang=en&parent=T17-SG16-220117) | [COM16-R35](https://www.itu.int/md/T17-SG16-R-0035/en) to [R38](https://www.itu.int/md/T17-SG16-R-0038/en) |

TABLE 1-bis
Rapporteur meetings organized under Study Group 16 during the study period (116)

| Dates | Place | Question(s) | Event name |
| --- | --- | --- | --- |
| 2017-01-19 | Geneva | [Q26/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=6779&Group=16) [[Report](http://ifa.itu.int/c/irg/ava/mtg/1701-GVA/IRG-AVA-1701-002-Meeting_report.docx)] | 9th IRG-AVA meeting |
| 2017-03-13 | Rennes, France | [Q27/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=6829&Group=16) [[Report](http://www.itu.int/md/T17-SG16-171016-TD-WP2-0048)] | ITU-T Q27/16 Rapporteurs Group Meeting |
| 2017-03-21 | Geneva | [Q26/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=6802&Group=16) [[Report](https://www.itu.int/ifa/c/irg/ava/mtg/1703-GVA/IRG-AVA-1703-002-Meeting_report.docx)] | 10th IRG-AVA meeting |
| 2017-03-31~04-07 | Australia | [Q6/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=6805&Group=16) [[Report](http://www.itu.int/md/T17-SG16-171016-TD-WP3-0028)] | ITU-T Q6/16 & JCT-VC & JVET |
| 2017-05-08~12 | Geneva | [Q8/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=6830&Group=16) [[Report](http://www.itu.int/md/T17-SG16-171016-TD-WP3-0030)], [Q13/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=6831&Group=16) [[Report](http://www.itu.int/md/T17-SG16-171016-TD-WP1-0068)], [Q14/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=6832&Group=16) [[Report](http://www.itu.int/md/T17-SG16-171016-TD-WP1-0069)], [Q26/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=6833&Group=16) [[Report](http://www.itu.int/md/T17-SG16-171016-TD-WP2-0047)], [Q28/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=6834&Group=16) [[Report](http://www.itu.int/md/T17-SG16-171016-TD-WP2-0049)] | Joint meeting of Qs 8, 13, 14, 26, 28/16 |
| 2017-06-06~08 | Xian, China | [Q21/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=6878&Group=16) [[Report](http://www.itu.int/md/T17-SG16-171016-TD-WP1-0070)] | Q21/16 Rapporteurs Group meeting (Xi'an, Shanxi Province, China) |
| 2017-07-14~21 | Turin, Italy | [Q6/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=8923&Group=16) [[Report](http://www.itu.int/md/T17-SG16-171016-TD-WP3-0029)] | ITU-T Q6/16 & JCT-VC |
| 2017-07-25 | E-meeting | [Q14/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=8954&Group=16) [[Report](http://www.itu.int/md/T17-SG16-171016-TD-WP1-0073)] | Q14/16 e-meeting |
| 2017-08-16 | E-meeting | [Q13/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=8956&Group=16) [[Report](http://www.itu.int/md/T17-SG16-171016-TD-WP1-0077)] | Q13/16 e-meeting |
| 2017-09-05 | E-meeting | [Q14/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=8955&Group=16) [[Report](http://www.itu.int/md/T17-SG16-171016-TD-WP1-0074)] | Q14/16 e-meeting |
| 2017-09-18 | Geneva | [Q28/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=8964&Group=16) [[Report](http://www.itu.int/md/T17-SG16-171016-TD-WP2-0050)] | Q28/16 Rapporteur meeting |
| 2017-10-02 | Geneva | [Q26/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=8958&Group=16) [[Report](https://www.itu.int/ifa/c/irg/ava/mtg/1710-GVA/)] | 11th IRG-AVA meeting |
| 2018-01-18 | E-meeting | [Q28/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9163&Group=16) [[Report](https://www.itu.int/md/T17-SG16-180216-TD-WP2-0087/en)] | Q28/16 on H.MBI-BHQ |
| 2018-01-20~26 | Gwangju, Rep. of Korea | [Q6/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9104&Group=16) [[Report](http://www.itu.int/md/T17-SG16-180709-TD-WP3-0052)] | ITU-T Q6/16 & JCT-VC & JVET |
| 2018-02-09 | Geneva | [Q28/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9103&Group=16) [[Report](http://www.itu.int/md/T17-SG16-180709-TD-WP2-0103)] | ITU-T Q28/16 Rapporteurs Group Meeting |
| 2018-02-12~16 | Geneva | [Q8/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9099&Group=16) [[Report](http://www.itu.int/md/T17-SG16-180709-TD-WP3-0054)], [Q13/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9100&Group=16) [[Report](http://www.itu.int/md/T17-SG16-180709-TD-WP1-0130)], [Q26/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9101&Group=16) [[Report](https://www.itu.int/md/T17-SG16-180216-TD-WP2-0089/en)], [Q28/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9102&Group=16) [[Report](https://www.itu.int/md/T17-SG16-180216-TD-WP2-0090/en)] | Joint meeting of Qs 8, 13, 26, 28/16 |
| 2018-03-05~14 | E-meeting | [Q14/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9166&Group=16) [[Report](http://www.itu.int/md/T17-SG16-180709-TD-WP1-0132)] | Q14/16 meeting #1 |
| 2018-03-27~29 | Shanghai, China | [Q21/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9164&Group=16) [[Report](http://www.itu.int/md/T17-SG16-180709-TD-WP1-0134)] | ITU-T Q21/16 Rapporteurs Group Meeting |
| 2018-04-10~20 | San Diego, California, US | [Q6/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9106&Group=16) [[Report](http://www.itu.int/md/T17-SG16-180709-TD-WP3-0053)] | ITU-T Q6/16 & JCT-VC & JVET |
| 2018-04-17 | Geneva | [Q26/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9230&Group=16) [[Report](http://www.itu.int/md/T17-SG16-180709-TD-WP2-0102)] | 12th IRG-AVA meeting |
| 2018-04-19~27 | E-meeting | [Q8/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9258&Group=16) [[Report](http://www.itu.int/md/T17-SG16-180709-TD-WP3-0057)] | Q8/16 meeting |
| 2018-04-24 | E-meeting | [Q28/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9257&Group=16) [[Report](http://www.itu.int/md/T17-SG16-180709-TD-WP2-0106)] | Q28/16 on H.861.1 (ex H.MBI-PF) |
| 2018-04-30 | Geneva | [Q28/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9207&Group=16) [[Report](http://www.itu.int/md/T17-SG16-180709-TD-WP2-0098)] | ITU-T Q28/16 Rapporteurs Group Meeting |
| 2018-05-21~25 | E-meeting | [Q14/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9167&Group=16) [[Report](http://www.itu.int/md/T17-SG16-180709-TD-WP1-0133)] | Q14/16 meeting #2 |
| 2018-05-22 | E-meeting | [Q28/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9310&Group=16) [[Report](http://www.itu.int/md/T17-SG16-180709-TD-WP2-0099)] | Q28/16 e-meeting #1 on F.SLD |
| 2018-06-11 | E-meeting | [Q28/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9324&Group=16) [[Report](http://www.itu.int/md/T17-SG16-180709-TD-WP2-0100)] | Q28/16 e-meeting #2 on F.SLD |
| 2018-09-10~18 | E-meeting | [Q14/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9393&Group=16) [[Report](http://www.itu.int/md/T17-SG16-181026-TD-WP1-0192)] | Q14/16 e-meeting |
| 2018-10-03~12 | Macao, China | [Q6/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9383&Group=16) [[Report](http://www.itu.int/md/T17-SG16-190319-TD-WP3-0075)] | ITU-T Q6/16 & JCT-VC & JVET |
| 2018-10-16 | Geneva | [Q26/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9326&Group=16) [[Report](http://www.itu.int/md/T17-SG16-190319-TD-WP2-0136)] | 13th IRG-AVA meeting |
| 2018-10-22~26 | Geneva | [Q13/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9372&Group=16) [[Report](http://www.itu.int/md/T17-SG16-181026-TD-WP1-0191)], [Q14/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9373&Group=16) [[Report](http://www.itu.int/md/T17-SG16-181026-TD-WP1-0193)] | Rapporteurs meeting of Qs 13, 14/16 |
| 2018-11-05~09 | Geneva | [Q26/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9388&Group=16) [[Report](http://www.itu.int/md/T17-SG16-190319-TD-WP2-0138)], [Q28/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9390&Group=16) [[Report](http://www.itu.int/md/T17-SG16-190319-TD-WP2-0139)] | Rapporteurs meeting of Qs 26/16 and 28/16 |
| 2018-11-19~21 | Xiamen, China | [Q21/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9374&Group=16) [[Report](http://www.itu.int/md/T17-SG16-190319-TD-WP1-0208)] | ITU-T Q21/16 Rapporteurs Group Meeting |
| 2018-11-19~21 | Xiamen, China | [Q24/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9377&Group=16) [[Report](http://www.itu.int/md/T17-SG16-190319-TD-WP2-0137)] | ITU-T Q24/16 Rapporteurs Group Meeting |
| 2018-12-05~07 | Seoul, Rep. of Korea | [Q8/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9410&Group=16) [[Report](http://www.itu.int/md/T17-SG16-190319-TD-WP3-0078)] | Rapporteur meeting of Q8/16 |
| 2019-01-07 | E-meeting | [Q28/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9536&Group=16) [[Report](http://www.itu.int/md/T17-SG16-190319-TD-WP2-0140)] | Q28/16 e-meeting on F.SLD |
| 2019-01-12~18 | Marrakesh, Morocco | [Q6/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9385&Group=16) [[Report](http://www.itu.int/md/T17-SG16-190319-TD-WP3-0076)] | ITU-T Q6/16 & JCT-VC & JVET |
| 2019-02-15 | Geneva | [Q28/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9539&Group=16) [[Report](http://www.itu.int/md/T17-SG16-190319-TD-WP2-0141)] | ITU-T Q28/16 Rapporteurs Group Meeting |
| 2019-04-25 | E-meeting | [Q27/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9625&Group=16) [[Report](http://www.itu.int/md/T17-SG16-190614-TD-WP2-0188)] | ITU-T Q27/16 Rapporteurs Group Meeting |
| 2019-05-06 | E-meeting | [Q28/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9626&Group=16) [[Report](http://www.itu.int/md/T17-SG16-190614-TD-WP2-0189)] | Q28/16 e-meeting on Safe Listening |
| 2019-05-15 | E-meeting | [Q13/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9643&Group=16) [[Report](http://www.itu.int/md/T17-SG16-191007-TD-WP1-0264)] | ITU-T Q13/16 e-meeting |
| 2019-06-06 | Geneva | [Q26/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9570&Group=16) [[Report](http://www.itu.int/md/T17-SG16-191007-TD-WP2-0201)] | 14th IRG-AVA meeting |
| 2019-06-10~14 | Geneva | [Q8/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9641&Group=16) [[Report](http://www.itu.int/md/T17-SG16-191007-TD-WP3-0097)], [Q26/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9614&Group=16) [[Report](http://www.itu.int/md/T17-SG16-190614-TD-WP2-0190)], [Q28/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9615&Group=16) [[Report](http://www.itu.int/md/T17-SG16-190614-TD-WP2-0191)] | Rapporteurs meeting of Qs 8, 26, 28/16 |
| 2019-07-03~12 | Gothenburg, Sweden | [Q6/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9807&Group=16) [[Report](http://www.itu.int/md/T17-SG16-191007-TD-WP3-0096)] | ITU-T Q6/16 & JCT-VC & JVET |
| 2019-07-09~10 | Changchun, China | [Q27/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9678&Group=16) [[Report](http://www.itu.int/md/T17-SG16-191007-TD-WP2-0203)] | Joint Q27/16 & ISO TC22/SC31/WG8 (VDS) meeting |
| 2019-07-16~18 | Nanjing, China | [Q5/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9650&Group=16) [[Report](http://www.itu.int/md/T17-SG16-191007-TD-WP3-0094)], [Q12/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9651&Group=16) [[Report](http://www.itu.int/md/T17-SG16-191007-TD-WP1-0263)], [Q13/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9648&Group=16) [[Report](http://www.itu.int/md/T17-SG16-191007-TD-WP1-0265)], [Q21/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9649&Group=16) [[Report](http://www.itu.int/md/T17-SG16-191007-TD-WP1-0267)] | Questions 5, 12, 13, 21/16 Rapporteurs meeting |
| 2019-08-05~08 | Edinburgh, United Kingdom | [Q24/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9680&Group=16) [[Report](http://www.itu.int/md/T17-SG16-191007-TD-WP2-0202)] | ITU-T Q24/16 Rapporteurs Group Meeting |
| 2019-08-21 | E-meeting | [Q12/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9755&Group=16) [[Report](http://www.itu.int/md/T17-SG16-191007-TD-WP1-0269)] | Q12/16 meeting |
| 2019-09-04~05 | E-meeting | [Q8/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9754&Group=16) [[Report](http://www.itu.int/md/T17-SG16-191007-TD-WP3-0098)] | Q8/16 meeting |
| 2019-10-09 | Geneva | [Q26/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9772&Group=16) [[Report](http://www.itu.int/md/T17-SG16-200622-TD-WP2-0269)] | 15th IRG-AVA meeting |
| 2019-10-22 | E-meeting | [Q27/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9809&Group=16) [[Report](http://www.itu.int/md/T17-SG16-200622-TD-WP2-0271)] | Q27/16 & JVDS meeting |
| 2019-11-05 | E-meeting | [Q27/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9810&Group=16) [[Report](http://www.itu.int/md/T17-SG16-200622-TD-WP2-0272)] | Q27/16 & JVDS meeting |
| 2019-12-10~11 | Geneva | [Q27/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9812&Group=16) [[Report](http://www.itu.int/md/T17-SG16-200622-TD-WP2-0273)] | Q27/16 & JVDS meeting |
| 2019-12-18 | E-meeting | [Q12/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9813&Group=16) [[Report](http://www.itu.int/md/T17-SG16-200622-TD-WP1-0333)] | Q12/16 meeting |
| 2020-01-07~17 | Brussels, Belgium | [Q6/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9814&Group=16) [[Report](http://www.itu.int/md/T17-SG16-200622-TD-WP3-0123)] | Q6/16 & JVET & JCT-VC |
| 2020-02-04 | Geneva | [Q26/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9910&Group=16) [[Report](http://www.itu.int/md/T17-SG16-200622-TD-WP2-0270)] | 16th IRG-AVA meeting |
| 2020-02-17 | Geneva | [Q28/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9816&Group=16) [[Report](http://www.itu.int/md/T17-SG16-200622-TD-WP2-0275)] | Q28/16 – Safe Listening meeting |
| 2020-03-03~04 | E-meeting | [Q22/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9952&Group=16) [[Report](http://www.itu.int/md/T17-SG16-200622-TD-WP2-0276)] | Q22/16 meeting |
| 2020-03-09~10 | Geneva | [Q27/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9823&Group=16) [[Report](http://www.itu.int/md/T17-SG16-200622-TD-WP2-0274)] | JVDS Q27/16 & JVDS meeting |
| 2020-03-23~27 | E-meeting | [Q21/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9995&Group=16) [[Report](http://www.itu.int/md/T17-SG16-200622-TD-WP1-0335)] | Q21/16 meeting |
| 2020-03-31~04-02 | E-meeting | [Q12/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9963&Group=16) [[Report](http://www.itu.int/md/T17-SG16-200622-TD-WP1-0334)] | Q12/16 meeting |
| 2020-04-01~02 | E-meeting | [Q24/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9954&Group=16) [[Report](http://www.itu.int/md/T17-SG16-200622-TD-WP2-0277)] | Q24/16 meeting |
| 2020-04-07~09 | E-meeting | [Q8/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9834&Group=16) [[Report](http://www.itu.int/md/T17-SG16-200622-TD-WP3-0125)] | Q8/16 meeting |
| 2020-04-15~24 | E-meeting | [Q6/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9833&Group=16) [[Report](http://www.itu.int/md/T17-SG16-200622-TD-WP3-0124)] | Q6/16 & JVET & JCT-VC |
| 2020-04-27 | E-meeting | [Q28/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9956&Group=16) [[Report](http://www.itu.int/md/T17-SG16-200622-TD-WP2-0278)] | Q28/16 – Safe Listening meeting |
| 2020-05-12 | E-meeting | [Q27/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=10038&Group=16) [[Report](http://www.itu.int/md/T17-SG16-200622-TD-WP2-0282)] | Q27/16 meeting |
| 2020-05-18~21 | E-meeting | [Q26/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=10152&Group=16) [[Report](http://www.itu.int/md/T17-SG16-200622-TD-WP2-0281)] | Q26/16 meeting |
| 2020-05-20~21 | E-meeting | [Q8/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=10122&Group=16) [[Report](http://www.itu.int/md/T17-SG16-200622-TD-WP3-0126)] | Q8/16 meeting |
| 2020-05-27 | E-meeting | [Q13/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9835&Group=16) [[Report](http://www.itu.int/md/T17-SG16-200622-TD-WP1-0336)] | Q13/16 meeting |
| 2020-05-28~29 | E-meeting | [Q24/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=10151&Group=16) [[Report](http://www.itu.int/md/T17-SG16-200622-TD-WP2-0280)] | Q24/16 meeting |
| 2020-06-05~10 | E-meeting | [Q28/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=9957&Group=16) [[Report](http://www.itu.int/md/T17-SG16-200622-TD-WP2-0284)] | Q28/16 – Safe Listening meeting |
| 2020-06-08 | E-meeting | [Q27/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=10282&Group=16) [[Report](http://www.itu.int/md/T17-SG16-200622-TD-WP2-0283)] | Q27/16 Rapporteur meeting |
| 2020-06-25 | E-meeting | [Q26/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=10365&Group=16) [[Report](https://www.itu.int/md/T17-SG16-210419-TD-WP2-0349)] | 17th IRG-AVA meeting |
| 2020-09-09 | E-meeting | [Q13/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=11511&Group=16) [[Report](https://www.itu.int/md/T17-SG16-210419-TD-WP1-0392)] | Q13/16 meeting |
| 2020-10-06~07 | E-meeting | [Q27/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=11512&Group=16) [[Report](https://www.itu.int/md/T17-SG16-210419-TD-WP2-0356)] | JVDS & Q27/16 meeting |
| 2020-10-07~16 | E-meeting | [Q6/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=11737&Group=16) [[Report](https://www.itu.int/md/T17-SG16-210419-TD-WP3-0158)] | Q6/16 & JVET |
| 2020-10-13~14 | E-meeting | [Q28/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=11600&Group=16) [[Report](https://www.itu.int/md/T17-SG16-210419-TD-WP2-0357)] | Q28/16 – Safe Listening meeting |
| 2020-10-20 | E-meeting | [Q26/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=11566&Group=16) [[Report](https://www.itu.int/md/T17-SG16-210419-TD-WP2-0350)] | 18th IRG-AVA meeting |
| 2020-11-17 | E-meeting | [Q27/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=11561&Group=16) [[Report](https://www.itu.int/md/T17-SG16-210419-TD-WP2-0355)] | JVDS meeting |
| 2020-11-23~24 | E-meeting | [Q28/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=11726&Group=16) [[Report](https://www.itu.int/md/T17-SG16-210419-TD-WP2-0358)] | Q28/16 – Safe-listening devices |
| 2020-11-25~26 | E-meeting | [Q26/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=11740&Group=16) [[Report](https://www.itu.int/md/T17-SG16-210419-TD-WP2-0353)] | Q26/16 meeting |
| 2020-12-01~03 | E-meeting | [Q22/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=11749&Group=16) [[Report](https://www.itu.int/md/T17-SG16-210419-TD-WP2-0351)] | Q22/16 meeting |
| 2020-12-14~16 | E-meeting | [Q23/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=11750&Group=16) [[Report](https://www.itu.int/md/T17-SG16-210419-TD-WP2-0352)] | Q23/16 meeting |
| 2020-12-14~16 | E-meeting | [Q21/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=11748&Group=16) [[Report](https://www.itu.int/md/T17-SG16-210419-TD-WP1-0393)] | Q21/16 meeting |
| 2020-12-14~16 | E-meeting | [Q5/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=11746&Group=16) [[Report](https://www.itu.int/md/T17-SG16-210419-TD-WP3-0156)] | Q5/16 meeting |
| 2020-12-14~16 | E-meeting | [Q12/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=11747&Group=16) [[Report](https://www.itu.int/md/T17-SG16-210419-TD-WP1-0391)] | Q12/16 meeting |
| 2021-01-06~15 | E-meeting | [Q6/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=11738&Group=16) [[Report](https://www.itu.int/md/T17-SG16-210419-TD-WP3-0159)] | Q6/16 & JVET |
| 2021-01-26~28 | E-meeting | [Q22/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=11834&Group=16) [[Report](https://www.itu.int/md/T17-SG16-210419-TD-WP2-0368)] | Q22/16 meeting |
| 2021-02-08~09 | E-meeting | [Q28/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=11833&Group=16) [[Report](https://www.itu.int/md/T17-SG16-210419-TD-WP2-0359)] | Q28/16 meeting |
| 2021-02-16 | E-meeting | [Q24/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=11837&Group=16) [[Report](https://www.itu.int/md/T17-SG16-210419-TD-WP2-0364)] | Q24/16 meeting |
| 2021-02-24 | E-meeting | [Q12/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=11835&Group=16) [[Report](https://www.itu.int/md/T17-SG16-210419-TD-WP1-0396)] | Q12/16 meeting |
| 2021-03-04~05 | E-meeting | [Q27/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=12339&Group=16) [[Report](https://www.itu.int/md/T17-SG16-210419-TD-WP2-0367)] | Joint Q27/16 & FG-VM WG2 |
| 2021-03-10 | E-meeting | [Q28/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=12351&Group=16) [[Report](https://www.itu.int/md/T17-SG16-210419-TD-WP2-0360)] | Q28/16 meeting |
| 2021-03-17 | E-meeting | [Q24/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=12350&Group=16) [[Report](https://www.itu.int/md/T17-SG16-210419-TD-WP2-0365)] | Q24/16 meeting |
| 2021-04-09 | E-meeting | [Q26/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=12341&Group=16) [[Report](https://www.itu.int/md/T17-SG16-220117-TD-WP2-0437)] | 19th IRG-AVA meeting |
| 2021-06-28~29 | E-meeting | [Q28/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=12514&Group=16) [[Report](https://www.itu.int/md/T17-SG16-210927-TD-WP2-0418)] | Q28/16 "Digital health" RGM |
| 2021-07-07~16 | E-meeting | [Q6/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=12530&Group=16) [[Report](https://jvet-experts.org/doc_end_user/current_document.php?id=11024)] | Q6/16 & JVET meeting |
| 2021-08-17~19 | E-meeting | [Q12/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=12649&Group=16) [[Report](https://www.itu.int/md/T17-SG16-220117-TD-WP1-0447)] | Q12/16 Rapporteur meeting |
| 2021-08-18~19 | E-meeting | [Q23/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=12650&Group=16) [[Report](https://www.itu.int/md/T17-SG16-210927-TD-WP2-0417)] | Q23/16 Rapporteur meeting |
| 2021-09-02~03 | E-meeting | [Q27/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=12706&Group=16) [[Report](https://www.itu.int/md/T17-SG16-210927-TD-WP2-0419)] | Q27/16 Rapporteur meeting |
| 2021-09-15~16 | E-meeting | [Q28/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=12713&Group=16) [[Report](https://www.itu.int/md/T17-SG16-210927-TD-WP2-0423)] | Q28/16 meeting |
| 2021-09-22~24 | E-meeting | [Q21/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=12686&Group=16) [[Report](https://www.itu.int/md/T17-SG16-220117-TD-WP1-0450)] | Q21/16 meeting |
| 2021-09-22~24 | E-meeting | [Q13/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=12687&Group=16) [[Report](https://www.itu.int/md/T17-SG16-220117-TD-WP1-0449)] | Q13/16 meeting |
| 2021-09-22 | E-meeting | [Q26/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=12695&Group=16) [[Report](https://www.itu.int/md/T17-SG16-210927-TD-WP2-0421)] | Joint Q11/9 and Q26/16 meeting |
| 2021-09-23~24 | E-meeting | [Q27/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=12707&Group=16) [[Report](https://www.itu.int/md/T17-SG16-210927-TD-WP2-0420)] | Q27/16 Rapporteur meeting |
| 2021-09-23 | E-meeting | [Q26/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=12697&Group=16) [[Report](https://www.itu.int/md/T17-SG16-220117-TD-WP2-0438)] | 20th IRG-AVA meeting |
| 2021-10-06~15 | E-meeting | [Q6/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=12531&Group=16) [[Report](https://www.itu.int/md/T17-SG16-220117-TD-WP3-0204)] | Q6/16 & JVET meeting |
| 2021-10-13~15 | E-meeting | [Q8/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=12688&Group=16) [[Report](https://www.itu.int/md/T17-SG16-220117-TD-WP3-0205)] | Q8/16 meeting |
| 2021-10-27~29 | E-meeting | [Q5/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=12712&Group=16) [[Report](https://www.itu.int/md/T17-SG16-220117-TD-WP3-0206)] | Q5/16 meeting |
| 2021-11-16 | E-meeting | [Q26/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=12772&Group=16) [[Report](https://www.itu.int/md/T17-SG16-220117-TD-WP2-0439)] | 21st IRG-AVA meeting |
| 2021-11-17~18 | E-meeting | [Q12/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=12816&Group=16) [[Report](https://www.itu.int/md/T17-SG16-220117-TD-WP1-0448)] | Q12/16 Rapporteur meeting |
| 2021-11-23 | E-meeting | [Q24/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=12770&Group=16) [[Report](https://www.itu.int/md/T17-SG16-220117-TD-WP2-0440)] | Q24/16 meeting |
| 2021-12-07~08 | E-meeting | [Q28/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=12797&Group=16) [[Report](https://www.itu.int/md/T17-SG16-220117-TD-WP2-0442)] | Q28/16 meeting |
| 2021-12-14 | E-meeting | [Q24/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=12771&Group=16) [[Report](https://www.itu.int/md/T17-SG16-220117-TD-WP2-0441)] | Q24/16 meeting |
| 2021-12-16~17 | E-meeting | [Q13/16](http://www.itu.int/net/ITU-T/lists/rgmdetails.aspx?id=12841&Group=16) [[Report](https://www.itu.int/md/T17-SG16-220117-TD-WP1-0470)] | Q13/16 meeting |
| 2022-01-12~21 | E-meeting | [Q6/16](http://www.itu.int/net/itu-t/lists/rgmdetails.aspx?id=12979&Group=16) | Q6/16 & JVET meeting |
| 2022-02-01 | E-meeting | [Q26/16](http://www.itu.int/net/itu-t/lists/rgmdetails.aspx?id=12840&Group=16) [[Report](https://extranet.itu.int/sites/irg/ava/Shared%20Documents/IRG-AVA-2202-002.docx)] | 22nd IRG-AVA meeting |

TABLE 2
Organization of Study Group 16

| Designation | Questions to be studied | Title of the Working Party | Chairman and Vice-Chairmen |
| --- | --- | --- | --- |
| WP1/16 | 11, 12, 13, 14\*, 21/16 | Multimedia content delivery | Mr Seong-Ho Jeong (Co‑chairman)Mr Marcelo Moreno (Co‑chairman) |
| WP2/16 | 22, 23, 24, 26, 27, 28/16 | Multimedia e-services | Mr Mohannad El-Megharbel (Co‑chairman)Mr Hideki Yamamoto (Co‑chairman) |
| WP3/16 | 5, 6, 7\*, 8/16 | Media coding and immersive environments | Mr Paul Coverdale (Chairman till Sep. 2020)Mr Hideo Imanaka (Co‑chairman from April 2021)Ms Yuan Zhang (Co‑chairman from April 2021) |
| NOTE \* As a result of the COVID pandemic contingency plans, Question 7/16 was merged with Question 6/16 and Question 14/16 with Question 13/16 on 18 January 2021 (see [TSAG-R20](https://www.itu.int/md/T17-TSAG-R-0020/en)).NOTE \*\* Question 1/16 and the Correspondence Group on Metaverse (CG-Metaverse) were allocated to the SG16 Plenary.  |

TABLE 3
Other Groups (if any)

| Name of the group | Co-Chairmen | Vice-chairmen |
| --- | --- | --- |
| IRG-AVA (Intersector Rapporteur Group on Audiovisual Media Accessibility) | ITU-R SG6: David Wood (EBU; till October 2020), Andy Quested (EBU; from April 2021), ITU-T SG9: Amal Punchihewa (ABU, Malaysia, till May 2017); Pradipta Biswas (Indian Institute of Science, India; from November 2018) andITU-T SG16: Masahito Kawamori (Keio University, Japan) | – |
| IRG-IBB (Intersector Rapporteur Group on Integrated Broadcast-Broadband) | ITU-R SG6: Ms Ana Eliza F. Silva (Brazil)ITU-T SG9: Mr Satoshi Miyaji (Japan) and ITU-T SG16: Mr Marcelo Moreno (Brazil) | – |
| FG-AI4AD (ITU-T Focus Group on Artificial Intelligence for Autonomous and Assisted Driving) | Bryn Balcombe (Department for Digital, Culture, Media and Sport, United Kingdom) | – |
| FG-AI4H (ITU-T Focus Group on Artificial Intelligence for Health) | Thomas Wiegand (Fraunhofer HHI, Germany) | Stephen Ibaraki (ACM and REDDS Capital, USA); Ramesh Krishnamurthy (WHO); Naomi Lee (The Lancet, UK); Sameer Pujari (WHO); Manjula Singh (ICMR, India); Shan Xu (CAICT, China) |
| FG-VM (ITU-T Focus Group on Vehicular Multimedia) | Jun (Harry) Li (TIAA, People's Republic of China) | Gaëlle Martin-Cocher (InterDigital Canada, Ltee, Canada) |
| CG-Metaverse (SG16 Correspondence group on Metaverse) | Shin Gak Kang (ETRI, Rep. of Korea); Kepeng Li (Tencent, China), Co-conveners | – |

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

**(valid until 18 January 2021, see §2.2.4)**

| Questions | Title of the Questions | WP | Rapporteur |
| --- | --- | --- | --- |
| 1/16 | Multimedia coordination | PLEN | Ms Sarra Rebhi (Tunisia; Rapporteur from April 2021);Mr Paul Coverdale (Huawei Technologies, China; Rapporteur a.i. from July 2018 to April 2021); Mr Khusan Isaev (Uzbekistan; Rapporteur from January 2017 to October 2019) |
| 6/16 | Visual coding | 3/16 | Mr Gary Sullivan (Microsoft, USA; Rapporteur)Mr Thomas Wiegand (Fraunhofer HHI, Germany; Associate Rapporteur);Ms Jill Boyce (Intel Corporation, USA; Associate Rapporteur from January 2017 to January 2022);Ms Yu Ye (Alibaba, China; from January 2022) |
| 7/16 | Speech/audio coding, voiceband modems, facsimile terminals and network-based signal processing | 3/16 | Mr Paul Coverdale (Huawei Technologies, China; Rapporteur) |
| 8/16 | Immersive live experience systems and services | 3/16 | Mr Hideo Imanaka (NTT, Japan; Rapporteur)Mr Hoerim Choi (KT, Rep. of Korea; Associate Rapporteur) |
| 11/16 | Multimedia systems, terminals, gateways and data conferencing | 1/16 | Mr Patrick Luthi (Switzerland; Rapporteur) |
| 13/16 | Multimedia application platforms and end systems for IPTV | 1/16 | Mr Marcelo Moreno (UFJF, Brazil; Rapporteur)Mr Chuanyang Miao (ZTE, China; Associate Rapporteur) |
| 14/16 | Digital signage systems and services | 1/16 | Mr Kazunori Tanikawa (NEC, Japan; Rapporteur)Mr Shin-Gak Kang (ETRI, Rep. of Korea; Associate Rapporteur) |
| 21/16 | Multimedia framework, applications and services | 1/16 | Ms Liang Wang (ZTE, China; Rapporteur from 17 October 2019)Mr Xiaoyang Ye (ZTE, China; Rapporteur from 29 March to 17 October 2019)Mr Kai Wei (CAICT, China; Rapporteur from 27 January 2017 till 29 March 2019)Mrs Nijingnan Zhang (China Unicom, China; Associate Rapporteur from 3 July 2020)Mr Xiaoyang Ye (ZTE, China; Associate Rapporteur) |
| 24/16 | Human factors related issues for improvement of the quality of life through international telecommunications | 2/16 | Ms Miran Choi (ETRI, Rep. of Korea; Rapporteur)Mr Floris Van Nes (ErgoNes, Netherlands; Associate Rapporteur till March 2019) |
| 26/16 | Accessibility to multimedia systems and services | 2/16 | Mr Masahito Kawamori (Keio University, Japan; Rapporteur)Mr Mohannad El-Megharbel (NTRA, Egypt; Associate Rapporteur) |
| 27/16 | Vehicle gateway platform for telecommunication/ITS services and applications | 2/16 | Mr Fernando Masami Matsubara (Mitsubishi Electric, Japan; Rapporteur) |
| 28/16 | Multimedia framework for e-health applications | 2/16 | Mr Masahito Kawamori (Keio University, Japan; Rapporteur) |

TABLE 5
Study Group 16 – New Questions adopted and Rapporteurs

**(valid until 18 January 2021, see §2.2.4)**

| Question | Title of the Questions | WP | Rapporteur |
| --- | --- | --- | --- |
| 5/16 | Artificial intelligence-enabled multimedia applications | 3/16 | Mr Yuntao Wang (CAICT, China; Rapporteur) |
| 12/16 | Visual surveillance systems and services | 1/16 | Mrs Yuan Zhang (China Telecom, China; Rapporteur)Mr Haitao Zhang (Beijing University of Posts and Telecommunications, China; Associate Rapporteur) |
| 22/16 | Distributed ledger technologies and e-services | 2/16 | Mr Kai Wei (CAICT, China; Rapporteur)Mr Ruifeng (Victor) Hu (Huawei Technologies, China; Associate Rapporteur from March 2019 to January 2022)Mrs Suzana Maranhão Moreno (BNDES, Brazil; Associate Rapporteur from October 2019 to January 2022) |
| 23/16 | Digital culture-related systems and services | 2/16 | Mr Hong (Norman) Chen (BUPT, China; Rapporteur)Mr Shizhong Xu(University of Electronic Science and Technology, China; Associate Rapporteur) |

TABLE 6
Study Group 16 – Questions deleted

| Question | Title of Question | Rapporteur | Results |
| --- | --- | --- | --- |
| 7/16 | Speech/audio coding, voiceband modems, facsimile terminals and network-based signal processing | Mr Paul Coverdale (Huawei Technologies, China) | Recommendations: G.722.2 Annex C, G.722.2 Annex D, and G.722.2 Annex C (2017) Cor. 1Implementer's guide: G.729 (2012)-IG |
| 14/16 | Digital signage systems and services | Mr Tanikawa Kazunori (NEC; Rapporteur); Mr Kang Shin-Gak (ETRI; Associate Rapporteur) | Recommendations: H.782, H.782 (V2), H.783, H.783 (V2), H.784, and H.785.1.Technical paper: HSTP.DS-Gloss |

TABLE 6-*bis*
Study Group 16 – List of Questions adopted and Rapporteurs following
TSAG endorsement on 18 January 2021 (in force by the end of the study period)

| Question | Title of the Questions | WP | Rapporteur |
| --- | --- | --- | --- |
| 1/16 | Multimedia and digital services coordination | PLEN | Ms Sarra Rebhi (Tunisia; Rapporteur) |
| 5/16 | Artificial intelligence-enabled multimedia applications | 3/16 | Mr Yuntao Wang (CAICT, China; Rapporteur)Mr Yuwei Wang (Institute of Computing Technology, China; Associate Rapporteur) |
| 6/16 | Visual, audio and signal coding | 3/16 | Mr Gary Sullivan (Microsoft, USA; Rapporteur)Mr Thomas Wiegand (Fraunhofer HHI, Germany; Associate Rapporteur)Ms Jill Boyce (Intel Corporation, USA; Associate Rapporteur from January 2017 to January 2022)Ms Yan Ye (Alibaba, China; Associate Rapporteur from 28 January 2022) |
| 8/16 | Immersive live experience systems and services | 3/16 | Mr Hideo Imanaka (NTT, Japan; Rapporteur)Mr Hoerim Choi (KT, Rep. of Korea; Associate Rapporteur) |
| 11/16 | Multimedia systems, terminals, gateways and data conferencing | 1/16 | Mr Patrick Luthi (Switzerland; Rapporteur) |
| 12/16 | Intelligent visual systems and services | 1/16 | Ms Yuan Zhang (China Telecom, China; Rapporteur)Mr Haitao Zhang (BUPT, China; Associate Rapporteur) |
| 13/16 | Content delivery, multimedia application platforms and end systems for IP-based TV services including digital signage | 1/16 | Mr Marcelo Moreno (UFJF, Brazil; Rapporteur)Mr Chuanyang Miao (ZTE, China; Associate Rapporteur) |
| 21/16 | Multimedia framework, applications and services | 1/16 | Ms Liang Wang (ZTE, China; Rapporteur)Mrs Nijingnan Zhang (China Unicom, China; Associate Rapporteur) |
| 22/16 | Multimedia aspects of distributed ledger technologies and e-services | 2/16 | Mr Kai Wei (CAICT, China; Rapporteur)Mr Ruifeng (Victor) Hu (Huawei Technologies, China; Associate Rapporteur from March 2019 to January 2022)Mrs Suzana Maranhão Moreno (BNDES, Brazil; Associate Rapporteur from October 2019 to January 2022)Ms Liangliang Zhang (Huawei Technologies, China; Associate Rapporteur from January 2022) |
| 23/16 | Digital culture-related systems and services | 2/16 | Mr Hong (Norman) Chen (BUPT, China; Rapporteur)Mr Shizhong Xu (University of Electronic Science and Technology, China; Associate Rapporteur) |
| 24/16 | Human factors for intelligent user interfaces and services | 2/16 | Ms Miran Choi (ETRI, Rep. of Korea; Rapporteur) |
| 26/16 | Accessibility to multimedia systems and services | 2/16 | Mr Masahito Kawamori (Keio University, Japan; Rapporteur)Mr Mohannad El-Megharbel (NTRA, Egypt; Associate Rapporteur) |
| 27/16 | Vehicular multimedia communications, systems, networks, and applications | 2/16 | Mr Fernando Masami Matsubara (Mitsubishi Electric, Japan; Rapporteur)Mr Hongki Cha (ETRI, Rep. of Korea; Associate Rapporteur) |
| 28/16 | Multimedia framework for digital health applications | 2/16 | Mr Masahito Kawamori (Keio University, Japan; Rapporteur) |

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

## 3.1 General

During the study period, Study Group 16 examined 919 contributions (up from 803 contributions in the previous study period, also considering the extension of the study period because of the COVID-19 pandemic). On the basis of these documents and of a large number of temporary documents, Study Group 16:

– drew up 234 new and revised Recommendations.

– issued 16 amended/corrigenda to Recommendations.

– produced one new and one revised implementers guides.

– developed four new and two revised Supplements.

– produced 19 new and five revised technical papers.

### 3.1.1 WTSA-20 Preparations

Initial discussions concerning the Study Group 16 mandate (including its title, points of guidance and lead roles) for the next study period were held during the 7-17 October 2019 meeting in plenary level ad hoc meetings. The trend from discussions was to align the wording of its mandate with the current and foreseen future standardization trends, as an evolution of multimedia and e-services. The text of the various Questions was discussed at Rapporteur and working party level; here, the trend was to maintain approximately the same number of Questions (considering the then proposed new Q23/16, and the merger of Question 7/16 into Question 6/16). More details can be found in the liaison statement sent to TSAG in [SG16-LS165](https://www.itu.int/ifa/t/2017/ls/sg16/sp16-sg16-oLS-00165.docx). Discussions would continue in the interim period aiming at completion at the subsequent SG16 meeting.

After the significant discussions in the October 2019 meeting on the title, mandate, points of guidance and lead roles, focus was put during the SG16 meeting online, 22 June – 3 July 2020, on completing the text of 14 Questions being proposed to WTSA-20 for the next study period. A plenary ad hoc group that discussed a more substantive proposal to create a new Question on vehicular multimedia concluded that it would be better to amend the mandate of existing Question 27/16. At the closing plenary, Study Group 16 endorsed the mandate as discussed at the previous SG16 meeting and the final 14 Question updates coming from Q1/16 and the three WPs. These were packaged and sent to TSAG (online, September 2020) for coordination at the Sector level prior to submission to WTSA-20.

With WTSA postponed to 1-9 March 2022, the 19-30 April 2021 meeting operated under the set of Study Group 16 Questions endorsed by TSAG on 18 January 2021 ([TSAG-R20](https://www.itu.int/md/T17-TSAG-R-0020/en)). This updated set corresponds to the one that had been agreed by Study Group 16 in July 2020 for approval by WTSA with minor amendments by TSAG in its September 2020 meeting. Concerning the mandate, no further updates were proposed at the 19-30 April 2021 meeting. Since the last Study Group 16 meeting in the study period would take place in the week after the last TSAG meeting in the period, unless an extra Study Group 16 meeting were planned, the current set of Questions and Resolution 2 updates as of the April 2021 meeting would be the ones to be submitted to WTSA, for further deliberations in its preparations for the next study period. The Study Group 16 management conducted a consultation to determine whether such an extra Study Group 16 Plenary would be needed, and there was no interest from members. Therefore, the title, mandate, guidance, lead roles and Questions as seen during the 19-30 April 2021 SG16 meeting were ready to be submitted to WTSA-20.

The missing texts for Part I of the SG16 report to WTSA-20 were the summary of results and the outlook for the SG16 studies in the new study period. They were drafted during the SG16 meeting online, 17-28 January 2022 by the SG management (including Rapporteurs) and shared with members for further comments. The final text is found in this report, sections 3 and 4.

### 3.1.2 Workshops and seminars

* [Second Mini Workshop on Immersive Live Experience (ILE)](https://www.itu.int/en/ITU-T/studygroups/2017-2020/16/Pages/ws/201701_ILE.aspx), Geneva, 19 January 2017
* [Mini-Workshop on Future CDN](https://www.itu.int/en/ITU-T/studygroups/2017-2020/16/Pages/ws/201710_FutureCDN.aspx), Macao, China, 17 October 2017
* [Third Mini Workshop on Immersive Live Experience (ILE)](https://www.itu.int/en/ITU-T/studygroups/2017-2020/16/Pages/ws/201710_ILE.aspx), Macao, China, 24 October 2017
* [ITU Workshop on "Multimedia applications and the future of digital society"](https://itu.int/en/ITU-T/Workshops-and-Seminars/20180709), Ljubljana, 9 July 2018
* [ITU Workshop "Enhancing human life using e-services"](https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Pages/Events/2019/eServices/enhancing-human-life-using-e-services.aspx), Geneva, 25 March 2019
* [ITU Workshop "The Turing Test for Autonomous Driving - A Global Performance Standard for AI on our Roads"](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/092019/Pages/default.aspx), Budapest, 10 September 2019
* [ITU Workshop "The Future of Media"](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/20191008/Pages/default.aspx), Geneva, Tue 8 October 2019
* [ITU Workshop "The future of television for Asia & Pacific"](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/202004), Online, 23 April 2021
* [ITU/WHO workshop "Role of industry in making telehealth accessible for persons with disabilities"](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/dh/202106/Pages/default.aspx), Online, 23 June 2021
* [ITU/WHO Workshop "Digital Vaccination Certificate"](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/2021/0811/Pages/default.aspx), Online, 11 August 2021
* [2nd Joint ITU/WHO Workshop on Digital COVID-19 Certificates](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/2021/1126), Online, 26 November 2021
* [ITU Workshop on the Future of television for Europe (2021 edition)](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/2021/1119), Online, 19 November 2021
* [Joint ITU/WHO Workshop on safe listening in e-sports and video gaming: identifying use cases and requirements](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/2021/1202/Pages/default.aspx), Online, 2 December 2021
* [ITU Workshop on AI and multimedia: Exploration of new frontiers and cross-SDO synergy](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/2022/0118), Online, 18 January 2022. This workshop was jointly organized with ISO/IEC JTC1/SC29 to strengthen collaboration in areas of common interest for AI and multimedia.

The ITU/WHO AI for health workshop series was organized as part of FG-AI4H meetings, and then subsequently organized under the *AI in Health* segment of the online ITU AI for Good webinar series:

* FG-AI4H meetings (nine events): [2018-09](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/20180925) (WHO, Geneva) | [2018-11](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/20181114/Pages/default.aspx) (Columbia Univ., New York) | [2019-01](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/ai4h/20190122/Pages/default.aspx) (EPFL, Lausanne) | [2019-04](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/20190402/Pages/default.aspx) (CAICT, Shanghai) | [2019-05](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/ai4h/20190529/Pages/default.aspx) (AI for Good, Geneva) | [2019-09](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/ai4h/201909/Pages/default.aspx) (Zanzibar) | [2019-11](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/ai4h/201911/Pages/default.aspx) (New Delhi) | [2020-01](https://itu.int/en/ITU-T/focusgroups/ai4h/Pages/ws/2001.aspx) (Fraunhofer HHI, Berlin) | [2020-01](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/ai4h/202001/Pages/default.aspx) (Brasilia).
* [AI4 for Good](https://aiforgood.itu.int/search-result-programme/?keyword=&category=346&event-venue=&enddate=&startdate=Select+year) (12 events)
* [Seeing the future: AI-based risk assessment models](https://aiforgood.itu.int/event/ai-and-health-regina-barzilay/), Naomi Lee (The Lancet Journal), Regina Barzilay (Massachusetts Institute of Technology (MIT)), 26 May 2021
* [Ignoring the mirage of the disposable clinician for the successful deployment of AI in medicine](https://aiforgood.itu.int/event/ignoring-the-mirage-of-the-disposable-clinician-for-the-successful-deployment-of-ai-in-medicine/), Isaac Kohane (Harvard Medical School), Maha Farhat (Harvard Medical School), 22 June 2021
* [Making neural nets uncool again](https://aiforgood.itu.int/event/ai-and-health-jeremy-howard/), Jeremy Howard (fast.ai), 16 July 2021
* [Ethics in AI for health: the quest for global governance](https://aiforgood.itu.int/event/ai-and-health-effy-vayena/), Effy Vayena (ETH Zurich), 15 September 2021
* [Contextualizing progress in the AI revolution](https://aiforgood.itu.int/event/contextualizing-progress-in-the-ai-revolution/), David Shaywitz (Astounding HealthTech), 22 September 2021
* [Dissecting algorithmic bias](https://aiforgood.itu.int/event/ai-and-health-ziad-obermeyer/), Ziad Obermeyer (Berkeley School of Public Health), 7 October 2021
* [The disorderly world of diagnostic and prognostic models for covid-19](https://aiforgood.itu.int/event/ai-and-health-maarten-van-smeden-laure-wynants/), Laure Wynants (Maastricht University), Maarten van Smeden (University Medical Center Utrecht), 8 November 2021
* [AI for Health in developing countries](https://aiforgood.itu.int/event/ai-and-health-hugo-morales/), Hugo Morales (Robô Laura), 22 November 2021
* [Fairness of machine learning classifiers in medical image analysis](https://aiforgood.itu.int/event/fairness-of-machine-learning-classifiers-in-medical-image-analysis/), Enzo Ferrante (Argentina's National Research Council (CONICET)), 6 December 2021
* [Bringing machine learning to clinical use safely, ethically and cost-effectively](https://aiforgood.itu.int/event/bringing-machine-learning-to-clinical-use-safely-ethically-and-cost-effectively/), Nigam Shah (Stanford University), Isaac Kohane (Harvard Medical School), 17 December 2021
* [Refusing AI Contact: Autism, Algorithms and the Dangers of ‘Technopsyence’](https://aiforgood.itu.int/event/refusing-ai-contact-autism-algorithms-and-the-dangers-of-technopsyence/), Os Keyes (University of Washington), 13 January 2022
* [AI-Enabled Public Health from a Marginalized Perspective](https://aiforgood.itu.int/event/ai-enabled-public-health-from-a-marginalized-perspective/), Lelia Marie Hampton (Massachusetts Institute of Technology (MIT)), 19 January 2022

The ITU Vehicular Multimedia workshop series was organized as part of FG-VM events: [2018-10](https://www.itu.int/en/ITU-T/focusgroups/vm/Pages/11-11_Mini-workshop.aspx) (Blackberry, Ottawa) | [2019-01](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/20190123/Pages/default.aspx) (TTC, Tokyo) | [2019-09](https://www.itu.int/en/ITU-T/focusgroups/vm/Pages/11-9_wsp.aspx) (ITU/Telecom, Budapest) | [2020-12](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/20201210/Pages/default.aspx) (Online) | [2021-04](https://www.itu.int/en/ITU-T/focusgroups/vm/Pages/12-04_Special-session.aspx) (Online)

The ITU Autonomous and Assisted Driving workshop series was organized as part of FG-AI4AD events: [2019-09-10](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/092019/Pages/default.aspx) (Hungary, Budapest) | [2020-01-21](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/20200121/Pages/default.aspx) (London) | [2020-09-16](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/20200916/Pages/default.aspx) (Online) | [2020-10-20](https://aiforgood.itu.int/event/ai-safety-ethics-for-self-driving-introducing-the-molly-problem/) (Online) | [2020-12-02](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/20201202/Pages/default.aspx) (Online) | [2021-03-02](https://aiforgood.itu.int/events/a-regulatory-framework-for-automated-driving-the-value-of-in-use-data-for-creating-a-no-blame-culture-of-safety/) (Online) | [2021-06-02](https://aiforgood.itu.int/event/ai-policy-standards-and-metrics-for-automated-driving-safety/) (Online) | [2021-10-06](https://aiforgood.itu.int/event/ai-for-road-safety/) (Online).

The [ITU DLT meet-up series](https://www.itu.int/en/ITU-T/webinars/Pages/dlt.aspx) was organized by DLT standardization experts in Q22/16 as regular interactive webinar episodes. Eleven episodes had been organized as of January 2022, and experts expect to have new episodes (in principle) on the 1st Wednesday of each month. A [call for speakers](https://itu.int/en/ITU-T/webinars/20200805/Documents/DLT%20Meet-ups_Call%20for%20speakers.pdf) tells how DLT practitioners can propose talks and special sessions. These were the 11 episodes organized in 2020 and 2021:

* Episode #1: [DLT Interoperability](https://www.itu.int/en/ITU-T/webinars/20200805/Pages/default.aspx) (5 August 2020)
* Episode #2:[Working together for DLT Interoperability](https://www.itu.int/en/ITU-T/webinars/20200902/Pages/default.aspx) (2 September 2020)
* Episode #3: [Telecom Use Cases](https://www.itu.int/en/ITU-T/webinars/20201014/Pages/default.aspx) (14 October 2020)
* Episode #4:[Creating a public infrastructure of the internet of value](https://www.itu.int/en/ITU-T/webinars/20201104/Pages/default.aspx) (4 November 2020)
* Episode #5: [DLT standardization: ITU-T standards and the way forward](https://www.itu.int/en/ITU-T/webinars/20201202/Pages/default.aspx) (2 December 2020)
* Episode #6: [DLT Authentication](https://www.itu.int/en/ITU-T/webinars/20210303/Pages/default.aspx) (3 March 2021)
* Episode #7: [Change Management DLT-based Decentralized Applications](https://www.itu.int/en/ITU-T/webinars/20210407/Pages/default.aspx) (7 April 2021)
* Episode #8: [Trusted DLT and Hardware Integration](https://www.itu.int/en/ITU-T/webinars/20210512/Pages/default.aspx) (12 May 2021)
* Episode #9: [DLT Standardization: A technical framework for regulatory compliance](https://www.itu.int/en/ITU-T/webinars/20210602/Pages/default.aspx) (2 June 2021)
* Episode #10: [Industrial and Energy Use Cases](https://www.itu.int/en/ITU-T/webinars/20210804/Pages/default.aspx) (4 August 2021)
* Episode #11: [DLT Interoperability Onchain X Offchain](https://www.itu.int/en/ITU-T/webinars/20211013/Pages/default.aspx) (13 October 2021)

## 3.2 Highlights of achievements

The main results achieved on the various Questions assigned to Study Group 16 are summarized in the subclauses below. Formal replies to the Questions are given in the synoptic tables in Annex 1 of this report.

### 3.2.1 Media coding

During this study period, while the audio compression topic only covered two issue reports for speech codecs, the media coding work has been almost exclusively on video and image compression.

The two audio coding updates were an Implementors Guide to ITU-T G.729 voice codec documented a problem and its solution, concerning the voice activity detector in Annex B, and revisions to Annexes of ITU-T G.722.2, which is a technically aligned specification with 3GPP (3GPP TS 26.171 to TS 26.174) with the AMR-WB advanced multi-rate wideband speech coding.

Concerning the video work, at the start of the study period, the exploration phase of the successor codec to H.265 completed and the development phase was launched in October 2019. The Joint Video Experts Team (JVET) of ITU-T SG16 and ISO/IEC JTC1/SC29 met three to four times a year to address thousands of proposals received. The group completed development of the first edition of "Versatile Video Coding" (VVC) in July 2020, which is published as ITU-T H.266 and ISO/IEC 23090-3. VVC achieves about a 50% bit rate reduction vs. H.265/HEVC for equal subjective video quality. Test results demonstrate that VVC provides about a 40% bit rate reduction for 4K/UHD test sequences using objective metrics. Application areas especially targeted for the use of VVC include ultra-high definition 4K and 8K video, video with a high dynamic range and wide colour gamut, and video for immersive media applications such as 360° omnidirectional video, as well as conventional standard-definition and high-definition video content. Work completed in January 2022 for the second edition of H.266 to add additional profiles to address application requirements for higher bit rates and higher bit depths as well as for the new H.266 reference software and conformance specification, H.266.1 and H.266.2.

The JVET, which focused initially on the development of the successor video compression technology of H.265/HEVC, has morphed in April 2021 to become the platform to address all joint video codec work between ITU-T SG16 and JTC1/SC29, including maintenance of H.262, H.264 and H.265, as well as H.266. Various revisions were issued for H.264 and H.265 during the study period, updating and extending features of these highly deployed video codecs.

Two standards were produced to assist a consistent use of video coding configurations and codepoints, with ITU-T H.273 "*Coding-independent code points for video signal type identification*" and ITU-T H.274 "*Versatile supplemental enhancement information for coded video bitstreams*" which specifies the syntax and semantics of video usability information parameters and supplemental enhancement information messages for use with coded video bitstreams, VVC in particular.

Three Supplements and one Technical Paper (that are technically aligned with ISO/IEC technical reports) were prepared:

* H-series Supplement 15 contains a report on conversion and coding practices for HDR/WCG Y'CbCr 4:2:0 video with PQ transfer characteristics.
* H-series Supplement 18 reviews approaches for processing and coding of high-definition range/ wide colour gamut (HDR/WCG) video content.
* H-Series Supplement 19 documents code points for different sets of video signal properties and their combinations that are widely used in production and video content workflows. The information in this Supplement will help producers of various content processing tools avoid processing mistakes that can cause video quality degradation due to having incorrect assumptions made about video property combinations.
* In order to create a historic reference for future development practices for video codecs, ITU-T Technical Paper HSTP-VID-WPOM was prepared that describes working practices using objective metrics for evaluation of video coding efficiency experiments.

Work started on a new Supplement H.Sup-FGST on film grain synthesis technology for video coding applications, in addition to updates to the existing video and image coding Recommendations.

Cooperation continued with JPEG, mostly with extension of the existing JPEG (ITU-T T.88 on lossy/lossless coding of bi-level images and T.873 with Reference software for Digital compression and coding of continuous-tone still images) and JPEG-2000 image coding (ITU-T T.801 with JPEG 2000 extensions, T.803 with JPEG 2000 conformance testing, T.804 JPEG 2000 reference software, and T.815 for encapsulation of JPEG 2000 images in HEVC file format). New work was started with JPEG on a joint project known as JPEG AI for learning-based image coding, with goals including improving compression capability and enabling efficient compressed-domain image processing and computer vision functionality.

SG16 agreed at its meeting online, 17-28 January 2022, to pursue joint standardization of a new technology called JPEG AI, which will consider the use of artificial intelligence techniques for still image compression. This new work item T.JPEG-AI may evolve into a series of Recommendations depending on the progress of this incipient standardization effort. The focal point in SG16 will be Q6/16, complemented by Q5/16 experts.

A great achievement for the set of visual coding standards developed under the SG16 mandate, together with ISO/IEC JTC1/SC29 were the two **Primetime Emmy Awards** received in this study period. In 2017, the Joint Collaborative Team on Video Coding (JCT-VC) of ITU-T SG16 and of ISO/IEC JTC1/SC29/WG11 (MPEG), which developed **H.265/HEVC**, [received](https://news.itu.int/itu-iso-iec-receive-another-primetime-emmy-for-video-compression-video/) a [2017 Primetime Engineering Emmy](https://www.emmys.com/news/awards-news/engineering-awards-170927) for outstanding achievement in engineering to the expert group responsible for High Efficiency Video Coding, the video compression standard that has emerged as the primary coding format for Ultra-High Definition (UHD) TV. In 2019, the [long-standing](https://news.itu.int/how-jpeg-gained-emmy-fame) joint ITU and ISO/IEC **JPEG** image compression standard (ITU-T T.80-series) was awarded a [2019 Primetime Engineering Emmy](https://www.emmys.com/news/awards-news/191001-engineering) in recognition of its outstanding achievement in engineering development. Both awards reaffirm the prestige of the video and image coding work driven in collaboration by ITU, ISO and IEC, after the one received for ITU-T H.264 in 2008.

### 3.2.2 IPTV and content delivery

During this study period, SG16 saw a steady progression of IPTV standards, a decline of digital signage ones and a growth of standards addressing multimedia content delivery networks (MCDN) and information-centric networks (ICNs). Following this trend, close to the end of the study period, the three standardization areas were merged under a revised Question 13/16, which continues in the new study period.

The main results on the IPTV work were as follows:

* ITU-T H.704 "Enhanced UI framework for IPTV terminal device - Gesture control interface", allows users to define or use pre-defined gestures to control an IPTV terminal device.
* ITU-T H.724 describes the functional components and features that enable interworking between the basic, full-fledged and mobile IPTV terminal devices of ITU-T H.721, H.722 and H.723. ITU-T H.724 will allow users to enjoy a continuous and seamless consumption experience independently of the terminal device type, the access network type and the users' location.
* ITU-T H.763.2 provides a specialization of the file format of scalable vector graphics (SVG) optimized for IPTV services.
* ITU-T H.763.3 specifies a basic profile for HTML syntax, attributes and document object model (DOM) that will enhance interoperability of IPTV services across different terminal devices.
* ITU-T H.764 "IPTV services enhanced script language", which specifies an ECMAScript language subset for IPTV terminal systems, was updated and complemented by the conformance testing specification in Technical Paper HSTP.CONF-H764 that defines a for ITU-T H.764.
* ITU-T H.766 defines the Lua programming language profile for IPTV services, a language that has embedded use in applications, such as multimedia programming for interactive content.
* ITU-T H.753 "Scene-based metadata for IPTV services" enables the use of standardized metadata by different content providers and distribution platforms during content distribution and service provisioning.
* ITU-T H.721 "IPTV terminal devices: Basic model" with an update to the specification of an essential terminal device for use in IPTV systems of the H.700-Series to support for new technologies such as timestamped fragmented TLV (TFT) for 4K/8K linear TV.

ITU-T H.702 defines accessibility profiles for IPTV terminal devices. It was updated during the study period, and complemented by a conformance testing specification in Technical Paper HSTP.CONF-H702 was approved, which contains the conformance testing specification for ITU-T H.702. Both documents were refined at the conformance testing of a related product that took place during the SG16 meeting in January 2017. At the same meeting, SG16 agreed in Jan 2017 to establish an **IPTV Testing Team** composed of interested SG16 experts to facilitate conformance testing events of IPTV terminals and systems.

The digital signage studies resulted in three Recommendations and one Technical Paper:

* ITU-T H.782 specifies the data elements and structures of the metadata for digital signage services.
* ITU-T H.783 defines the services to be used for audience measurement in digital signage systems.
* ITU-T H.784 that defines a display device control interface.
* ITU-T H.785.1 defines service requirements and a reference model when using digital signage technology for providing information services in public places.
* Technical Paper HSTP.DS-Gloss with a glossary on digital signage.

Twelve Recommendations were approved in the areas of CDNs and ICNs:

* ITU-T F.743.4 "Functional requirements for virtual content delivery networks".
* ITU-T F.743.5 "Framework and interfaces for multimedia content delivery network".
* ITU-T F.743.6 "Service requirements for next generation content delivery networks".
* ITU-T F.743.9 "Use cases and requirements for multimedia CDN".
* ITU-T F.743.10 "Requirements for mobile edge computing enabled content delivery networks" (New).
* ITU-T F.746.4 "Requirements for deployment of information centric networks".
* ITU-T F.746.6 "Requirements for a name resolution service in information-centric networks".
* ITU-T F.746.8 "Requirements for unified status monitoring of networks and services".
* ITU-T H.643.1 "Architecture for deployment of information centric network".
* ITU-T H.644.1 "Functional architecture for virtual content delivery networks".
* ITU-T H.644.2 "Virtual content delivery network: Network virtualization".
* ITU-T H.644.4 "Architecture for mobile/multi-access edge computing enabled content delivery networks".

### 3.2.3 Accessibility and human factors

The work in accessibility and human factors progressed during the study period. Persons with disabilities joined the work on accessibility, where captioning and when needed sign language interpretation were provided. Some of the outcomes from the studies are highlighted as follows.

* Joint work on accessibility for IPTV (ITU-T H.702) was conducted, as reported in the IPTV results section.
* ITU-T F.921 was approved that specifies key elements required for audio-based indoors navigation systems for persons with vision impairments. The Recommendation is complemented by the compliance verification specification found in Technical Paper ITU-T FSTP-CONF-F921.
* ITU-T F.922 define requirements of information service systems for visually impaired persons.
* After long studies, ITU-T F.930 was approved describing the modalities required for Multimedia telecommunication relay services, which are mediated services enabling the communication between deaf or hard of hearing persons with persons with normal hearing over regular phone or using video communication tools.
* ITU-T F.791 with accessibility terms and definitions was updated.
* ITU-T FSTP-ACC-RCS is a Technical Paper that provides an overview and guidelines for the remote provision of captioning services (CART).
* ITU-T H.871 was approved that define safe listening guidelines for personal sound amplifiers, based on the principles laid out in ITU and WHO common standard H.870.
* ITU-T FSTP.ACC-ALD is a Technical Papers describing various assistive listening systems.
* ITU-T FSTP.ACC-WebVRI is a technical paper in response to needs identified during the COVID-19 pandemic that provides guidelines on web-based remote sign language interpretation.
* ITU-T HSTP.ACC-UC is a technical paper that describes use cases for inclusive media access services.

Collaboration with ISO/IEC JTC1 SC35 "User Interfaces" was strengthened with a collocated meeting in Geneva, 12-16 February 2018, and the definition of various twin texts (i.e., technically aligned specifications). At the end of the study period, one item was approved, two were Consented and two others remain under development:

* ITU-T T.701.11 (ISO/IEC 20071-11) provides guidance on the use of text alternatives for images (also known as "Alt-Text")" in written documents (as opposed to web pages).
* Consented ITU-T T.701.21 (ISO/IEC TS 20071-21) contains guidance on producing and presenting audio description for audiovisual content.
* Consented ITU-T T.701.25 (ISO/IEC 20071-25:2017) complements T.701.21 with guidance on the audio presentation of text in videos, including captions, subtitles and other on-screen text.
* Draft [H.ACC-GVP](https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=14439) (ISO/IEC 20071-23) Guidance on the Visual presentation of audio information, including captions and subtitles.
* Draft [F.ACC-AVSL](https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16371) (ISO/IEC 20071-24) Visual presentation of audio information in sign languages.

In the context of human factor studies, ITU-T H.862.4 "Framework for ICT olfactory function test systems" and ITU-T H.862.5 "Emotion enabled multimodal user interface based on artificial neural networks" were issued, along with ITU-T F.747.10 "*Requirements of distributed ledger systems (DLS) for secure human factor services*", which was the first TAP Recommendation in SG16's history. Other work under Q24/16 is reported in the AI section of this report.

### 3.2.4 Digital health

Three main lines of work in Q28/16 were in evidence during the study period: the personal connected health devices collaboration with the Continua Personal Connected Health Alliance (PCHA), collaboration with World Health Organization (WHO) and standards for medical devices and systems. The other area of development has been the work in the application of ICTs for health devices and systems.

* During the study period, updates were done to the personal connected health specifications in the H.810-H.850 series:
* A new edition was issued of the Continua Design Guidelines in the H.810-series with eight texts, plus updates during the period for H.810 and H.813. Technical Paper ITU-T HSTP-H812-FHIR was issued as a *specification for trial implementation* of the FHIR observation upload using the FHIR technique. This specification is issued at this stage as a technical paper, instead of as a Recommendation, as it was intended for trial implementation while the underlying protocol implementation completes final evaluation in HL7. The release for trial implementation is a common practice in the health informatics field and allowed early adopters to start developing and testing their products using the FHIR technique, in anticipation of the final issuance of the Recommendation, planned as H.812.5. The H.810-series system specification is complemented by conformance testing specifications in the H.820-H.850 series, which now comprise 54 Recommendations. During the study period, there were nine new of those and 70 revisions to the conformance testing specifications.
* A revision was completed for two of the Technical Papers explaining the H.810 series. Technical Paper **ITU-T HSTP-H810** contains a general Introduction to the ITU-T H.810 Continua Design Guidelines and has been updated to include the architectural refresh introduced in 2016 as well as new features from the 2017 edition, in particular support for FHIR as a method to upload observations.
* Technical Paper **ITU-T** **HSTP.H810-XCHF** explains fundamentals of data exchange within ITU-T H.810 Continua Design Guideline architecture has been updated to highlight the new FHIR observation upload mechanism.
* Two areas of study were pursued with the direct involvement of the WHO and their experts:
* **Safe listening:** First was ITU-T H.870 "Guidelines for safe listening devices/systems", a technical standard with guidelines on the design of safe listening music players that includes requirements for sound dosage and messaging to device users to help guide them towards safe listening behaviour. At the last meeting in the study period, work was completed on H.870's 2nd edition, which clarifies requirements for safe listening and streamlines the text of the standard. Work also completed on a conformance testing spec for H.870 (2018), found in technical paper HSTP-CONF-H870., and discussions were held with ITU-T SG11 CASC on identifying suitable test laboratories to develop a conformance testing initiative. A Technical Paper ITU-T FSTP-SLD-UC was also approved that complements H.870 with a gap analysis on use cases of safe listening devices. As a collaboration between TSB, BDT and WHO, a toolkit was developed to help with the adoption of H.870 by users, industry and regulators (<https://itu.int/go/safelistening/toolkit>). At the end of the study period, considerations on the applicability of safe listening principles to video gaming and e-sports, as well as in infotainment contexts.

As noted in the accessibility section of this report, ITU-T H.871 that provide safe listening guidance applicable to personal sound amplifiers (PSAs) was work derived from the safe listening studies and produced under Q26/16. This work item was a result of the involvement of audiology experts brought onboard from the collaboration with WHO in the safe listening standardization activities.

* **Accessible telehealth:** Upon request from WHO and because of increased use of telehealth services due to the COVID-19 pandemic, work was done on a new standard on the accessibility of telehealth services. The increased use of telehealth services during the pandemic made it urgent to better support persons with disabilities, and let to the development of ITU-T F.780.2 that defined use cases and requirements for accessibility of telehealth services.
* In the standardization area for health and medical devices and systems, the following deliverables are noted:
* ITU-T F.780.1 defines a framework for telemedicine systems using ultra-high definition (UHD) imaging. A 2nd edition was also approved, with adds UHD imaging profiles for medical services.
* New ITU-T H.861.0 defines "*Requirements on a communication platform for multimedia brain information*" and describes a conceptual ecosystem intended to exchange brain data based on multimedia brain information platform (MBI-PF) requirements and definitions, including a communication platform that enables both experts and non-experts to utilize brain data for monitoring and maintaining brain health status. It was complemented by ITU-T H.861.1 "*Requirements on establishing brain healthcare quotients*".
* ITU-T H.862.0 defines a service model and requirements concerning sleep monitoring and sleep status check services to ensure interoperability of sleep management services. This Recommendation is complemented by ITU-T H.862.1 on a data model for the sleep management services and by ITU-T H.862.2 on annotation methods for bio-signal data.

Separate from Q28/16, a new front of work has started under the ITU-T Focus Group on artificial intelligence for health (FG-AI4H), which has been managed in partnership with WHO and was created in 2018 and renewed operations. The goal of the group was to create a benchmarking framework for health solutions that use AI and for that an extensive community of experts was established, including ICT and machine learning experts, health and medical experts, and regulators in the health device field. Over 50 deliverable documents were under development as of the preparation of this report. More details are found at: <https://www.itu.int/go/fgai4h>.

### 3.2.5 ITS

The studies on intelligent transportation progressed withing Q27/16 during this period, directly complemented by the work on a joint group on vehicular domain services ([JVDS](https://www.itu.int/en/ITU-T/studygroups/2017-2020/16/Pages/jvds.aspx)) established with ISO TC22/SC31/WG8 and that resulted in one Recommendation, and the Focus Group on vehicular multimedia ([FG-VM](https://www.itu.int/en/ITU-T/focusgroups/vm/Pages/default.aspx)), that brought in two new Recommendations. On the other hand, the ITU-T Focus Group on AI for autonomous and assisted driving ([FG-AI4AD](https://itu.int/go/fgai4ad)) opened new frontiers for standardization by looking into services and applications enabled by AI systems in autonomous and assisted driving. One key issue was the behavioural evaluation of AI responsible for dynamic driving tasks, so as to ensure that performance of AI on roads meets, or exceeds, the performance of a competent and careful human driver, and, consequently, to build public trust in these technologies.

Here are the highlights:

* ITU-T F.749.2 (ex F.VGP-REQ) that defines functional requirements for a vehicle gateway platform, including communication requirements, service requirements and a description of various use cases and scenarios. Additionally, they agreed to prepare a new technical paper with a gap analysis of vehicle gateways defined by SDOs, for completion later this year.
* ITU-T H.550 (ex H.VGP-ARCH) defines the architecture and functional entities for vehicle gateway platforms (VGPs).
* ITU-T H.551 (ex F.VM-VMA) provides an architecture for vehicular multimedia systems. This TAP text was the 2nd deliverable of the FG-VM to be transposed as an ITU-T Recommendation.
* ITU-T H.560 (ex G.V2A) specifies the communications interface between external applications and a VGP.
* ITU-T F.749.4 (ex F.VS-AIMC) "*Use cases and requirements for multimedia communication enabled vehicle systems using artificial intelligence*".
* ITU-T FSTP.SS-OTA "*Technical Paper: Standardization survey for over-the-air updating in vehicle*".
* ITU-T F.749.5 | ISO 23239-1 "*Vehicle domain service - General information and use case definitions*" was a product of collaboration with ISO TC22/SC31 under the JVDS. The [other three WIs planned under the JVDS](https://www.itu.int/itu-t/workprog/wp_search.aspx?isn_sp=3925&isn_status=-1,1,3,7,2,4&title=domain%20service&details=0&field=acdefghijo) were discontinued after its disbanding in April 2021 and the TC22 decision to stop the work.
* Two new Recommendations were result of the FG-VM studies:
* ITU-T F.749.3 (ex F.VM-URVMN) "*Use cases and requirements for the vehicular multimedia networks*".
* ITU-T H.551 (ex F.VM-VMA) "*Architecture of vehicular multimedia systems*".

### 3.2.6 Immersive experiences (AR/VR/ILE)

The Immersive live experience (ILE) studies progressed during the study period under Q8/16 in collaboration with JTC1/SC29 in particular for their augmented reality and virtual reality studies. A series of mini workshops and workshop sessions were organized during the study period. Studies started on interactivity and on the use of haptic information under Q8/16 as well as on an architecture for virtual reality using cloud systems under Q21/16.

The following Recommendations were produced during this study period:

* ITU-T H.430.1 defines the term Immersive live experience (ILE) and the requirements for ILE services.
* ITU-T H.430.2 specifies the architectural framework for ILE services.
* ITU-T H.430.3 indicates service scenarios for ILE.
* ITU-T H.430.4 specifies service configuration, media transport protocols and signalling information of MPEG multimedia transport (MMT) for ILE systems.
* ITU-T H.430.5 provides three reference models for proscenium, open, and arena scene style presentation environments. It also provides functional blocks and some implementation guidelines for ILE viewing sites as additional information.

### 3.2.7 AI in multimedia systems

Various Questions in Study Group 16 (e.g., Questions 21/16 and 24/16) conducted studies that could be classified under this category, in particular before the creation of Question 5/16 in the middle of the study period, which is a Question specifically studying the use of artificial intelligence in multimedia.

Question 5/16, together with Question 6/16, started a collaboration with JTC1/SC29/WG1 on the use of AI within the still image compression work, called "JPEG AI".

The outcomes in this period include the following publications:

* ITU-T H.625 that defines an architecture for speech-to-speech translation services based on distributed / federated networks was revised.
* ITU-T F.746.5 that defines a framework for language learning system based on speech and natural language processing.
* ITU-T F.746.7 defines metadata for intelligent question answering service to complement ITU-T F.746.3.
* ITU-T F.746.9 defines requirements and an architecture for human communication with intelligent devices ("bots") inside the home.
* ITU-T F.746.10 provides an architecture for spontaneous dialog processing system for language learning.
* ITU-T F.746.11 defines interfaces for intelligent question answering services.
* ITU-T F.746.13 identifies requirements for smart speaker based intelligent multimedia communication systems.
* ITU-T F.748.11 was the first Recommendation completed by new Q5/16 and addresses metrics and evaluation methods for benchmarking processors used by deep neural networks.
* ITU-T F.748.12 defines a framework for evaluating deep learning software.
* ITU-T F.748.13 specifies a technical framework for shared machine learning systems.
* ITU-T F.748.14 contains requirements and evaluation methods of non-interactive 2D real-person digital human application systems.
* ITU-T F.748.15 provides a framework and metrics for digital human application systems.
* ITU-T F.748.16 identifies requirements for machine vision-based applications and services in smart manufacturing.
* ITU-T H.862.3 defines requirements of voice management interface for human-care services, which include health, welfare, and protection of people, and could assist in the design of innovative services and applications, such as nursing robots to care patients and to identify current and future health issues through conversation with patients (e.g., early diagnosis of dementia).
* ITU-T F-series Supplement 4 provides an overview of convergence of artificial intelligence and blockchain.

### 3.2.8 Multimedia conferencing systems

Work in Multimedia conferencing systems focused on maintenance of a set mature technology standards under the purview of Q11/16:

* **Digital multimedia transport:** ITU-T H.222.0 | ISO/IEC 13818-1 is a common text of ITU-T SG16 and JTC1/SC29 commonly referred to as "MPEG2-System" that is used in most terrestrial and satellite system for transport of audiovisual content, and several corrigenda, amendments and revisions published during the study period that enabled MPEG-2 system transport specification to continue to be relevant by supporting modern technology, such as virtual segmentation and signalling of Wide Colour Gamut (WCG) and High Dynamic Range (HDR), carriage of JPEG 2000 encoded content (JPEG 2000 ultra-low latency encoding; transport of professional video, audio and data over IP; support of resolutions above 4K for moving JPEG 2000 video images); carriage of JPEG XS in MPEG-2 TS; carriage of VVC (ITU-T H.266 | ISO/IEC 23090-3) and EVC (ISO/IEC 23094-1) video; signalling of compatible profile sets for MPEG-H 3D Audio (ISO/IEC 23008-3); extension of the semantics for ISO 639 language descriptors; carriage of timed metadata for media orchestration and sample variants; carriage of HEVC tiles over MPEG-2 systems.
* **Media Gateway Protocols:** Revised ITU-T H.248.77 "Gateway control protocol: Secure real-time transport protocol (SRTP) package and procedures", following conclusion of some dependencies in the IETF. A revision of the H.248 Sub-series Implementors' Guide was also approved.
* **Videoconferencing:** Six Recommendations relevant to traditional videoconferencing systems were updated:
* ITU-T H.230 "Frame-synchronous control and indication signals for audiovisual systems".
* ITU-T H.243 "Procedures for establishing communication between three or more audiovisual terminals using digital channels up to 1920 kbit/s".
* ITU-T H.323 v8 "Packet-based multimedia communications systems". This revised version incorporates enhancements to the usage of URLs and DNS (Annex O), tunnelling of signalling protocols (Annex M) and other clarifications.
* ITU-T H.225.0 v8 "Call signalling protocols and media stream packetization for packet-based multimedia communication systems".
* H.245 v17 "Control protocol for multimedia communication". This revised version includes support for WebRTC data channel and the use of DTLS for media streams.
* H.235.10 "H.323 security: Support of DTLS for media streams". This Recommendation describes the security procedures for the establishment of media streams utilising Datagram Transport Layer Security (DTLS).

### 3.2.9 Ubiquitous multimedia applications

For ubiquitous multimedia applications on a range of areas and included civilian unmanned aerial vehicles. The following new standards were developed:

* ITU-T F.749.10 defines requirements for communication services for civilian unmanned aerial vehicles, as well as use cases in industry and consumer application areas.
* ITU-T F.749.11 describes the requirements when using mobile edge computing for of civilian unmanned aerial vehicles applications.
* ITU-T F.749.13 contains a framework and requirements for civilian unmanned aerial vehicle flight control using artificial intelligence.
* ITU-T F.749.14 provides requirements of coordination for civilian unmanned aerial vehicles.
* ITU-T F.749.15 identifies requirements for inspection and examination services using civilian unmanned aerial vehicles (CUAV) and expands the application areas of the CUAV series of Recommendations on flight control, flight data transportation, mission payload data services and video / imaging services.
* ITU-T HSTP-DIS-UAV is a Technical Paper that describes use cases and scenarios for disaster information services using unmanned aerial vehicles.
* ITU-T F.746.12 contains requirements for a real-time interactive multimedia service under poor network conditions.
* ITU-T F.743.13 identifies requirements for cooperation of multiple edge gateways.
* ITU-T F.743.15 identifies requirements for multi-operator core network enabled multimedia services.

### 3.2.10 Video surveillance and intelligent visual systems and services

The work on video surveillance progressed during the study period initially under Q21/16, then in the middle of the study period under a new, specific Question 12/16. Initially titled video surveillance the Question updated its title to intelligent visual systems and services.

The Question has also cooperated with ITU-T SG11 CASC during this study period to explore ways to create a pilot project for conformance and interoperability (C&I) testing of video surveillance products.

The work has progressed significantly in developing revised and new Recommendations for video surveillance systems:

* Revised ITU-T F.743 "Requirements and service description for video surveillance".
* ITU-T F.743.7 "Requirements for big data enhanced visual surveillance services".
* ITU-T F.743.8 "Requirements for cloud computing platform supporting a visual surveillance system".
* ITU-T F.743.11 "Requirements for video surveillance with mobile premises units".
* ITU-T F.743.12 "Requirements for edge computing in video surveillance".
* ITU-T F.743.14 "Requirements for video distribution systems".
* Revised ITU-T H.626 "Functional architecture for video surveillance system".
* ITU-T H.626.2 "Architecture for cloud storage in visual surveillance".
* ITU-T H.626.3 "Architecture for visual surveillance system interworking".
* ITU-T H.626.4 "Architecture for point-to-point visual surveillance system".
* ITU-T H.626.5 "Architecture for intelligent visual surveillance systems", as well as a 2nd edition.
* Revised ITU-T H.627 "Signalling and protocols for a video surveillance system".
* ITU-T T.627 contains a test specification for video surveillance networking based on H.627. ITU-T T.627 will be a key element of a pilot project for conformance and interoperability (C&I) testing of video surveillance products.
* ITU-T H.627.1 on protocol specifications enabling interoperable mobile visual surveillance.
* ITU-T H.627.2 "Requirements and protocols for home surveillance systems".
* ITU-T F.743.16 "Requirements for communication resource management in intelligent visual surveillance system".
* Technical Paper ITU-T FSTP-VS-ECSR "Requirements for event centre server in video surveillance systems".

The Question also developed Recommendations for software-defined cameras, which are useful in the abstraction of hardware devices for reuse within video surveillance systems:

* ITU-T F.735.1 "Requirements for software-defined camera".
* ITU-T F.735.2 "Architecture and protocols for software-defined camera".

One controversial area of work was on facial recognition, with [F.FRAVSReqs](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=14434) "Requirements for face recognition application in visual surveillance systems", which was discontinued after lengthy discussions involving a number of Member States.

### 3.2.11 Digital culture

The work on Recommendations addressing the use of ICTs for digital culture applications and systems progressed during the study period initially under Q21/16, then towards the end of the study period under new Question 23/16. Work will continue inter alia exploring standards for information retrieval systems for cultural relics and artworks and multi-camera collaboration of mobile terminal computational photography.

* ITU-T T.621 specifies a file structure for interactive mobile comic and animation content. This specification defines an interactive mobile comic and animation file structure used in the organization and storage of mobile animation contents and can be used as a guideline for creation, processing, transmission and play of mobile animation contents.
* ITU-T F.740.1 defines requirements for an information service of objects in museums.
* ITU-T H.629.1 describes scenarios, framework and metadata for digitalized artwork images display system.
* ITU-T F.740.2 defines requirements and a reference framework for digital representation of cultural relics/artworks using augmented reality.

### 3.2.12 Distributed ledger technology (DLT)

The work on Recommendations addressing the use of ICTs for distributed ledger technology (DLT) progressed during the study period initially under Q21/16, then in the middle of the study period under new Question 22/16.

As part of the outreach for the new DLT work in SG16, Q22/16 experts organized throughout the study period a series of online [DLT "meet-ups"](https://www.itu.int/go/dlt-meetups) (a form of interactive and informal webinars) to discuss topics related to DLT and their standardization. The main goal of this initiative was to increase the collaboration of Q22/16 with global DLT community, also capitalizing on and keeping alive the community of experts created under the FG-DLT. A [call for speakers](https://itu.int/en/ITU-T/webinars/20200805/Documents/DLT%20Meet-ups_Call%20for%20speakers.pdf) tells how DLT practitioners can propose talks and special sessions. Eleven episodes were organized during the study period, see the list in §[3.1.2](#_3.1.2_Workshops_and).

The following publications were developed:

* Three Technical Papers were approved, (the two first ones being deliverables from the ITU-T Focus Group on Distributed Ledger technologies, [FG-DLT](https://www.itu.int/en/ITU-T/focusgroups/dlt)):
* ITU-T HSTP.DLT-RF "Distributed ledger technologies: Regulatory framework".
* ITU-T HSTP.DLT-UC "Distributed ledger technologies: Use cases".
* ITU-T HSTP.DLT-Risk "DLT-based application development risks and their mitigations".
* ITU-T F.751.0 defines the Requirements for distributed ledger systems.
* ITU-T F.751.1 identify Assessment criteria for distributed ledger technologies.
* ITU-T F.751.2 provides Reference framework for distributed ledger technologies.
* ITU-T F.751.3 defines the Requirements for change management in DLT-based decentralized applications.
* ITU-T F.751.4 defines the General Framework for DLT-based invoices.
* ITU-T F.747.10, developed under the human factors Question 24/16, defines requirements of distributed ledger systems (DLS) for secure human factor services.
* ITU-T F-series Supplement 4 provides an overview of convergence of artificial intelligence and blockchain.

### 3.1.13 Awards

* At the 16-27 October 2017 meeting, SG16 was informed that the Joint Collaborative Team on Video Coding (JCT-VC) of ITU-T SG16 and of ISO/IEC JTC1/SC29/WG11 (MPEG) [received](https://news.itu.int/itu-iso-iec-receive-another-primetime-emmy-for-video-compression-video/) a [2017 Primetime Engineering Emmy](https://www.emmys.com/news/awards-news/engineering-awards-170927) for outstanding achievement in engineering to the expert group responsible for ‘High Efficiency Video Coding’, the video compression standard that has emerged as the primary coding format for Ultra-High Definition (UHD) TV. The award is the second Primetime Emmy to recognize the prestige of the video coding work driven in collaboration by ITU, ISO and IEC, after the one received for ITU-T H.264 in 2008.
* At the 7-17 October 2019 meeting, SG16 learned that the [long-standing](https://news.itu.int/how-jpeg-gained-emmy-fame) joint ITU and ISO/IEC JPEG image compression standard (ITU-T T.80-series) was awarded a [2019 Primetime Engineering Emmy](https://www.emmys.com/news/awards-news/191001-engineering) in recognition of its outstanding achievement in engineering development. Another great achievement for the set of visual coding standards developed under the SG16 mandate, recognized for H.264 in 2008 and H.265 in 2017.

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

### 3.3.1 Lead study group activities

ITU-T Study Group 16 has performed on its lead SG roles assigned by WTSA-16:

– multimedia coding, systems and applications

– ubiquitous multimedia applications

– telecommunication/ICT accessibility for persons with disabilities

– human factors

– multimedia aspects of intelligent transport system (ITS) communications

– Internet Protocol television (IPTV) and digital signage

– multimedia aspects of e-services

In addition to being the parent of the JCA on multimedia aspects of e-services (JCA-MMeS), ITU-T Study Group 16 also had active participation in various joint coordination activities:

− JCA-AHF: [Joint Coordination Activity on Accessibility and Human factors](http://www.itu.int/ITU-T/jca/ahf/index.html).

The Study Group also coordinated its activities with a number of external players, there including:

− ISO/IEC JTC1 SC29 and its working groups on still image and video coding, and on digital transport.

− ISO/IEC JTC1 SC35 and its working groups on user interfaces and accessibility.

− WHO, ISO, IEC and CENELEC on e-health standardization.

− Various disability organizations within the scope of Study Group 16's accessibility work.

During its meeting in Macao, China, 16-27 October 2017, SG16 agreed to **join the SME Trial** agreed by ITU Council 2017 aiming at identifying novel areas of work and attracting new members. Numerous organizations joined the trial and, after PP-18 and the creation of a special fee for SMEs under the Associate category, various organizations joined the SG16 work under the SME option.

**A.4/A.5/A.6:** At its meeting online, 19-30 April 2021, Study Group 16 reviewed the ITU-T A.4 qualification analysis from TSB for International Association of Trusted Blockchain Applications (INATBA) that was initiated by Q22/16. Study Group 16 agreed to have INATBA recognized as an A.4 organization, subject to the verification by the Study Group 16 management that the IPR policy currently under ballot is confirmed.

**Coordination:** At theSG16 meeting online, 19-30 April 2021, joint sessions were held with SG17 security experts on digital ledger technology (DLT) security, with JPEG on their JPEG AI project, and with MPEG on future planning for video coding collaboration. SG17 is also interested in organizing a workshop on the digital vaccination certificate topic with Study Group 16 and involving other stakeholders in the August 2021 timeframe. Study Group 16 will also organize another workshop with WHO on accessible telehealth applications and services.

### 3.3.2 JCA on multimedia aspects of e-services (JCA-MMeS)

* At the 16-27 January 2017 meeting, SG16 established a **JCA on multimedia aspects of e-services** (JCA-MMeS), chaired by SG16 vice-chairman Mr Mohannad El-Megharbel (Egypt). The terms of reference for the new group are found in the group home page, <https://www.itu.int/en/ITU-T/jca/mmes>. The group held five meetings during the study period and the list of representatives was found in [JCA-MMeS-DOC13-R1](https://www.itu.int/en/ITU-T/jca/mmes/JCAMMeS%20Docs/JCA-MMeS-Doc013-R1.docx).
* The first meeting of the **JCA on multimedia aspects of e-services** was held in Macao, China, 16-27 October 2017, to help coordinate the standardization work on multimedia aspects of e-services. With the **agreement** of SG16, the list of tasks for the JCA was updated to highlight emerging areas: digital finance services (DFS), distributed ledger technologies (DLT), e-agriculture, e-forestry and e-aquaculture.

### 3.3.3 IRG-AVA

The Intersector Rapporteur Group on Audiovisual Media Accessibility (IRG-AVA) was created by ITU-T Study Group 16 together with ITU-T Study Group 9 and ITU-R Study Group 6 to study topics related to audiovisual media accessibility for the development of draft Recommendations on "access systems" that can be used for a wide range of media delivery systems, including broadcast, cable, Internet, and IPTV. The IRG also addressed 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 group is open to participation from entities able to join the work of its parent groups, thus working as a good mechanism to put into contact the different communities of experts attending these three study groups. The home page of the group is <http://itu.int/en/irg/ava>, and it met 14 times during the study period:

– Ninth meeting: Geneva, 19 January 2017 (1615-1730 hours CET)
[Announcement](http://itu.int/ml/lists/arc/irgava/2016-12/msg00000.html) - [Agenda](https://www.itu.int/ifa/c/irg/ava/mtg/1701-GVA/IRG-AVA-1701-001-Agenda-document-allocation.docx) - [Report](http://ifa.itu.int/c/irg/ava/mtg/1701-GVA/IRG-AVA-1701-002-Report.docx) - [Transcript](http://ifa.itu.int/c/irg/ava/mtg/1701-GVA/20170119-1615~1730CET-ITU-IRG-AVA.pdf) - [LS in](https://www.itu.int/net/itu-t/ls/ols.aspx?from=-1&to=2531&after=2016-10-17) - [LS Out](https://www.itu.int/net/itu-t/ls/ols.aspx?from=2531&after=2017-01-18) - [Documentation](http://ifa.itu.int/c/irg/ava/mtg/1701-GVA/)

– Tenth meeting: Geneva, 21 March 2017 (1530-1700 hours CET)
[Announcement](http://itu.int/ml/lists/arc/irgava/2017-02/msg00003.html) - [Agenda](https://www.itu.int/ifa/c/irg/ava/mtg/1701-GVA/IRG-AVA-1701-001-Agenda-document-allocation.docx) - [Report](http://ifa.itu.int/c/irg/ava/mtg/1703-GVA/IRG-AVA-1703-002-Meeting_report.docx) - [Transcript](http://ifa.itu.int/c/irg/ava/mtg/1703-GVA/IRG-AVA-1703-Transcript-20170321-1530~1715.docx) - [LS in](https://www.itu.int/net/itu-t/ls/ols.aspx?from=-1&to=2531&after=2017-01-20) - [LS Out](https://www.itu.int/net/itu-t/ls/ols.aspx?from=2531&after=2017-03-20) - [Documentation](http://ifa.itu.int/c/irg/ava/mtg/1703-GVA/)

– 11th meeting: Geneva, 2 October 2017 (1730-1900 hours CEST)
[Announcement](https://itu.int/ml/lists/arc/irgava/2017-09/msg00000.html) - [Agenda](https://www.itu.int/ifa/c/irg/ava/mtg/1710-GVA/IRG-AVA-1710-001-R3-Agenda-document-allocation.docx) - [Report](http://ifa.itu.int/c/irg/ava/mtg/1710-GVA/IRG-AVA-1710-002-Meeting_report.docx) - [Transcript](http://ifa.itu.int/c/irg/ava/mtg/1710-GVA/20171002-ITU-IRG-AVA-raw-captioning-official.docx) - [LS in](https://www.itu.int/net/itu-t/ls/ols.aspx?from=-1&to=2531&after=2017-03-21) - [LS Out](https://www.itu.int/net/itu-t/ls/ols.aspx?from=2531&after=2017-10-01) - [Documentation](http://ifa.itu.int/c/irg/ava/mtg/1710-GVA/)

– 12th meeting: Geneva, 17 April 2018 (1530-1730 hours CEST)
[Announcement](https://itu.int/ml/lists/arc/irgava/2018-03/msg00000.html) - [Agenda](https://www.itu.int/ifa/c/irg/ava/mtg/1804-GVA/IRG-AVA-1804-001-R1-Agenda-document-allocation.docx) - [Report](http://ifa.itu.int/c/irg/ava/mtg/1804-GVA/IRG-AVA-1804-002-Meeting_report.docx) - [Transcript](http://ifa.itu.int/c/irg/ava/mtg/1804-GVA/IRG-AVA-1804-Raw-caption-transcription.docx) - [LS in](https://www.itu.int/net/itu-t/ls/ols.aspx?from=-1&to=2531&after=2017-10-03) - [LS Out](https://www.itu.int/net/itu-t/ls/ols.aspx?from=2531&after=2018-04-16) - [Documentation](http://ifa.itu.int/c/irg/ava/mtg/1804-GVA/)

– 13th meeting: Geneva, 16 October 2018 (1530-1730 hours CEST)
[Announcement](https://itu.int/ml/lists/arc/irgava/2018-06/msg00000.html) - [Agenda](https://www.itu.int/ifa/c/irg/ava/mtg/1810-GVA/IRG-AVA-1810-001-R1-Agenda-document-allocation.docx) - [Report](http://ifa.itu.int/c/irg/ava/mtg/1810-GVA/IRG-AVA-1810-002-Meeting_report.docx) - [Transcript](http://ifa.itu.int/c/irg/ava/mtg/1810-GVA/IRG-AVA-1810-RTT-20181016-1530-1730-CET.docx) - [LS in](https://www.itu.int/net/itu-t/ls/ols.aspx?from=-1&to=2531&after=2018-04-18) - [LS Out](https://www.itu.int/net/itu-t/ls/ols.aspx?from=2531&after=2018-10-15) - [Documentation](http://ifa.itu.int/c/irg/ava/mtg/1810-GVA/)

– 14th meeting: Geneva, 6 June 2019 (1615-1730 hours CEST)
[Announcement](https://www.itu.int/ml/lists/arc/irgava/2019-05/msg00000.html) - [Agenda](https://www.itu.int/ifa/c/irg/ava/mtg/1906-GVA/IRG-AVA-1906-001-Agenda-document-allocation.docx) - [Report](http://ifa.itu.int/c/irg/ava/mtg/1906-GVA/IRG-AVA-1906-002-Meeting_report.docx) - [Transcript](https://www.itu.int/en/irg/ava/Pages) - [LS in](https://www.itu.int/net/itu-t/ls/ols.aspx?from=-1&to=2531&after=2018-10-16) - [LS Out](https://www.itu.int/net/itu-t/ls/ols.aspx?from=2531&after=2019-06-05) - [Documentation](http://ifa.itu.int/c/irg/ava/mtg/1906-GVA/)

– 15th meeting: Geneva, 9 October 2019 (1615-1730 hours CEST)
[Announcement](https://www.itu.int/ml/lists/arc/irgava/2019-09/msg00000.html) - [Agenda](https://extranet.itu.int/sites/irg/ava/Shared%20Documents/IRG-AVA-1910-001-R1.docx) - [Report](https://extranet.itu.int/sites/irg/ava/Shared%20Documents/IRG-AVA-1910-002.docx) - [Transcript](https://extranet.itu.int/sites/irg/ava/Shared%20Documents/RTC-20191009-IRG-AVA-Raw.docx) - [LS in](https://www.itu.int/net/itu-t/ls/ols.aspx?from=-1&to=2531&after=2019-06-06&before=2019-10-09) - [LS Out](https://www.itu.int/net/itu-t/ls/ols.aspx?from=2531&after=2019-10-08&before=2019-10-10) - [Documentation](https://extranet.itu.int/sites/irg/ava/Shared%20Documents/Forms/1910GVA.aspx)

– 16th meeting: Geneva, 4 February 2020 (1545-1730 hours CET)
[Announcement](https://www.itu.int/ml/lists/arc/irgava/2019-12/msg00000.html) - [Agenda](https://extranet.itu.int/sites/irg/ava/Shared%20Documents/IRG-AVA-2002-001-R1.docx) - [Report](https://extranet.itu.int/sites/irg/ava/Shared%20Documents/IRG-AVA-2002-002.docx) - [Transcript](https://extranet.itu.int/sites/irg/ava/Shared%20Documents/IRG-AVA-2002-000-Caption.rtf) - [LS in](https://www.itu.int/net/itu-t/ls/ols.aspx?from=-1&to=2531&after=2019-10-09&before=2020-02-04) - [LS Out](https://www.itu.int/net/itu-t/ls/ols.aspx?from=2531&after=2020-02-03&before=2020-02-05) - [Documentation](https://extranet.itu.int/sites/irg/ava/Shared%20Documents/Forms/2002GVA.aspx)

– 17th meeting: virtual, 25 June 2020 (1315-1445 hours CEST)
[Announcement](https://www.itu.int/ml/lists/arc/irgava/2020-06/msg00000.html) - [Agenda](https://extranet.itu.int/sites/irg/ava/Shared%20Documents/IRG-AVA-2006-001.docx) - [Report](https://extranet.itu.int/sites/irg/ava/Shared%20Documents/IRG-AVA-2006-002.docx) - [Transcript](https://extranet.itu.int/sites/irg/ava/Shared%20Documents/IRG-AVA-2006-000-Caption.docx) - [LS in](https://www.itu.int/net/itu-t/ls/ols.aspx?from=-1&to=2531&after=2020-02-04&before=2020-06-25) - [LS Out](https://www.itu.int/net/itu-t/ls/ols.aspx?from=2531&after=2020-06-24&before=2020-06-26) - [Documentation](https://extranet.itu.int/sites/irg/ava/Shared%20Documents/Forms/2006VIR.aspx)

– 18th meeting: virtual, 20 October 2020 (1530-1730 hours CEST)
[Announcement](https://www.itu.int/ml/lists/arc/irgava/2020-08/msg00005.html) - [Agenda](https://extranet.itu.int/sites/irg/ava/Shared%20Documents/IRG-AVA-2010-001-R1.docx) - [Report](https://extranet.itu.int/sites/irg/ava/Shared%20Documents/IRG-AVA-2010-002.docx) - [Transcript](https://extranet.itu.int/sites/irg/ava/Shared%20Documents/IRG-AVA-2010-000-Captioning.docx) - [LS in](https://www.itu.int/net/itu-t/ls/ols.aspx?from=-1&to=2531&after=2020-06-25&before=2020-10-20) - [LS Out](https://www.itu.int/net/itu-t/ls/ols.aspx?from=2531&after=2020-10-19&before=2020-10-21) - [Documentation](https://extranet.itu.int/sites/irg/ava/Shared%20Documents/Forms/2010VIR.aspx)

– 19th meeting: virtual, 9 April 2021 (1400-1630 hours CEST)
[Announcement](https://www.itu.int/ml/lists/arc/irgava/2021-02/msg00001.html) - [Agenda](https://extranet.itu.int/sites/irg/ava/Shared%20Documents/IRG-AVA-2104-001.docx) - [Report](https://extranet.itu.int/sites/irg/ava/Shared%20Documents/IRG-AVA-2104-002.docx) - [Transcript](https://extranet.itu.int/sites/irg/ava/Shared%20Documents/IRG-AVA-2104-000-Captioning.docx) - [LS in](https://www.itu.int/net/itu-t/ls/ols.aspx?from=-1&to=2531&after=2020-10-20&before=2021-04-10) - [LS Out](https://www.itu.int/net/itu-t/ls/ols.aspx?from=2531&after=2021-04-08&before=2021-04-10) - [Documentation](https://extranet.itu.int/sites/irg/ava/Shared%20Documents/Forms/2104VIR.aspx)

– 20th meeting: virtual, 23 September 2021 (1430-1700 hours CEST)
[Announcement](https://www.itu.int/ml/lists/arc/irgava/2021-08/msg00001.html) - [Agenda](https://extranet.itu.int/sites/irg/ava/Shared%20Documents/IRG-AVA-2109-001-R1.docx) - [Report](https://extranet.itu.int/sites/irg/ava/Shared%20Documents/IRG-AVA-2109-002.docx) - [Transcript](https://extranet.itu.int/sites/irg/ava/Shared%20Documents/IRG-AVA-2109-000-captioning.docx) - [LS in](https://www.itu.int/net/itu-t/ls/ols.aspx?from=-1&to=2531&after=2021-04-09&before=2021-09-24) - [LS Out](https://www.itu.int/net/itu-t/ls/ols.aspx?from=2531&before=2022-01-17&after=2021-09-22) - [Documentation](https://extranet.itu.int/sites/irg/ava/Shared%20Documents/Forms/2109VIR.aspx)

– 21st meeting: virtual, 16 November 2021 (1315-1600 hours CET)
[Announcement](https://www.itu.int/ml/lists/arc/irgava/2021-10/msg00000.html) - [Agenda](https://extranet.itu.int/sites/irg/ava/Shared%20Documents/IRG-AVA-2111-001.docx) - [Report](https://extranet.itu.int/sites/irg/ava/Shared%20Documents/IRG-AVA-2111-002.docx) - [Transcript](https://extranet.itu.int/sites/irg/ava/Shared%20Documents/IRG-AVA-2111-000-captioning.docx) - [LS in](https://www.itu.int/net/itu-t/ls/ols.aspx?from=-1&to=2531&after=2021-09-23&before=2021-11-17) - [LS Out](https://www.itu.int/net/itu-t/ls/ols.aspx?from=2531&before=2022-02-28&after=2021-11-15) - [Documentation](https://extranet.itu.int/sites/irg/ava/Shared%20Documents/Forms/2110VIR.aspx)

– 22nd meeting: virtual, 1 February 2022 (Time to be confirmed)
[Announcement](https://www.itu.int/ml/lists/arc/irgava/2022-01/msg00014.html) - [Agenda](https://extranet.itu.int/sites/irg/ava/Shared%20Documents/IRG-AVA-2202-001.docx) - [Report](https://extranet.itu.int/sites/irg/ava/Shared%20Documents/IRG-AVA-2202-002.docx) - [Transcript](https://extranet.itu.int/sites/irg/ava/Shared%20Documents/IRG-AVA-2202-000-captioning.docx) - [LS in](https://www.itu.int/net/itu-t/ls/ols.aspx?from=-1&to=2531&after=2021-11-15&before=2022-02-01) - [LS out](https://www.itu.int/net/itu-t/ls/ols.aspx?from=2531&after=2021-11-16) - [Documentation](https://extranet.itu.int/sites/irg/ava/Shared%20Documents/Forms/2202VIR.aspx)

It is expected that the IRG-AVA will continue in the next study period.

### 3.3.4 IRG-IBB

The Intersector Rapporteur Group on Integrated Broadcast-Broadband (IRG-IBB) was created by ITU-T Study Group 9 and ITU-R Study Group 6 to study topics related to IBB systems. ITU-T Study Group 16 joined the group in October 2015 as a parent group. At its meeting in November 2021, the IRG-IBB decided to close its operations and that any IBB matters should be addressed to its parent groups.

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. A wide range of services is enabled by the IBB system.

IRG-IBB aims at developing Recommendations and other non-normative materials, and to contribute to the coordination of the standardization work of the involved ITU-T and ITU-R groups.

The home page of the IRG-IBB is found at <http://itu.int/en/irg/ibb>, and the group held eight meetings

* Geneva, 25 October 2016, co-located with ITU-R SG6
[Announcement](https://www.itu.int/ml/lists/arc/irgibb/2016-09/msg00000.html) - [Documentation](https://www.itu.int/ifa/c/irg/ibb/mgt/2016-10_Geneva)
* Geneva, 26 January 2018, co-located with ITU-T SG9
[Announcement](https://www.itu.int/en/irg/ibb/Documents/8th%20IRG-IRB-meeting%20announcement.pdf) - [Documentation](https://www.itu.int/ifa/c/irg/ibb/mgt/2018-01_Geneva)
* Geneva, 22 October 2018, co-located with ITU-R SG6
[Announcement](https://www.itu.int/en/irg/ibb/Documents/9th%20IRG-IRB-meeting%20announcement.pdf) - [Documentation](https://www.itu.int/ifa/c/irg/ibb/mgt/2018-10_Geneva)
* Geneva, 1 April 2019, co-located with ITU-R SG6
[Announcement](https://www.itu.int/ifa/c/irg/ibb/mgt/2019-04_Geneva/10th%20IRG-IRB-meeting_announcement.pdf) - [Documentation](https://www.itu.int/ifa/c/irg/ibb/mgt/2020-04_Geneva)
* Virtual, 29 June 2020, co-located with ITU-T SG16
[Announcement](https://www.itu.int/en/irg/ibb/PublishingImages/Pages/default/11th-IRG-IBB_Announcement.pdf) - [Documentation](https://www.itu.int/ifa/c/irg/ibb/mgt/2020-06_e-meeting)
* Virtual, 13 October 2020, co-located with ITU-R WP6B
[Announcement](https://www.itu.int/en/irg/ibb/Documents/12th-IRGIBB_Announcement.pdf) - [Documentation](https://www.itu.int/ifa/c/irg/ibb/mgt/2020-10_e-meeting)
* Virtual, 21 April 2021, co-located with ITU-T SG9 and SG16
[Documentation](https://www.itu.int/ifa/c/irg/ibb/mgt/2021-04_e-meeting) - [Announcement](https://www.itu.int/en/irg/ibb/Documents/13th-IRGIBB_Announcement.pdf?csf=1&e=ci11Fv) - [Report](https://www.itu.int/ifa/c/irg/ibb/mgt/2021-04_e-meeting/IRG-IBB-2104-Doc007.docx)
* Virtual, 18 November 2021, co-located with ITU-T SG9
[Announcement](https://www.itu.int/en/irg/ibb/Documents/14th-IRGIBB_Announcement.pdf) - [Documentation](https://www.itu.int/ifa/c/irg/ibb/mgt/2021-11_e-meeting/) - [Report](https://www.itu.int/ifa/c/irg/ibb/mgt/2021-11_e-meeting/IRG-IBB-2111-006.docx)

### 3.3.5 Focus Groups

Three ITU-T focus groups were created under SG16 in this study period.

#### a) FG-AI4AD

The ITU-T Focus Group on artificial intelligence for autonomous and assisted driving ([FG-AI4AD](https://itu.int/go/fgai4ad)) was created at the SG16 meeting in Geneva, 7-17 October 2019 with an initial term of two years and with Bryn Balcombe (Department for Digital, Culture, Media and Sport, United Kingdom) as chairman. The initial term was extended for additional 10 months in January 2021.

The FG supported standardization activities for services and applications enabled by AI systems in autonomous and assisted driving. It focused on the behavioural evaluation of AI responsible for dynamic driving tasks, so as to ensure that performance of AI on roads meets, or exceeds, the performance of a competent and careful human driver, and, consequently, to build public trust in these technologies.

FG-AI4AD held eight meetings in this study period:

* 1st FG-AI4AD Meeting – London, UK, 21-22 January 2020
[Announcement](https://www.itu.int/md/T17-TSB-CIR-0209/en) – [Workshop](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/20200121/Pages/default.aspx) – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/ai4ad/input/Forms/01.aspx) – [Report](https://extranet.itu.int/sites/itu-t/focusgroups/ai4ad/output/FGAI4AD-O-002.docx?d=w812d734b04bd4fc284c34ce278130819) – [LS/in](https://www.itu.int/net/itu-t/ls/ols.aspx?from=-1&to=8044&after=2019-10-01&before=2020-01-23) - No LS/out
* 2nd FG-AI4AD Meeting – Online, 4-5 May 2020
[Announcement](https://www.itu.int/en/ITU-T/focusgroups/ai4ad/Documents/2020-04_FGAI4AD-Announcement.docx) – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/ai4ad/input/Forms/02.aspx) – [Report](https://extranet.itu.int/sites/itu-t/focusgroups/ai4ad/_layouts/15/WopiFrame.aspx?sourcedoc=%7b7FC48C79-0A8E-4F6F-8F3B-6F08B34F43AA%7d&file=FGAI4AD-O-003.docx&action=default) – [LS/in](https://www.itu.int/net/itu-t/ls/ols.aspx?from=-1&to=8044&after=2019-10-01&before=2020-01-24) - No LS/out
* 3rd FG-AI4AD Meeting – Online, 16-17 September 2020
[Announcement](https://www.itu.int/en/ITU-T/focusgroups/ai4ad/Documents/2020-09_FG-AI4AD_Announcement.pdf) – [Workshop](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/20200916/Pages/default.aspx) – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/ai4ad/input/Forms/03.aspx) – [Report](https://extranet.itu.int/sites/itu-t/focusgroups/ai4ad/_layouts/15/WopiFrame.aspx?sourcedoc=%7b45ADFA91-E65A-40CD-8098-EA497ADB7426%7d&file=FGAI4AD-O-011.docx&action=default) – [LS/in](https://www.itu.int/net/itu-t/ls/ols.aspx?from=-1&to=8044&after=2020-03-06&before=2020-09-17) - [LS/out](https://www.itu.int/net/itu-t/ls/ols.aspx?from=8044&after=2020-05-06&before=2020-09-18)
* 4th FG-AI4AD Meeting – Online, 2-3 December 2020
[Announcement](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T17-TSB-CIR-0279) – [Workshop](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/20201202/Pages/default.aspx) – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/ai4ad/input/Forms/04.aspx) – [Report](https://extranet.itu.int/sites/itu-t/focusgroups/ai4ad/_layouts/15/WopiFrame.aspx?sourcedoc=%7b704C3BC9-18AE-481D-BE24-EF5A959AB659%7d&file=FGAI4AD-O-013.docx&action=default) – [LS/in](https://www.itu.int/net/itu-t/ls/ols.aspx?from=-1&to=8044&after=2020-09-17&before=2020-12-03) - [LS/out](https://www.itu.int/net/itu-t/ls/ols.aspx?from=8044&after=2020-09-19&before=2020-12-03)
* 5th FG-AI4AD Meeting – Online, 2-3 March 2021
[Announcement](https://www.itu.int/md/T17-TSB-CIR-0293/en) - [Workshop](https://aiforgood.itu.int/events/a-regulatory-framework-for-automated-driving-the-value-of-in-use-data-for-creating-a-no-blame-culture-of-safety/) - [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/ai4ad/SitePages/Home.aspx) – [Report](https://extranet.itu.int/sites/itu-t/focusgroups/ai4ad/_layouts/15/WopiFrame.aspx?sourcedoc=%7b81209EBA-8EA0-4FDE-8494-DB87A3E16380%7d&file=FGAI4AD-O-016.docx&action=default) – [LS/in](https://www.itu.int/net/itu-t/ls/ols.aspx?from=-1&to=8044&after=2020-12-03&before=2021-03-03) – [No LS/out](https://www.itu.int/net/itu-t/ls/ols.aspx?from=8044&after=2020-12-04&before=2021-03-03)
* 6th FG-AI4AD Meeting – Online, 2-3 June 2021
[Announcement](https://www.itu.int/md/T17-TSB-CIR-0311/en) – [Webinar](https://aiforgood.itu.int/event/ai-policy-standards-and-metrics-for-automated-driving-safety/) – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/ai4ad/SitePages/Home.aspx) – [Report](https://extranet.itu.int/sites/itu-t/focusgroups/ai4ad/_layouts/15/WopiFrame.aspx?sourcedoc=%7b620C618C-B184-4C15-91E6-5F70D1137215%7d&file=FGAI4AD-O-018.docx&action=default)
* 7th FG-AI4AD Meeting – Online, 6-7 October 2021
[Announcement](https://www.itu.int/md/T17-TSB-CIR-0340/en) – [Webinar](https://aiforgood.itu.int/event/ai-for-road-safety/) – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/ai4ad/SitePages/Home.aspx) – [Report](https://extranet.itu.int/sites/itu-t/focusgroups/ai4ad/_layouts/15/WopiFrame.aspx?sourcedoc=%7b66E238E7-64E2-4535-8560-4743AFE64F4B%7d&file=FGAI4AD-O-020.docx&action=default)
* 8th FG-AI4AD Meeting – Online, 1-2 December 2021
[Announcement](https://www.itu.int/en/ITU-T/focusgroups/ai4ad/Documents/Announcement_FG-AI4AD_December2021.docx) – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/ai4ad/SitePages/Home.aspx) – [Report](https://extranet.itu.int/sites/itu-t/focusgroups/ai4ad/_layouts/15/WopiFrame.aspx?sourcedoc=%7b5B5E931E-C5AA-4971-8D5A-E5356AA97958%7d&file=FGAI4AD-O-023.docx&action=default)

The webpage of the group is <https://www.itu.int/en/ITU-T/focusgroups/ai4ad> and the documentation is found at <https://extranet.itu.int/sites/itu-t/focusgroups/ai4ad>.

#### b) FG-AI4H

The Focus Group on artificial intelligence for health ([FG-AI4H](https://www.itu.int/en/ITU-T/focusgroups/ai4h/Pages/default.aspx)) was created in partnership with the World Health Organization (WHO) at the SG16 meeting in Ljubljana, 9-20 July 2018 with an initial term of two years and with Thomas Wiegand (Fraunhofer HHI, Germany) as chairman. The FG started operations in September 2018. The initial term was extended for additional two years in July 2020 and for another one year in January 2022.

The FG-AI4H objective was to establish a standardized assessment framework for the evaluation of AI-based methods for health, diagnosis, triage or treatment decisions.

FG-AI4H held the following meetings during the study period:

* Meeting A – WHO Headquarters, Geneva, 25-27 September 2018,
[Announcement](https://www.itu.int/md/T17-TSB-CIR-0109/en) – [Workshop](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/20180925) – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/Forms/180925.aspx) – [LS/in](https://www.itu.int/net/itu-t/ls/ols.aspx?from=-1&to=7952&after=2018-07-20&before=2018-09-27) – [LS/out](https://www.itu.int/net/itu-t/ls/ols.aspx?from=7952&after=2018-09-25&before=2018-09-28) – [Report](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-A-101-R01.docx)
* Meeting B – Columbia University, New York, United States, 14, 15-16 November 2018,
[Announcement](https://www.itu.int/md/T17-TSB-CIR-0123) – [Workshop](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/20181114/Pages/default.aspx) – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/Forms/181114.aspx) – [Report](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-B-101-R01.docx) – No LS/in – No LS/out
* Meeting C – EPFL SwissTech Convention Center, Lausanne, 22-25 January 2019,
[Announcement](https://www.itu.int/md/T17-TSB-CIR-0126) – [Workshop](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/ai4h/20190122/Pages/default.aspx) – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/Forms/190122.aspx)- [Report](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-C-101.docx) – No LS/in – No LS/out
* Meeting D – Shanghai, China, 2-5 April 2019,
[Announcement](https://itu.int/md/T17-TSB-CIR-0135/en) – [Workshop](https://itu.int/en/ITU-T/Workshops-and-Seminars/20190402/Pages/default.aspx) – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/Forms/190402.aspx) – [Report](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-101.docx) – No LS/in – No LS/out
* Meeting E – Geneva, Switzerland, 29 May-1 June 2019,
[Announcement](https://itu.int/md/T17-TSB-CIR-0161/en) – [Workshop](https://itu.int/en/ITU-T/Workshops-and-Seminars/ai4h/20190529/Pages/default.aspx) – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/Forms/190530.aspx) – [Report](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-E-101.docx) – No LS/in – No LS/out
* Meeting F -, Zanzibar, Tanzania, 2-5 September 2019,
[Announcement](https://itu.int/md/T17-TSB-CIR-0176/en) – [Workshop](https://itu.int/en/ITU-T/Workshops-and-Seminars/ai4h/201909/Pages/default.aspx) – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/Forms/190903.aspx) – [Report](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-F-101.docx) – [LS/in](https://itu.int/net/itu-t/ls/ols.aspx?from=-1&to=7952&after=2019-04-30&before=2019-09-06) – [LS/out](https://itu.int/net/itu-t/ls/ols.aspx?from=7952&after=2019-09-01&before=2019-09-06)
* Meeting G – New Delhi, India, 11-15 November 2019,
[Announcement](https://www.itu.int/md/T17-TSB-CIR-0196/en) – [Workshop](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/ai4h/201911/Pages/default.aspx) – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/Forms/191113.aspx) – [Report](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-G-101-R01.docx) – No [LS/in](https://www.itu.int/net/itu-t/ls/ols.aspx?from=-1&to=7952&after=2019-09-05&before=2019-11-13) – No LS/out
* Meeting H – Brasilia, Brazil, 21-24 January 2020,
[Announcement](https://www.itu.int/md/T17-TSB-CIR-0215/en) – [Workshop](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/ai4h/202001/Pages/default.aspx) – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/Forms/200122.aspx) – [Report](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-H-101-R01.docx) – [LS/in](https://www.itu.int/net/itu-t/ls/ols.aspx?from=-1&to=7952&after=2019-11-12&before=2020-01-24) – [LS/out](https://www.itu.int/net/itu-t/ls/ols.aspx?from=7952&after=2020-01-22&before=2020-01-24)
* Meeting I – Online, 7-8 May 2020,
[Announcement](https://www.itu.int/ml/lists/arc/fgai4h/2020-04/msg00002.html) – No Workshop – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/Forms/200507.aspx) – [Report](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-I-101.docx)– [LS/in](https://www.itu.int/net/itu-t/ls/ols.aspx?from=-1&to=7952&after=2020-01-24&before=2020-05-08) – No LS/out
* Meeting J – Online, 30 Sep. – 2 Oct. 2020
[Announcement](https://www.itu.int/ml/lists/arc/fgai4h/2020-08/msg00001.html) – No Workshop – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/Forms/200930.aspx) – [Report](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-J-101.docx) – [LS/in](https://www.itu.int/net/itu-t/ls/ols.aspx?from=-1&to=7952&after=2020-05-08&before=2020-10-02) – No LS/out
* Meeting K – Online, 27-29 January 2021
[Announcement](https://www.itu.int/ml/lists/arc/fgai4h/2020-11/msg00002.html.html) – No Workshop – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/Forms/210127.aspx) – [Report](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-K-101.docx) – [LS/in](https://www.itu.int/net/itu-t/ls/ols.aspx?from=-1&to=7952&after=2020-10-02&before=2021-01-29) – No LS/out
* Meeting L – Online, 19-21 May 2021
[Announcement](https://www.itu.int/ml/lists/arc/fgai4h/2021-04/msg00000.html) – No Workshop – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/Forms/210519.aspx) – [Report](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-L-101.docx) – [LS/in](https://www.itu.int/net/itu-t/ls/ols.aspx?from=-1&to=7952&after=2021-01-29&before=2021-05-22) – [LS/out](https://www.itu.int/net/itu-t/ls/ols.aspx?from=7952&after=2021-05-18&before=2021-05-22)
* Meeting M – Online, 28-30 September 2021
[Announcement](https://www.itu.int/ml/lists/arc/fgai4h/2021-08/msg00005.html) – No Workshop – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/Forms/210928.aspx) – [Report](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-M-101.docx) – [LS/in](https://www.itu.int/net/itu-t/ls/ols.aspx?from=-1&to=7952&after=2021-05-21&before=2021-09-28) – No LS/out
* Meeting N – Online, 15-17 February 2022
[Announcement](https://www.itu.int/ml/lists/arc/fgai4h/2021-11/msg00004.html) – No Workshop – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/Forms/220215.aspx) – [Report](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-N-101.docx) – [LS/in](https://www.itu.int/net/itu-t/ls/ols.aspx?from=-1&to=7952&after=2021-09-30&before=2022-02-17) – [LS/out](https://www.itu.int/net/itu-t/ls/ols.aspx?from=7952&after=2022-02-14&before=2022-02-18)

The FG-AI4H produced the following key output documents as of the publication of this report:

– [FG-AI4H Whitepaper](https://www.itu.int/en/ITU-T/focusgroups/ai4h/Documents/FG-AI4H_Whitepaper.pdf)

– [FGAI4H-L-102](https://www.itu.int/en/ITU-T/focusgroups/ai4h/Documents/FGAI4H-CfP_UC_Benchm_Data.pdf): Updated call for proposals: use cases, benchmarking, and data

– [FGAI4H-F-103](https://www.itu.int/en/ITU-T/focusgroups/ai4h/Documents/FGAI4H-F-103-DataPolicy.pdf): Updated FG-AI4H data acceptance and handling policy

– [FGAI4H-C-104](https://itu.int/en/ITU-T/focusgroups/ai4h/Documents/FGAI4H-C-104-DraftThemClassifScheme.pdf): Thematic classification scheme

– [FGAI4H-F-105](https://www.itu.int/en/ITU-T/focusgroups/ai4h/Documents/FGAI4H-F-105-WorkingGroupExperts.pdf): ToRs for the WG-Experts and call for experts

– [FGAI4H-F-106](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-F-106.docx): Guidelines on FG-AI4H online collaboration tools

– [FGAI4H-M-107](https://www.itu.int/en/ITU-T/focusgroups/ai4h/Documents/ITU_WHO_AI4H_Onboarding.pdf): Onboarding FG-AI4H document

– [FGAI4H-N-200](https://itu.int/en/ITU-T/focusgroups/ai4h/Documents/listdeliverables.pdf): Updated list of FG-AI4H deliverables

– [TG-Dental Output 1](https://www.itu.int/en/ITU-T/focusgroups/ai4h/Documents/FGAI4H-TG-Dental-O-001.pdf): Artificial intelligence in dental research: A checklist for authors and reviewers new

– [AHG-DT4HE Output 1](https://www.itu.int/en/ITU-T/focusgroups/ai4h/Documents/FGAI4H-DT4ER-O-001.pdf): Guidance on digital technologies for COVID health emergency

The webpage of the group is <https://www.itu.int/en/ITU-T/focusgroups/ai4h> and the documentation is found at <https://extranet.itu.int/sites/itu-t/focusgroups/ai4h>.

#### c) FG-VM

The Focus Group on vehicular multimedia ([FG-VM](https://www.itu.int/en/ITU-T/focusgroups/vm/Pages/default.aspx)) was created at the SG16 meeting in Ljubljana, 9-20 July 2018 with an initial term of two years and with Jun Harry Li (TIAA, China) as chairman. The FG started operations in September 2018. The initial term was extended for additional 1.5 years in July 2020, and then for an additional 10 months in January 2021.

The FG-VM goal was to identify the need for new vehicular multimedia standards based on space and terrestrial networks integration. The study analysed and identified gaps in the vehicular multimedia standardization landscape and eventually draft technical reports and specifications covering, among others, vehicular multimedia use cases, requirements, applications, interfaces, protocols, architectures, and security, leveraging from previous work done by ITU in this field.

FG-VM held the following meetings since its creation:

– 1st FG-VM Meeting – Ottawa, Canada, 11 October 2018,
[Announcement](https://www.itu.int/md/T17-TSB-CIR-0110/en) – [FG-VM mini-workshop](https://www.itu.int/en/ITU-T/focusgroups/vm/Pages/11-11_Mini-workshop.aspx) – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/vm/input/Forms/01.aspx) – [Report](https://extranet.itu.int/sites/itu-t/focusgroups/vm/output/FGVM-O-005.docx) – [LS-In](https://www.itu.int/ls/Home/ls_search?from=-1,&after=&before=2018-10-11&to=7951,,&title=) – [No LS-Out](https://www.itu.int/ls/Home/ls_search?from=7951,&after=2018-10-10&before=2018-10-12&to=-1,,&title=)

– 2nd FG-VM Meeting – Tokyo, Japan, 23-25 January 2019
[Announcement](https://www.itu.int/md/T17-TSB-CIR-0129) – [Workshop on the future of VM](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/20190123/Pages/default.aspx) – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/vm/input/Forms/02.aspx) – [LS-In](https://www.itu.int/ls/Home/ls_search?from=-1,&after=43385&before=2019-01-25&to=7951,,&title=) – [No LS-Out](https://www.itu.int/ls/Home/ls_search?from=7951,&after=2019-01-22&before=2019-01-26&to=-1,,&title=)

– 3rd FG-VM Meeting – Geneva, Switzerland, 18-19 March 2019
[Announcement](https://www.itu.int/md/T17-TSB-CIR-0146/en) – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/vm/input/Forms/03.aspx) [-](https://extranet.itu.int/sites/itu-t/focusgroups/vm/input/Forms/AllItems.aspx) [Report](https://extranet.itu.int/sites/itu-t/focusgroups/vm/output/FGVM-O-010.docx?d=w862451226cbe4e419bc84781011cc1fd) – [LS-In](https://www.itu.int/ls/Home/ls_search?from=-1,&after=43491&before=2019-03-19&to=7951,,&title=) – [LS-Out](https://www.itu.int/ls/Home/ls_search?from=7951,&after=2019-03-17&before=2019-03-20&to=-1,,&title=)

– 4th FG-VM Meeting – Online, 16-17 May 2019
[Announcement](https://www.itu.int/en/ITU-T/focusgroups/vm/Documents/Announcement_FG-VM_4th-meeting.pdf) – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/vm/input/Forms/04.aspx)- [Report](https://extranet.itu.int/sites/itu-t/focusgroups/vm/output/FGVM-O-015.docx?d=w6273df6b0860409185f655bca613b09a) – [LS-In](https://www.itu.int/ls/Home/ls_search?from=-1,&after=43544&before=2019-05-17&to=7951,,&title=) – [LS-Out](https://www.itu.int/ls/Home/ls_search?from=7951,&after=2019-05-15&before=2019-05-18&to=-1,,&title=)

– 5th FG-VM Meeting – Changchun, China, 11-12 July 2019
[Announcement](https://www.itu.int/md/T17-TSB-CIR-0175/en) – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/vm/input/Forms/05.aspx) – [Report](https://extranet.itu.int/sites/itu-t/focusgroups/vm/output/FGVM-O-018.docx?d=w1fb3ac87eca046a9936a7de2a52b8cf3&Source=https://extranet.itu.int/sites/itu-t/focusgroups/vm/output/Forms/AllItems.aspx) – [LS-In](https://www.itu.int/ls/Home/ls_search?from=-1,&after=43603&before=2019-07-12&to=7951,,&title=) – [LS-Out](https://www.itu.int/ls/Home/ls_search?from=7951,&after=2019-07-10&before=2019-07-13&to=-1,,&title=)

– 6th FG-VM Meeting – Budapest, Hungary, 11-12 September 2019
[Announcement](https://www.itu.int/md/T17-TSB-CIR-0200/en) – [FG-VM mini-workshop –](https://www.itu.int/en/ITU-T/focusgroups/vm/Pages/11-9_wsp.aspx) [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/vm/input/Forms/06.aspx) – [Report](https://extranet.itu.int/sites/itu-t/focusgroups/vm/_layouts/15/WopiFrame.aspx?sourcedoc=%7bEFCD1384-62E1-4AB2-9958-43D079EC4D84%7d&file=FGVM-O-030.docx&action=default) – [LS-In](https://www.itu.int/ls/Home/ls_search?from=-1,&after=43659&before=2019-07-12&to=7951,,&title=) – [LS-Out](https://www.itu.int/ls/Home/ls_search?from=7951,&after=2019-07-10&before=2019-07-13&to=-1,,&title=)

– 7th FG-VM Meeting – Geneva, Switzerland, 12-13 December 2019
[Announcement](https://www.itu.int/md/T17-TSB-CIR-0200/en) – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/vm/input/Forms/07.aspx) – [Report](https://extranet.itu.int/sites/itu-t/focusgroups/vm/output/FGVM-O-034.docx) – [LS-In](https://www.itu.int/ls/Home/ls_search?from=-1,&after=43659&before=2019-12-13&to=7951,,&title=) – [LS-Out](https://www.itu.int/ls/Home/ls_search?from=7951,&after=2019-12-11&before=2019-12-14&to=-1,,&title=)

– 8th FG-VM Meeting – Online, 12-13 March 2020
[Announcement](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T17-TSB-CIR-0227) – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/vm/input/Forms/08.aspx) – [Report](https://extranet.itu.int/sites/itu-t/focusgroups/vm/output/FG-VM-O-039.docx?d=w7cc5df31a3604fc1811d47e483218dea&csf=1&e=HxIoVh) – [LS-In](https://www.itu.int/ls/Home/ls_search?from=-1,&after=43813&before=2020-03-13&to=7951,,&title=) – [LS-Out](https://www.itu.int/ls/Home/ls_search?from=7951,&after=2020-03-11&before=2020-03-14&to=-1,,&title=)

– 9th FG-VM Meeting – Online, 18-19 June 2020
[Announcement](https://www.itu.int/en/ITU-T/focusgroups/vm/Documents/2020-06_FG-VM.pdf) – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/vm/input/Forms/09.aspx) – [Report](https://extranet.itu.int/sites/itu-t/focusgroups/vm/_layouts/15/WopiFrame.aspx?sourcedoc=%7b9BB28D74-CAE3-4BF6-B47E-080380C15474%7d&file=FGVM-O-043.docx&action=default) – [LS-In](https://www.itu.int/ls/Home/ls_search?from=-1,&after=43904&before=2020-06-19&to=7951,,&title=) – [LS-Out](https://www.itu.int/ls/Home/ls_search?from=7951,&after=2020-06-17&before=2020-06-20&to=-1,,&title=)

– 10th FG-VM Meeting – Online, 28-29 September 2020
[Announcement](https://www.itu.int/en/ITU-T/focusgroups/vm/Documents/2020-09_FG-VM.pdf) – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/vm/input/Forms/10.aspx) – [Report](https://extranet.itu.int/sites/itu-t/focusgroups/vm/_layouts/15/WopiFrame.aspx?sourcedoc=%7b93CBCF35-183E-4E24-A3DC-03D49DAB2F76%7d&file=FGVM-O-049.docx&action=default) – [LS-In](https://www.itu.int/ls/Home/ls_search?from=-1,&after=44002&before=2020-09-29&to=7951,,&title=) – [LS-Out](https://www.itu.int/ls/Home/ls_search?from=7951,&after=2020-09-27&before=2020-09-30&to=-1,,&title=)

– 11th FG-VM Meeting – Online 10-11 December 2020
[Announcement](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T17-TSB-CIR-0281) – [Workshop](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/20201210/Pages/default.aspx) – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/vm/input/Forms/11.aspx) – [Report](https://extranet.itu.int/sites/itu-t/focusgroups/vm/_layouts/15/WopiFrame.aspx?sourcedoc=%7b1C7BD714-B200-4BD3-A530-DBECDCF35780%7d&file=FGVM-O-053.docx&action=default) – [LS-In](https://www.itu.int/ls/Home/ls_search?from=-1,&after=44104&before=2020-12-11&to=7951,,&title=) – [LS-Out](https://www.itu.int/ls/Home/ls_search?from=7951,&after=2020-12-09&before=2020-12-12&to=-1,,&title=)

– 12th FG-VM Meeting – Online 12-13 April 2021
[Announcement](https://www.itu.int/en/ITU-T/focusgroups/vm/Documents/FG-VM_Announcement_April2021.docx?csf=1&e=iSmPrZ) – [Special Session](https://www.itu.int/en/ITU-T/focusgroups/vm/Pages/12-04_Special-session.aspx) – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/vm/SitePages/Home.aspx) – [Report](https://extranet.itu.int/sites/itu-t/focusgroups/vm/output/FGVM-O-060.docx) – [LS-In](https://www.itu.int/ls/Home/ls_search?from=-1,&after=44177&before=2021-04-13&to=7951,,&title=) – [LS-Out](https://www.itu.int/ls/Home/ls_search?from=7951,&after=2021-04-11&before=2021-04-14&to=-1,,&title=)

– 13th FG-VM Meeting – Online, 29-30 June 2021
[Announcement](https://www.itu.int/en/ITU-T/focusgroups/vm/Documents/FG-VM_Announcement_29_June_2021.docx?csf=1&e=GUqBQw) – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/vm/SitePages/Home.aspx) – [Report](https://extranet.itu.int/sites/itu-t/focusgroups/vm/_layouts/15/WopiFrame.aspx?sourcedoc=%7bDCF3D19F-0AB8-45FC-87E0-FFFD0D4B25B3%7d&file=FGVM-O-066.docx&action=default) – [LS-In](https://www.itu.int/ls/Home/ls_search?from=-1,&after=44300&before=2021-06-30&to=7951,,&title=) – [No LS-Out](https://www.itu.int/ls/Home/ls_search?from=7951,&after=2021-06-28&before=2021-07-01&to=-1,,&title=)

– 14th FG-VM Meeting – Online, 29 September 2021
[Announcement](https://www.itu.int/en/ITU-T/focusgroups/vm/Documents/FG-VM_Announcement_29Sept2021.docx) – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/vm/SitePages/Home.aspx) – [Report](https://extranet.itu.int/sites/itu-t/focusgroups/vm/_layouts/15/WopiFrame.aspx?sourcedoc=%7bBED5975E-8F45-42A4-9CB1-CA74B305142F%7d&file=FGVM-O-069R1.docx&action=default) – [LS-In](https://www.itu.int/ls/Home/ls_search?from=-1,&after=44378&before=2021-09-29&to=7951,,&title=) – [No LS-Out](https://www.itu.int/ls/Home/ls_search?from=7951,&after=2021-09-28&before=2021-09-30&to=-1,,&title=)

– 15th FG-VM Meeting – Online, 15-16 December 2021
[Announcement](https://www.itu.int/en/ITU-T/focusgroups/vm/Documents/FG-VM_Announcement_15-16_December_2021.docx) – [Documents](https://extranet.itu.int/sites/itu-t/focusgroups/vm/SitePages/Home.aspx) – [Report](https://extranet.itu.int/sites/itu-t/focusgroups/vm/output/FGVM-O-073.docx) – [LS-In](https://www.itu.int/ls/Home/ls_search?from=-1,&after=44469&before=2021-12-16&to=7951,,&title=) – [No LS-Out](https://www.itu.int/ls/Home/ls_search?from=7951,&after=2021-12-14&before=2021-12-17&to=-1,,&title=)

As of publication of this report, two deliverables had been approved and one was in the process of being completed:

– [FGVM-01R2](https://www.itu.int/en/ITU-T/focusgroups/vm/Documents/FGVM-01R2.pdf?csf=1&e=uVY5lV) [[Flipbook](https://www.itu.int/en/publications/Documents/tsb/2020-FG-VM-Use-cases-and-requirements-for-the-vehicular-multimedia-networks/index.html#p=1)], further endorsed as Recommendation [ITU-T F.749.3](https://www.itu.int/rec/T-REC-F.749.3) "Use cases and requirements for the vehicular multimedia networks".

– [FGVM-02](https://www.itu.int/en/ITU-T/focusgroups/vm/Documents/FGVM-02.pdf?csf=1&e=jK5KdA) "Architecture of Vehicle Multimedia Systems", further endorsed as Recommendation [ITU-T H.551](https://www.itu.int/rec/T-REC-H.551) "Architecture of vehicular multimedia systems".

– Draft FGVM-03 "Implementation Aspects of Vehicular Multimedia" ([FGVM-O-071](https://extranet.itu.int/sites/itu-t/focusgroups/vm/output/FGVM-O-071.zip)).

The FG-VM is expected to continue active until October 2022.

The webpage of the group is: <https://www.itu.int/en/ITU-T/focusgroups/vm>.

### 3.3.6 Correspondence group on Metaverse

A correspondence group was created at the SG16 meeting online, 17-28 January 2022 to discuss technical aspects on metaverse. The group will report to the first SG16 meeting in the new study period and provide information leading to an SG16 analysis of future standardization directions, potential work items and future coordination needs. The group will be co-convened by Messrs Shin Gak Kang (ETRI, Rep. of Korea) and Kepeng Li (Tencent, China). The group is open to all SG16 members and the ToR is found [here](https://staging.itu.int/en/ITU-T/studygroups/2017-2020/16/Documents/ToRCGmetaverse.pdf). The file repository is in the [SG16 IFA](https://www.itu.int/ifa/t/2017/sg16/exchange/plen/cgmv) and the mailing list for the CG-Metaverse is t17sg16cgmetaverse@lists.itu.int (subscribe [here](https://www.itu.int/go/tsg16/services)).

### 3.3.7 Regional groups

There were no regional groups under ITU-T Study Group 16 during this study period.

At the meeting online, 19-30 April 2021, the proposal in [SG16-C785-R1](https://www.itu.int/md/T17-SG16-C-0785/en) to establish a **regional group** for Study Group 16 in East and Southeast Asia was discussed but *not* supported. Proponents were invited to discuss the idea further in APT / ASTAP.

# 4 Observations concerning future work

During this study period, SG16 was responsible for studies relating to ubiquitous multimedia applications, multimedia capabilities for services and applications for existing and future networks. This encompasses accessibility; multimedia architectures and applications; human interfaces and services; terminals; protocols; signal processing; media coding and systems (e.g., network signal processing equipment, multipoint conference units, gateways and gatekeepers).

Following a long tradition of work, SG16 has been home to all media coding work in ITU-T and is home to well-known and adopted standards. This includes narrowband and wideband speech coders, and work carried out together with ISO/IEC's JPEG and MPEG working groups in image and video compression, including JPEG and JPEG 2000 (ITU-T T.80 and T.800 series) and MPEG-2 Video (ITU-T H.262), ITU-T H.264 (or MPEG-4 Part 10 Advanced Video Coding), and ITU-T H.265 (HEVC). SG16 is the origin of a large family of successful videoconferencing systems tailored to several networks: for example, ITU-T H.320, H.323, F.734, and H.420 for telepresence systems. SG16 is responsible for standards enabling IPTV services and terminals, detailed by the ITU-T H.700-series, as well as works on standardized digital signage systems. The media gateway protocol family of standards in the ITU-T H.248-series is also used worldwide, especially for NGN.

In addition to the traditional multimedia standardization areas, SG16’s work has been evolving in line with industry needs and the study group has seen an increase in the development of multimedia standards for digital health, digital culture, visual surveillance, immersive live experience (ILE), low-latency interactive multimedia content delivery (including user-generated live content, virtual reality etc), artificial intelligence (AI) for multimedia, distributed ledger technologies (DLT), vehicular gateways, vehicular multimedia aspects of the automotive and mobility industry. SG16 has also observed an increase in the use of AI techniques in multimedia standards, and this is expected to grow within the next few years to become a regular element of its standardization work. Complimentarily, AI techniques can take advantage of multimedia data when applications are developed.

One common element observed in the evolution of the SG16 standardization work is the need of serving the ICT standardization needs in different vertical industries, some of which in the past have not participated in the work of SG16 or even ITU. Reaching out to constituencies from other verticals has been achieved using different tools, such as creation of ITU-T Focus Groups and developing joint activities and initiatives with sister UN organizations such as the World Health Organization (WHO) for digital health and UN Economic Commission for Europe (UNECE) for intelligent transport, and other SDOs, for example ISO TC22/SC31 for vehicular domain services and JTC1 SC35 on user interfaces (accessibility). The good results suggest that these mechanisms should continue to be explored to develop new communities of experts that would enable definition of relevant standards that respond to market and user needs and may enable sufficient room for SG16 sustained growth for the next few study periods.

In order to best support these standardization trends, the ongoing work in SG16 can be seen as addressing three different dimensions:

(1) Traditional multimedia services, application and systems

This category addresses technology standards for well-established areas for multimedia applications and systems. This includes inter alia videoconferencing systems, telepresence systems including ILE, media gateway protocols, audio and video compression, IPTV and digital signage systems, multimedia content delivery networks, and visual surveillance systems. This dimension of work will explore new dimensions of well-known technologies as well as cater for maintenance of SG16 standards for existing and still relevant technology areas.

(2) Vertical-industry oriented services

For at least the last two study periods, SG16 has also been working on standards for services used by vertical industries that expand the traditional concept of multimedia and represented a segment of significant increase for standardization work. Examples include:

* Finance and banking sector: SG16 develops Recommendations on Distributed Ledger Technologies and DLT-based services. Q22/16 received the deliverables of ITU-T FG DLT to meet the ICT and security requirements of financial industry and many Technical Papers and Recommendations have been developed in a short period.
* Health sector: SG16 has established a Question (Q28/16) on e-health, it focuses on standardization of multimedia systems and services to support digital health applications (including e-health). ITU-T SG16 has also established a Focus Group on artificial intelligence for health (FG-AI4H) in partnership with the World Health Organization (WHO) to establish a standardized assessment framework for the evaluation of AI-based methods for health, diagnosis, triage or treatment decisions.
* Culture sector: SG16 has spawned studies on requirements, file format or metadata for digital culture service and application to a new Question focusing on multimedia standards for digital culture. The first Recommendation published was ITU-T T.621 “File structure for interactive mobile comic and animation content”, and subsequent studies include Requirements for an information system of objects in museums, Scenarios, framework and metadata for digitalized artwork images display systems, requirements and reference framework for digital representation of cultural relics/artworks using augmented reality, requirements and metadata for digitization of ethnic costumes. It also plans studies on uniform data classification standards, and digital metadata standards suitable for the intangible cultural heritage.
* Entertainment sector: in addition to existing areas such as media compression and immersive technologies, networking technologies such as IPTV and content delivery networks, wider areas as over-the-top (OTT) delivery content mechanisms are growing areas of standardization, together with topics such as video gaming (which has aspects touching digital culture studies as well as safe listening).
* Transport sector: SG16 studied vehicle gateway platform/‌ITS services and applications, such as functions and service requirements of a vehicle gateway platform to support vehicle communications, enhancements to support emergency and early warning services (e.g., for traffic accidents); SG16 also studied standards for civilian unmanned aerial vehicle (CUAV) communication service, includes requirements and unified application framework for CUAV communication services and applications, as well as interfaces between the CUAV system and other vertical industry application system. SG16 is the parent group of two related focus groups. As the parent group of FG-VM, studies on standards for vehicular multimedia services and infotainment applications have quickly evolved. As parent of the FG-AI4AD, it is exploring the frontiers of standardization for services and applications enabled by AI systems in autonomous and assisted driving.

(3) Enabling technologies

In this category, SG16 standardization could be seen as a provider of building blocks at the application layer (i.e., transport-agnostic) that would enable the specification of complex, specific systems defined in ITU or elsewhere.

Indeed, more recently, the work in SG16 has not focused on the development of monolithic systems and has produced either higher level specifications, or specifications that can serve as "tools" to build a particular system.

While SG16 standardization work has covered families of Recommendations that defined monolithic, strictly-specified systems (such as H.323 for multimedia communication, H.248 for media gateways and the H.810-H.50 series with the Continua Personal Connected Health specifications), more recently it has done more work towards developing "reusable building block" Recommendations such as audio and video compression algorithms, which are adopted / supported in a variety of systems defined in ITU and elsewhere. Some standards can also be grouped as building blocks for specific systems, although a monolithic system per se is not defined (e.g., IPTV systems Recommendations in the H.700 series or video surveillance). Taking the example of IPTV, recently SG16 started work on the possibilities for exposing the IPTV platform's managed features, including QoS and multicast, to third parties (e.g., OTTs) in a transparent way. At another level, various architecture and requirement documents have been developed that define only key system elements, and do not prescribe the specific technologies or techniques / algorithms to be used; these Recommendations allow the identification of building blocks suitable for a particular application area.

In order to implement this vision, SG16 proposes to WTSA an update of its title, mandate, points of guidance and lead study group roles that uses a more modern terminology and jargon that resonates with the current technology trends and with a wider audience having different backgrounds. These updates will also better position the SG16 standards development environment for multimedia and related digital technologies to meet an increased demand of technology standards that serve the needs of many vertical industries with high-quality, nimble standards that can be reused when defining different systems and applications in ITU or elsewhere. SG16 also prepared the revised set of Questions found in Part II of this report that organizes the various areas of study identified in the updated mandate to sustain a productive line of standardization activities for the next study period and beyond.

# 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 16 concerning the general areas of study, title, mandate, lead roles and points of guidance in 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 7.

The list of Recommendations determined/consented at the last meeting of Study Group 16 (not already approved as of the publication of this report) is found in Table 8.

The list of Recommendations deleted by Study Group 16 during the study period is found in Table 9.

The List of Recommendations submitted by Study Group 16 to WTSA-20 for approval is found in Table 10.

Tables 11 onwards list other publications approved and/or deleted by Study Group 16 during the study period.

TABLE 7
Study Group 16 – Recommendations approved during the study period

| Recommendation | Approval | Status | Process | Title |
| --- | --- | --- | --- | --- |
| [F.735.1](http://handle.itu.int/11.1002/1000/14323) | 2020-08-13 | In force | AAP | Requirements for software-defined cameras |
| [F.735.2](http://handle.itu.int/11.1002/1000/14678) | 2021-06-13 | In force | AAP | Architecture and protocols for software-defined cameras |
| [F.740.1](http://handle.itu.int/11.1002/1000/14101) | 2019-11-29 | In force | AAP | Requirements for an information service of objects in museums |
| [F.740.2](http://handle.itu.int/11.1002/1000/14679) | 2021-06-13 | In force | AAP | Requirements and reference framework for digital representation of cultural relics and artworks using augmented reality |
| [F.743 (V2)](http://handle.itu.int/11.1002/1000/14102) | 2019-11-29 | In force | AAP | Requirements and service description for video surveillance |
| [F.743.10](http://handle.itu.int/11.1002/1000/14103) | 2019-11-29 | In force | AAP | Requirements for mobile edge computing enabled content delivery networks |
| [F.743.11](http://handle.itu.int/11.1002/1000/14324) | 2020-08-13 | In force | AAP | Requirements for video surveillance with mobile premises units |
| [F.743.12](http://handle.itu.int/11.1002/1000/14680) | 2021-06-13 | In force | AAP | Requirements for edge computing in video surveillance |
| [F.743.20](http://handle.itu.int/11.1002/1000/14325) | 2020-08-13 | In force | AAP | Assessment framework for big data infrastructure |
| [F.743.21](http://handle.itu.int/11.1002/1000/14326) | 2020-08-13 | In force | AAP | Framework for data asset management |
| [F.743.4](http://handle.itu.int/11.1002/1000/13178) | 2017-03-01 | In force | AAP | Functional requirements for virtual content delivery networks |
| [F.743.5](http://handle.itu.int/11.1002/1000/13656) | 2018-08-29 | In force | AAP | Framework and interfaces for multimedia content delivery network |
| [F.743.6](http://handle.itu.int/11.1002/1000/13657) | 2018-08-29 | In force | AAP | Service requirements for next generation content delivery networks |
| [F.743.7](http://handle.itu.int/11.1002/1000/13897) | 2019-05-14 | In force | AAP | Requirements for big data-enhanced visual surveillance services |
| [F.743.8](http://handle.itu.int/11.1002/1000/13898) | 2019-05-14 | In force | AAP | Requirements for a cloud computing platform supporting a visual surveillance system |
| [F.743.9](http://handle.itu.int/11.1002/1000/13899) | 2019-05-14 | In force | AAP | Use-cases and requirements for multimedia content delivery network |
| [F.746.10](http://handle.itu.int/11.1002/1000/14327) | 2020-08-13 | In force | AAP | Architecture for a spontaneous dialogue processing system for language learning |
| [F.746.11](http://handle.itu.int/11.1002/1000/14328) | 2020-08-13 | In force | AAP | Interfaces for intelligent question answering system |
| [F.746.4](http://handle.itu.int/11.1002/1000/13179) | 2017-03-01 | In force | AAP | Requirements for deployment of information-centric network |
| [F.746.5](http://handle.itu.int/11.1002/1000/13427) | 2017-12-14 | In force | AAP | Framework for a language learning system based on speech and natural language processing (NLP) technology |
| [F.746.6](http://handle.itu.int/11.1002/1000/13428) | 2017-12-14 | In force | AAP | Requirements for a name resolution service in information-centric networks |
| [F.746.7](http://handle.itu.int/11.1002/1000/13658) | 2018-08-29 | In force | AAP | Metadata for an intelligent question answering service |
| [F.746.8](http://handle.itu.int/11.1002/1000/13659) | 2018-08-29 | In force | AAP | Requirements for unified status monitoring of networks and services |
| [F.746.9](http://handle.itu.int/11.1002/1000/13916) | 2019-05-14 | In force | AAP | Requirements and architecture for indoor conversational robot systems |
| [F.747.10](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=15286) | 2022-01-17 | In force | TAP | Requirements of distributed ledger systems for secure human factor services |
| [F.747.9](http://handle.itu.int/11.1002/1000/13180) | 2017-03-01 | In force | AAP | Requirements and architecture for energy management services |
| [F.748.11](http://handle.itu.int/11.1002/1000/14329) | 2020-08-13 | In force | AAP | Metrics and evaluation methods for a deep neural network processor benchmark |
| [F.748.12](http://handle.itu.int/11.1002/1000/14681) | 2021-06-13 | In force | AAP | Deep learning software framework evaluation methodology |
| [F.748.13](http://handle.itu.int/11.1002/1000/14682) | 2021-06-13 | In force | AAP | Technical framework for the shared machine learning system |
| [F.749.10](http://handle.itu.int/11.1002/1000/13900) | 2019-05-14 | In force | AAP | Requirements for communication services of civilian unmanned aerial vehicles |
| [F.749.11](http://handle.itu.int/11.1002/1000/14104) | 2019-11-29 | In force | AAP | Requirements for civilian unmanned aerial vehicles enabled mobile edge computing |
| [F.749.12](http://handle.itu.int/11.1002/1000/14331) | 2020-08-13 | In force | AAP | Framework for communication application of civilian unmanned aerial vehicles |
| [F.749.13](http://handle.itu.int/11.1002/1000/14684) | 2021-06-13 | In force | AAP | Framework and requirements for civilian unmanned aerial vehicle flight control using artificial intelligence |
| [F.749.14](http://handle.itu.int/11.1002/1000/14685) | 2021-06-13 | In force | AAP | Requirements of coordination for civilian unmanned aerial vehicles |
| [F.749.2](http://handle.itu.int/11.1002/1000/13183) | 2017-03-01 | In force | AAP | Service requirements for vehicle gateway platforms |
| [F.749.3](http://handle.itu.int/11.1002/1000/14330) | 2020-08-13 | In force | AAP | Use cases and requirements for vehicular multimedia networks |
| [F.749.4](http://handle.itu.int/11.1002/1000/14683) | 2021-06-13 | In force | AAP | Use cases and requirements for multimedia communication enabled vehicle systems using artificial intelligence |
| [F.749.5](http://handle.itu.int/11.1002/1000/14792) | 2021-10-29 | In force | AAP | Vehicle domain service – General information and use case definitions |
| [F.751.0](http://handle.itu.int/11.1002/1000/14332) | 2020-08-13 | In force | AAP | Requirements for distributed ledger systems |
| [F.751.1](http://handle.itu.int/11.1002/1000/14333) | 2020-08-13 | In force | AAP | Assessment criteria for distributed ledger technologies |
| [F.751.2](http://handle.itu.int/11.1002/1000/14334) | 2020-08-13 | In force | AAP | Reference framework for distributed ledger technologies |
| [F.780.1](http://handle.itu.int/11.1002/1000/13660) | 2018-10-14 | In force | AAP | Framework for telemedicine systems using ultra-high definition imaging |
| [F.791](http://handle.itu.int/11.1002/1000/13661) | 2018-08-29 | In force | AAP | Accessibility terms and definitions |
| [F.921 (V1)](http://handle.itu.int/11.1002/1000/13185) | 2017-03-01 | Superseded | AAP | Audio-based network navigation system for persons with vision impairment |
| [F.921 (V2)](http://handle.itu.int/11.1002/1000/13662) | 2018-08-29 | In force | AAP | Audio-based indoor and outdoor network navigation system for persons with vision impairment |
| [F.922](http://handle.itu.int/11.1002/1000/14335) | 2020-08-13 | In force | AAP | Requirements of information service systems for visually impaired persons |
| [F.930](http://handle.itu.int/11.1002/1000/13571) | 2018-03-29 | In force | AAP | Multimedia telecommunication relay services |
| [G.722.2 Annex C](http://handle.itu.int/11.1002/1000/13429) | 2017-12-14 | In force | AAP | Fixed-point C-code |
| [G.722.2 Annex C (2017) Cor.1](http://handle.itu.int/11.1002/1000/13663) | 2018-08-29 | In force | AAP | Corrections to Table C.5 |
| [G.722.2 Annex D](http://handle.itu.int/11.1002/1000/13430) | 2017-12-14 | In force | AAP | Digital test sequences |
| [H.222.0 (2014) Amd.3 Cor.1](http://handle.itu.int/11.1002/1000/13184) | 2017-03-01 | Superseded | AAP | Syntax correction for the green extension descriptor |
| [H.222.0 (2014) Amd.7](http://handle.itu.int/11.1002/1000/13186) | 2017-03-01 | Superseded | AAP | Virtual segmentation |
| [H.222.0 (2014) Amd.8](http://handle.itu.int/11.1002/1000/13187) | 2017-03-01 | Superseded | AAP | Signalling HDR and WCG video content in MPEG-2 systems |
| [H.222.0 (2014) Cor.2](http://handle.itu.int/11.1002/1000/13188) | 2017-03-01 | Superseded | AAP | STD buffer sizes for HEVC and miscellaneous editorial issues |
| [H.222.0 (2017)](http://handle.itu.int/11.1002/1000/13269) | 2017-03-01 | Superseded | AAP | Information technology – Generic coding of moving pictures and associated audio information: Systems |
| [H.222.0 (2017) Amd.1](http://handle.itu.int/11.1002/1000/13431) | 2017-12-14 | Superseded | AAP | Ultra-low latency and 4k and higher resolution support for transport of JPEG 2000 video |
| [H.222.0 (2018)](http://handle.itu.int/11.1002/1000/13664) | 2018-08-29 | Superseded | AAP | Information technology – Generic coding of moving pictures and associated audio information: Systems |
| [H.222.0 (2018) Amd.1](http://handle.itu.int/11.1002/1000/14105) | 2019-11-29 | Superseded | AAP | Carriage of JPEG XS in MPEG-2 TS |
| [H.222.0 (2018) Cor.1](http://handle.itu.int/11.1002/1000/14106) | 2019-11-29 | Superseded | AAP | Correction of stream\_type value |
| [H.222.0 (2021)](http://handle.itu.int/11.1002/1000/14658) | 2021-06-13 | In force | AAP | Information technology - Generic coding of moving pictures and associated audio information: Systems |
| [H.230](http://handle.itu.int/11.1002/1000/13901) | 2019-05-14 | In force | AAP | Frame-synchronous control and indication signals for audiovisual systems |
| [H.243](http://handle.itu.int/11.1002/1000/13902) | 2019-05-14 | In force | AAP | Procedures for establishing communication between three or more audiovisual terminals using digital channels up to 1920 kbit/s |
| [H.248.77](http://handle.itu.int/11.1002/1000/13432) | 2017-12-14 | In force | AAP | Gateway control protocol: Secure real-time transport protocol (SRTP) package and procedures |
| [H.264 (V12)](http://handle.itu.int/11.1002/1000/13189) | 2017-04-13 | Superseded | AAP | Advanced video coding for generic audiovisual services |
| [H.264 (V13)](http://handle.itu.int/11.1002/1000/13903) | 2019-06-13 | Superseded | AAP | Advanced video coding for generic audiovisual services |
| [H.264 (V14)](http://handle.itu.int/11.1002/1000/14659) | 2021-08-22 | In force | AAP | Advanced video coding for generic audiovisual services |
| [H.265 (V4)](http://handle.itu.int/11.1002/1000/12905) | 2016-12-22 | Superseded | AAP | High efficiency video coding |
| [H.265 (V5)](http://handle.itu.int/11.1002/1000/13433) | 2018-02-13 | Superseded | AAP | High efficiency video coding |
| [H.265 (V6)](http://handle.itu.int/11.1002/1000/13904) | 2019-06-29 | Superseded | AAP | High efficiency video coding |
| [H.265 (V7)](http://handle.itu.int/11.1002/1000/14107) | 2019-11-29 | Superseded | AAP | High efficiency video coding |
| [H.265 (V8)](http://handle.itu.int/11.1002/1000/14660) | 2021-08-22 | In force | AAP | High efficiency video coding |
| [H.265.1 (V1)](http://handle.itu.int/11.1002/1000/13665) | 2018-10-14 | In force | AAP | Conformance specification for ITU-T H.265 high efficiency video coding |
| [H.265.2 (V3)](http://handle.itu.int/11.1002/1000/12947) | 2016-12-22 | In force | AAP | Reference software for ITU-T H.265 high efficiency video coding |
| [H.266](http://handle.itu.int/11.1002/1000/14336) | 2020-08-29 | In force | AAP | Versatile video coding |
| [H.273](http://handle.itu.int/11.1002/1000/12907) | 2016-12-22 | Superseded | AAP | Coding-independent code points for video signal type identification |
| [H.273 (V2)](http://handle.itu.int/11.1002/1000/14661) | 2021-07-14 | In force | AAP | Coding-independent code points for video signal type identification |
| [H.274](http://handle.itu.int/11.1002/1000/14337) | 2020-08-29 | In force | AAP | Versatile supplemental enhancement information messages for coded video bitstreams |
| [H.430.1](http://handle.itu.int/11.1002/1000/13666) | 2018-08-29 | In force | AAP | Requirements for immersive live experience (ILE) services |
| [H.430.2](http://handle.itu.int/11.1002/1000/13667) | 2018-08-29 | In force | AAP | Architectural framework for immersive live experience (ILE) services |
| [H.430.3](http://handle.itu.int/11.1002/1000/13668) | 2018-08-29 | In force | AAP | Service scenario of immersive live experience (ILE) |
| [H.430.4](http://handle.itu.int/11.1002/1000/14108) | 2019-11-29 | In force | AAP | Service configuration, media transport protocols, signalling information of MPEG media transport for immersive live experience (ILE) systems |
| [H.430.5](http://handle.itu.int/11.1002/1000/14338) | 2020-08-13 | In force | AAP | Reference models for immersive live experience (ILE) presentation environments |
| [H.550](http://handle.itu.int/11.1002/1000/13434) | 2017-12-14 | In force | AAP | Architecture and functional entities of vehicle gateway platforms |
| [H.551](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17062) | 2022-01-28 | In force | TAP | Architecture of vehicular multimedia systems |
| [H.560](http://handle.itu.int/11.1002/1000/13435) | 2017-12-14 | In force | AAP | Communications interface between external applications and a vehicle gateway platform |
| [H.625](http://handle.itu.int/11.1002/1000/13190) | 2017-03-01 | In force | AAP | Architecture for network-based speech-to-speech translation services |
| [H.626 (V2)](http://handle.itu.int/11.1002/1000/14109) | 2019-11-29 | In force | AAP | Architectural requirements for video surveillance system |
| [H.626.2](http://handle.itu.int/11.1002/1000/13436) | 2017-12-14 | In force | AAP | Architecture for cloud storage in visual surveillance |
| [H.626.3](http://handle.itu.int/11.1002/1000/13669) | 2018-08-29 | In force | AAP | Architecture for visual surveillance system interworking |
| [H.626.4](http://handle.itu.int/11.1002/1000/13670) | 2018-08-29 | In force | AAP | Architecture for a point-to-point visual surveillance system  |
| [H.626.5](http://handle.itu.int/11.1002/1000/13905) | 2019-05-14 | In force | AAP | Architecture for intelligent visual surveillance systems |
| [H.627](http://handle.itu.int/11.1002/1000/14342) | 2020-08-13 | In force | AAP | Signalling and protocols for a video surveillance system |
| [H.627.1](http://handle.itu.int/11.1002/1000/13191) | 2017-03-01 | In force | AAP | Protocols for mobile visual surveillance |
| [H.629.1](http://handle.itu.int/11.1002/1000/14110) | 2019-11-29 | In force | AAP | Scenarios, framework and metadata for digitalized artwork images display system |
| [H.643.1](http://handle.itu.int/11.1002/1000/13906) | 2019-05-14 | In force | AAP | Architecture for the deployment of information-centric networks |
| [H.644.1](http://handle.itu.int/11.1002/1000/13907) | 2019-05-14 | In force | AAP | Functional architecture for virtual content delivery networks |
| [H.644.2](http://handle.itu.int/11.1002/1000/14111) | 2019-11-29 | In force | AAP | Virtual content delivery network – Network virtualization |
| [H.644.3](http://handle.itu.int/11.1002/1000/14340) | 2020-08-13 | In force | AAP | Functional architecture of multimedia content delivery networks |
| [H.644.4](http://handle.itu.int/11.1002/1000/14686) | 2021-06-13 | In force | AAP | Architecture for mobile/multi-access edge computing enabled content delivery networks |
| [H.702 (2015) Cor.1](http://handle.itu.int/11.1002/1000/13192) | 2017-03-01 | Superseded | AAP | Various corrections and clarifications |
| [H.702 (2020)](http://handle.itu.int/11.1002/1000/14341) | 2020-08-13 | In force | AAP | Accessibility profiles for IPTV systems |
| [H.704](http://handle.itu.int/11.1002/1000/14343) | 2020-08-13 | In force | AAP | Enhanced user interface framework for IPTV terminal device - Gesture control interface |
| [H.724](http://handle.itu.int/11.1002/1000/13437) | 2017-12-14 | In force | AAP | IPTV terminal device: Interworking-enabled model of multiple devices |
| [H.753](http://handle.itu.int/11.1002/1000/14112) | 2019-11-29 | In force | AAP | Scene-based metadata for IPTV services |
| [H.753 (2019) Cor.1](http://handle.itu.int/11.1002/1000/14694) | 2021-06-13 | In force | AAP | Scene-based metadata for IPTV services: Correction of definition and abbreviation for Scene on Demand |
| [H.763.2](http://handle.itu.int/11.1002/1000/13210) | 2017-03-01 | In force | AAP | Scalable vector graphics for IPTV services |
| [H.763.3](http://handle.itu.int/11.1002/1000/13438) | 2017-12-14 | In force | AAP | HTML for IPTV services |
| [H.764 (V2)](http://handle.itu.int/11.1002/1000/14124) | 2019-11-29 | In force | AAP | IPTV services enhanced script language |
| [H.766](http://handle.itu.int/11.1002/1000/13671) | 2018-08-29 | In force | AAP | Lua for IPTV services |
| [H.782 (V1)](http://handle.itu.int/11.1002/1000/13439) | 2017-12-14 | Superseded | AAP | Digital signage: Metadata |
| [H.782 (V2)](http://handle.itu.int/11.1002/1000/13783) | 2018-11-29 | In force | AAP | Digital signage: Metadata |
| [H.783 (V1)](http://handle.itu.int/11.1002/1000/13692) | 2018-08-29 | Superseded | AAP | Digital signage: Audience measurement services |
| [H.783 (V2)](http://handle.itu.int/11.1002/1000/13908) | 2019-05-14 | In force | AAP | Digital signage: Audience measurement services |
| [H.784](http://handle.itu.int/11.1002/1000/13784) | 2018-11-29 | In force | AAP | Digital signage: Display device control interface |
| [H.785.1](http://handle.itu.int/11.1002/1000/13672) | 2018-08-29 | In force | AAP | Digital signage: Service requirements and a reference model on information services in public places via an interoperable service platform |
| [H.810 (V4)](http://handle.itu.int/11.1002/1000/13413) | 2017-11-29 | Superseded | AAP | Interoperability design guidelines for personal connected health systems: Introduction |
| [H.810 (V5)](http://handle.itu.int/11.1002/1000/14113) | 2019-11-29 | In force | AAP | Interoperability design guidelines for personal connected health systems: Introduction |
| [H.811](http://handle.itu.int/11.1002/1000/13414) | 2017-11-29 | In force | AAP | Interoperability design guidelines for personal connected health systems: Personal Health Devices interface |
| [H.812](http://handle.itu.int/11.1002/1000/13415) | 2017-11-29 | In force | AAP | Interoperability design guidelines for personal connected health systems: Services interface |
| [H.812.1](http://handle.itu.int/11.1002/1000/13416) | 2017-11-29 | In force | AAP | Interoperability design guidelines for personal connected health systems: Services interface: Observation Upload capability |
| [H.812.2](http://handle.itu.int/11.1002/1000/13417) | 2017-11-29 | In force | AAP | Interoperability design guidelines for personal connected health systems: Services interface: Questionnaire capability |
| [H.812.3](http://handle.itu.int/11.1002/1000/13418) | 2017-11-29 | In force | AAP | Interoperability design guidelines for personal connected health systems: Services interface: Capability Exchange capability |
| [H.812.4](http://handle.itu.int/11.1002/1000/13419) | 2017-11-29 | In force | AAP | Interoperability design guidelines for personal connected health systems: Services interface: Authenticated Persistent Session capability |
| [H.813 (V3)](http://handle.itu.int/11.1002/1000/13420) | 2017-11-29 | Superseded | AAP | Interoperability design guidelines for personal connected health systems: Healthcare Information System interface |
| [H.813 (V4)](http://handle.itu.int/11.1002/1000/14114) | 2019-11-29 | In force | AAP | Interoperability design guidelines for personal connected health systems: Healthcare Information System interface |
| [H.820](http://handle.itu.int/11.1002/1000/13673) | 2018-08-29 | In force | AAP | Conformance of ITU-T H.810 personal health system: Conformity assessment test plan |
| [H.821](http://handle.itu.int/11.1002/1000/13200) | 2017-04-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Healthcare information system interface |
| [H.830.1](http://handle.itu.int/11.1002/1000/13201) | 2017-04-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Services interface Part 1: Web services interoperability: Health & Fitness Service sender |
| [H.830.2](http://handle.itu.int/11.1002/1000/13202) | 2017-04-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Services interface Part 2: Web services interoperability: Health & Fitness Service receiver |
| [H.830.3](http://handle.itu.int/11.1002/1000/13203) | 2017-04-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Services interface Part 3: SOAP/ATNA: Health & Fitness Service sender |
| [H.830.4](http://handle.itu.int/11.1002/1000/13211) | 2017-04-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Services interface Part 4: SOAP/ATNA: Health & Fitness Service receiver |
| [H.830.5](http://handle.itu.int/11.1002/1000/13204) | 2017-04-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Services interface Part 5: PCD-01 HL7 Messages: Health & Fitness Service sender  |
| [H.830.5 (2017) Cor.1](http://handle.itu.int/11.1002/1000/13424) | 2017-11-29 | In force | AAP | Alignment with CDG2016 (Iris)  |
| [H.830.6](http://handle.itu.int/11.1002/1000/13213) | 2017-04-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Services interface Part 6: PCD-01 HL7 Messages: Health & Fitness Service receiver |
| [H.830.6 (2017) Cor.1](http://handle.itu.int/11.1002/1000/13425) | 2017-11-29 | In force | AAP | Alignment with CDG2016 (Iris) |
| [H.830.7](http://handle.itu.int/11.1002/1000/13208) | 2017-04-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Services interface Part 7: Consent Management: Health & Fitness Service sender |
| [H.830.8](http://handle.itu.int/11.1002/1000/13209) | 2017-04-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Services interface Part 8: Consent Management: Health & Fitness Service receiver |
| [H.830.9](http://handle.itu.int/11.1002/1000/13212) | 2017-04-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Services interface Part 9: hData Observation Upload: Health & Fitness Service sender |
| [H.830.10](http://handle.itu.int/11.1002/1000/13205) | 2017-04-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Services interface Part 10: hData Observation Upload: Health & Fitness Service receiver |
| [H.830.11](http://handle.itu.int/11.1002/1000/13206) | 2017-04-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Services interface Part 11: Questionnaires: Health & Fitness Service sender |
| [H.830.12](http://handle.itu.int/11.1002/1000/13207) | 2017-04-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Services interface Part 12: Questionnaires: Health & Fitness Service receiver |
| [H.830.13](http://handle.itu.int/11.1002/1000/13674) | 2018-08-29 | In force | AAP | Conformance of ITU-T H.810 personal health system: Services interface Part 13: Capability Exchange: Health & Fitness Service sender |
| [H.830.14](http://handle.itu.int/11.1002/1000/13675) | 2018-08-29 | In force | AAP | Conformance of ITU-T H.810 personal health system: Services interface Part 14: Capability Exchange: Health & Fitness Service receiver |
| [H.830.15 (V1)](http://handle.itu.int/11.1002/1000/13676) | 2018-08-29 | Superseded | AAP | Conformance of ITU-T H.810 personal health system: Services interface Part 15: FHIR Observation Upload: Health & Fitness Service sender |
| [H.830.15 (V2)](http://handle.itu.int/11.1002/1000/14115) | 2019-11-29 | In force | AAP | Conformance of ITU-T H.810 personal health system: Services interface Part 15: FHIR Observation Upload: Health & Fitness Service sender |
| [H.830.16 (V1)](http://handle.itu.int/11.1002/1000/13677) | 2018-08-29 | Superseded | AAP | Conformance of ITU-T H.810 personal health system: Services interface Part 16: FHIR Observation Upload: Health & Fitness Service receiver |
| [H.830.16 (V2)](http://handle.itu.int/11.1002/1000/14097) | 2019-10-17 | In force | Agree­ment | Conformance of ITU-T H.810 personal health system: Services interface Part 16: FHIR Observation Upload: Health & Fitness Service receiver |
| [H.830.17](http://handle.itu.int/11.1002/1000/14687) | 2021-06-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Services interface Part 17: Personal Health Device Observation Upload (POU) Sender |
| [H.830.18](http://handle.itu.int/11.1002/1000/14688) | 2021-06-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Services interface Part 18: Personal Health Device Observation Upload (POU) Receiver |
| [H.840](http://handle.itu.int/11.1002/1000/13214) | 2017-04-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface: USB host |
| [H.841 (V3)](http://handle.itu.int/11.1002/1000/13215) | 2017-04-13 | Superseded | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 1: Optimized Exchange Protocol: Personal Health Device |
| [H.841 (V4)](http://handle.itu.int/11.1002/1000/13678) | 2018-08-29 | Superseded | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 1: Optimized Exchange Protocol: Personal Health Device |
| [H.841 (V5)](http://handle.itu.int/11.1002/1000/14344) | 2020-08-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 1: Optimized Exchange Protocol: Personal Health Device |
| [H.842 (V3)](http://handle.itu.int/11.1002/1000/13216) | 2017-04-13 | Superseded | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 2: Optimized Exchange Protocol: Personal Health Gateway |
| [H.842 (V4)](http://handle.itu.int/11.1002/1000/13679) | 2018-08-29 | Superseded | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 2: Optimized Exchange Protocol: Personal Health Gateway |
| [H.842 (V5)](http://handle.itu.int/11.1002/1000/14116) | 2019-11-29 | In force | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 2: Optimized Exchange Protocol: Personal Health Gateway |
| [H.843 (V3)](http://handle.itu.int/11.1002/1000/13217) | 2017-04-13 | Superseded | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 3: Continua Design Guidelines: Personal Health Device  |
| [H.843 (V4)](http://handle.itu.int/11.1002/1000/13680) | 2018-08-29 | In force | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 3: Continua Design Guidelines: Personal Health Device  |
| [H.844 (V3)](http://handle.itu.int/11.1002/1000/13218) | 2017-04-13 | Superseded | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 4: Continua Design Guidelines: Personal Health Gateway |
| [H.844 (V4)](http://handle.itu.int/11.1002/1000/13681) | 2018-08-29 | Superseded | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 4: Continua Design Guidelines: Personal Health Gateway |
| [H.844 (V5)](http://handle.itu.int/11.1002/1000/14117) | 2019-11-29 | In force | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 4: Continua Design Guidelines: Personal Health Gateway |
| [H.845.1](http://handle.itu.int/11.1002/1000/13219) | 2017-04-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 5A: Weighing scales |
| [H.845.2 (V3)](http://handle.itu.int/11.1002/1000/13220) | 2017-04-13 | Superseded | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 5B: Glucose meter |
| [H.845.2 (V4)](http://handle.itu.int/11.1002/1000/13682) | 2018-08-29 | In force | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 5B: Glucose meter |
| [H.845.3](http://handle.itu.int/11.1002/1000/13221) | 2017-04-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 5C: Pulse oximeter |
| [H.845.4](http://handle.itu.int/11.1002/1000/13222) | 2017-04-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 5D: Blood pressure monitor |
| [H.845.5](http://handle.itu.int/11.1002/1000/13223) | 2017-04-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 5E: Thermometer |
| [H.845.6](http://handle.itu.int/11.1002/1000/13224) | 2017-04-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 5F: Cardiovascular fitness and activity monitor  |
| [H.845.7](http://handle.itu.int/11.1002/1000/13225) | 2017-04-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 5G: Strength fitness equipment |
| [H.845.8](http://handle.itu.int/11.1002/1000/13226) | 2017-04-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 5H: Independent living activity hub |
| [H.845.9](http://handle.itu.int/11.1002/1000/13227) | 2017-04-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 5I: Adherence monitor |
| [H.845.10](http://handle.itu.int/11.1002/1000/13234) | 2017-04-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 5I: Insulin pump |
| [H.845.10 (2017) Cor.1](http://handle.itu.int/11.1002/1000/13423) | 2017-11-29 | In force | AAP | Alignment with CDG2016 (Iris) |
| [H.845.11](http://handle.itu.int/11.1002/1000/13228) | 2017-04-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 5K: Peak expiratory flow monitor |
| [H.845.12](http://handle.itu.int/11.1002/1000/13229) | 2017-04-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 5L: Body composition analyser |
| [H.845.13](http://handle.itu.int/11.1002/1000/13230) | 2017-04-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 5M: Basic electrocardiograph |
| [H.845.14](http://handle.itu.int/11.1002/1000/13231) | 2017-04-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 5N: International normalized ratio |
| [H.845.15](http://handle.itu.int/11.1002/1000/13232) | 2017-04-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 5O: Sleep apnoea breathing therapy equipment |
| [H.845.16](http://handle.itu.int/11.1002/1000/13235) | 2017-04-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 5P: Continuous glucose monitor |
| [H.845.16 (2017) Cor.1](http://handle.itu.int/11.1002/1000/13426) | 2017-11-29 | In force | AAP | Alignment with CDG2016 (Iris) |
| [H.845.17 (V1)](http://handle.itu.int/11.1002/1000/13683) | 2018-08-29 | Superseded | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 5Q: Power status monitor |
| [H.845.17 (V2)](http://handle.itu.int/11.1002/1000/14118) | 2019-11-29 | In force | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 5Q: Power status monitor |
| [H.846 (V3)](http://handle.itu.int/11.1002/1000/13233) | 2017-04-29 | Superseded | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 6: Personal Health Gateway |
| [H.846 (V4)](http://handle.itu.int/11.1002/1000/13684) | 2018-08-29 | Superseded | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 6: Personal Health Gateway |
| [H.846 (V5)](http://handle.itu.int/11.1002/1000/13909) | 2019-05-14 | Superseded | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 6: Personal Health Gateway |
| [H.846 (V6)](http://handle.itu.int/11.1002/1000/14119) | 2019-11-29 | In force | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 6: Personal Health Gateway |
| [H.847](http://handle.itu.int/11.1002/1000/13236) | 2017-04-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 7: Continua Design Guidelines for Bluetooth Low Energy: Personal Health Devices |
| [H.848](http://handle.itu.int/11.1002/1000/13237) | 2017-04-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 8: Continua Design Guidelines for Bluetooth Low Energy: Personal Health Gateway |
| [H.849 (V3)](http://handle.itu.int/11.1002/1000/13238) | 2017-04-29 | Superseded | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 9: Transcoding for Bluetooth Low Energy: Personal Health Devices  |
| [H.849 (V4)](http://handle.itu.int/11.1002/1000/13685) | 2018-08-29 | Superseded | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 9: Transcoding for Bluetooth Low Energy: Personal Health Devices  |
| [H.849 (V5)](http://handle.itu.int/11.1002/1000/13910) | 2019-05-14 | Superseded | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 9: Transcoding for Bluetooth Low Energy: Personal Health Devices  |
| [H.849 (V6)](http://handle.itu.int/11.1002/1000/14098) | 2019-10-17 | In force | Agree­ment | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 9: Transcoding for Bluetooth Low Energy: Personal Health Devices  |
| [H.850 (V3)](http://handle.itu.int/11.1002/1000/13239) | 2017-04-29 | Superseded | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 10: Transcoding for Bluetooth Low Energy: Personal Health Gateway - General requirements |
| [H.850 (V4)](http://handle.itu.int/11.1002/1000/14120) | 2019-11-29 | In force | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 10: Transcoding for Bluetooth Low Energy: Personal Health Gateway - General requirements |
| [H.850.1 (V1)](http://handle.itu.int/11.1002/1000/13354) | 2017-04-29 | Superseded | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 10A: Transcoding for Bluetooth Low Energy: Personal Health Gateway - Thermometer |
| [H.850.1 (V2)](http://handle.itu.int/11.1002/1000/14345) | 2020-08-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 10A: Transcoding for Bluetooth Low Energy: Personal Health Gateway - Thermometer |
| [H.850.2 (V1)](http://handle.itu.int/11.1002/1000/13355) | 2017-04-29 | Superseded | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 10B: Transcoding for Bluetooth Low Energy: Personal Health Gateway - Blood pressure |
| [H.850.2 (V2)](http://handle.itu.int/11.1002/1000/14346) | 2020-08-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 10B: Transcoding for Bluetooth Low Energy: Personal Health Gateway – Blood pressure |
| [H.850.3 (V1)](http://handle.itu.int/11.1002/1000/13356) | 2017-04-29 | Superseded | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 10C: Transcoding for Bluetooth Low Energy: Personal Health Gateway - Heart-rate |
| [H.850.3 (V2)](http://handle.itu.int/11.1002/1000/14347) | 2020-08-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 10C: Transcoding for Bluetooth Low Energy: Personal Health Gateway - Heart-rate |
| [H.850.4 (V1)](http://handle.itu.int/11.1002/1000/13357) | 2017-04-29 | Superseded | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 10D: Transcoding for Bluetooth Low Energy: Personal Health Gateway - Glucose meter |
| [H.850.4 (V2)](http://handle.itu.int/11.1002/1000/14348) | 2020-08-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 10D: Transcoding for Bluetooth Low Energy: Personal Health Gateway - Glucose meter |
| [H.850.5 (V1)](http://handle.itu.int/11.1002/1000/13358) | 2017-04-29 | Superseded | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 10E: Transcoding for Bluetooth Low Energy: Personal Health Gateway - Weighing scales |
| [H.850.5 (V2)](http://handle.itu.int/11.1002/1000/14349) | 2020-08-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 10E: Transcoding for Bluetooth Low Energy: Personal Health Gateway - Weighing scales |
| [H.850.6 (V1)](http://handle.itu.int/11.1002/1000/13359) | 2017-04-29 | Superseded | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 10F: Transcoding for Bluetooth Low Energy: Personal Health Gateway - Pulse oximeter |
| [H.850.6 (V2)](http://handle.itu.int/11.1002/1000/14121) | 2019-11-29 | Superseded | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 10F: Transcoding for Bluetooth Low Energy: Personal Health Gateway - Pulse oximeter |
| [H.850.6 (V3)](http://handle.itu.int/11.1002/1000/14350) | 2020-08-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 10F: Transcoding for Bluetooth Low Energy: Personal Health Gateway - Pulse oximeter |
| [H.850.7 (V1)](http://handle.itu.int/11.1002/1000/13360) | 2017-04-29 | Superseded | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 10G: Transcoding for Bluetooth Low Energy: Personal Health Gateway - Continuous glucose monitoring |
| [H.850.7 (V2)](http://handle.itu.int/11.1002/1000/14122) | 2019-11-29 | Superseded | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 10G: Transcoding for Bluetooth Low Energy: Personal Health Gateway - Continuous glucose monitoring |
| [H.850.7 (V3)](http://handle.itu.int/11.1002/1000/14351) | 2020-08-13 | In force | AAP | Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 10G: Transcoding for Bluetooth Low Energy: Personal Health Gateway - Continuous glucose monitoring |
| [H.861.0](http://handle.itu.int/11.1002/1000/13440) | 2017-12-14 | In force | AAP | Requirements on communication platform for multimedia brain information |
| [H.861.1](http://handle.itu.int/11.1002/1000/13572) | 2018-03-29 | In force | AAP | Requirements on establishing brain healthcare quotients |
| [H.862.0](http://handle.itu.int/11.1002/1000/14123) | 2019-11-29 | In force | AAP | Requirements and framework for ICT sleep management service models |
| [H.862.1](http://handle.itu.int/11.1002/1000/14352) | 2020-08-13 | In force | AAP | Data model for sleep management services |
| [H.862.2](http://handle.itu.int/11.1002/1000/14353) | 2020-08-13 | In force | AAP | Framework of annotation methods for biosignal data |
| [H.862.3](http://handle.itu.int/11.1002/1000/14354) | 2020-08-13 | In force | AAP | Requirements of voice management interface for human-care services |
| [H.862.4](http://handle.itu.int/11.1002/1000/14689) | 2021-06-13 | In force | AAP | Framework for information and communication technology olfactory function test systems |
| [H.862.5](http://handle.itu.int/11.1002/1000/14690) | 2021-06-13 | In force | AAP | Emotion enabled multimodal user interface based on artificial neural networks |
| [H.870](http://handle.itu.int/11.1002/1000/13686) | 2018-08-29 | In force | AAP | Guidelines for safe listening devices/systems |
| [H.871](http://handle.itu.int/11.1002/1000/13967) | 2019-07-29 | In force | AAP | Safe listening guidelines for personal sound amplifiers |
| [T.621](http://handle.itu.int/11.1002/1000/13240) | 2017-03-01 | In force | AAP | File structure for interactive mobile comic and animation content |
| [T.627](http://handle.itu.int/11.1002/1000/14692) | 2021-06-13 | In force | AAP | Test specification for video surveillance networking |
| [T.701.11](http://handle.itu.int/11.1002/1000/14358) | 2020-09-29 | In force | AAP | Guidance on text alternatives for images |
| [T.800 (V3)](http://handle.itu.int/11.1002/1000/13911) | 2019-06-13 | In force | AAP | Information technology – JPEG 2000 image coding system: Core coding system |
| [T.801 (V2)](http://handle.itu.int/11.1002/1000/14666) | 2021-06-13 | In force | AAP | Information technology-JPEG 2000 image coding system - Extensions |
| [T.803 (V2)](http://handle.itu.int/11.1002/1000/14667) | 2021-06-13 | In force | AAP | Information technology-JPEG 2000 image coding system: Conformance testing |
| [T.804 (V3)](http://handle.itu.int/11.1002/1000/14668) | 2021-06-13 | In force | AAP | Information technology-JPEG 2000 image coding system: Reference software |
| [T.814](http://handle.itu.int/11.1002/1000/13912) | 2019-06-13 | In force | AAP | Information technology - JPEG 2000 image coding system: High-throughput JPEG 2000 |
| [T.815 (V1)](http://handle.itu.int/11.1002/1000/13913) | 2019-06-13 | Superseded | AAP | Information technology - JPEG 2000 image coding system: Encapsulation of JPEG 2000 images into ISO/IEC 23008-12 |
| [T.815 (V2)](http://handle.itu.int/11.1002/1000/14669) | 2021-06-13 | In force | AAP | Information technology - JPEG 2000 image coding system - Encapsulation of JPEG 2000 images into ISO/IEC 23008-12 |
| [T.832 (V4)](http://handle.itu.int/11.1002/1000/13914) | 2019-06-29 | In force | AAP | Information technology - JPEG XR image coding system - Image coding specification |
| [T.873 (V1)](http://handle.itu.int/11.1002/1000/13915) | 2019-05-14 | Superseded | AAP | Information technology - Digital compression and coding of continuous-tone still images: Reference software |
| [T.873 (V2)](http://handle.itu.int/11.1002/1000/14693) | 2021-06-13 | In force | AAP | Information technology - Digital compression and coding of continuous-tone still images: Reference software |
| [T.88](http://handle.itu.int/11.1002/1000/13688) | 2018-08-29 | In force | AAP | Information technology – Lossy/lossless coding of bi-level images |

TABLE 8
Study Group 16 –Recommendations consented/determined at the last meeting
(not yet approved)

| Recommendation | Consent/Determination | Process | Title |
| --- | --- | --- | --- |
| [F.743.13](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=14697) | 2022-01-28 | AAP | Requirements for cooperation of multiple edge gateways |
| [F.743.14](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=15278) | 2022-01-28 | AAP | Requirements for video distribution systems |
| [F.743.15](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=17022) | 2022-01-28 | AAP | Requirements for multi-operator core network enabled multimedia services |
| [F.743.16](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16647) | 2022-01-28 | AAP | Requirements for communication resource management in intelligent visual surveillance system |
| [F.743.17](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16359) | 2022-01-28 | AAP | Requirements for cloud gaming system |
| [F.746.12](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16361) | 2022-01-28 | AAP | Requirements for a real-time interactive multimedia service under poor network conditions |
| [F.746.13](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16633) | 2022-01-28 | AAP | Requirements for smart speaker based intelligent multimedia communication system |
| [F.748.14](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=17075) | 2022-01-28 | AAP | Requirements and evaluation methods of non-interactive 2D real-person digital human application systems |
| [F.748.15](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=17076) | 2022-01-28 | AAP | Framework and metrics for digital human application systems |
| [F.748.16](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16642) | 2022-01-28 | AAP | Requirements for machine vision-based applications and services in smart manufacturing |
| [F.749.15](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16362) | 2022-01-28 | AAP | Requirements for inspection and examination services using civilian unmanned aerial vehicles |
| [F.751.3](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16934) | 2022-01-28 | AAP | Requirements for change management in DLT-based decentralized applications |
| [F.751.4](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16367) | 2022-01-28 | AAP | General framework for DLT-based invoices |
| [F.780.1 (V2)](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16690) | 2022-01-28 | AAP | Framework for telemedicine systems using ultra-high definition imaging |
| [F.780.2](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16898) | 2022-01-28 | AAP | Accessibility of telehealth services |
| [H.225.0 (V8)](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=13259) | 2022-01-28 | AAP | Call signalling protocols and media stream packetization for packet-based multimedia communication systems |
| [H.235.10](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=13287) | 2022-01-28 | AAP | H.323 security: Support of DTLS for media streams |
| [H.245 (V17)](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=13242) | 2022-01-28 | AAP | Control protocol for multimedia communication |
| [H.266 (V2)](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16464) | 2022-01-28 | AAP | Versatile video coding |
| [H.266.1](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16383) | 2022-01-28 | AAP | Conformance specification for ITU-T H.266 versatile video coding |
| [H.266.2](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16384) | 2022-01-28 | AAP | Reference software for ITU-T H.266 versatile video coding |
| [H.274 (V2)](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16463) | 2022-01-28 | AAP | Versatile supplemental enhancement information messages for coded video bitstreams |
| [H.323 (V8)](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=13274) | 2022-01-28 | AAP | Packet-based multimedia communications systems |
| [H.626.5 (V2)](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16906) | 2022-01-28 | AAP | Architecture for intelligent video surveillance systems |
| [H.627.2](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16648) | 2022-01-28 | AAP | Requirements and protocols for home surveillance systems |
| [H.721 (V3)](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=13317) | 2022-01-28 | AAP | IPTV terminal devices: Basic model |
| [H.870 (V2)](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=15054) | 2022-01-28 | AAP | Guidelines for safe listening devices/systems |
| [T.701.21](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=14438) | 2022-01-28 | AAP | Guidance on audio description |
| [T.701.25](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=14440) | 2022-01-28 | AAP | Guidance on the audio presentation of text in videos, including captions, subtitles and other on-screen text |

TABLE 9
Study Group 16 – Recommendations deleted during study period

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

TABLE 10
Study Group 16 – Recommendations submitted to WTSA-20

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

TABLE 11
Study Group 16 – Supplements

| Supplement | Date | Status | Title |
| --- | --- | --- | --- |
| [F Suppl. 4](http://handle.itu.int/11.1002/1000/14651) | 2021-04-30 | In force | Overview of convergence of artificial intelligence and blockchain |
| [H Suppl. 15](http://handle.itu.int/11.1002/1000/13243) | 2017-01-27 | In force | Conversion and coding practices for HDR/WCG Y'CbCr 4:2:0 video with PQ transfer characteristics |
| [H Suppl. 18](http://handle.itu.int/11.1002/1000/13441) | 2017-10-27 | In force | Signalling, backward compatibility and display adaptation for HDR/WCG video coding |
| [H Suppl. 19](http://handle.itu.int/11.1002/1000/13895) | 2019-03-29 | Superseded | Usage of video signal type code points |
| [H Suppl. 19 (V2)](http://handle.itu.int/11.1002/1000/14096) | 2019-10-17 | Superseded | Usage of video signal type code points |
| [H Suppl. 19 (V3)](http://handle.itu.int/11.1002/1000/14652) | 2021-04-30 | In force | Usage of video signal type code points |

TABLE 12
Study Group 16 – Implementors' Guides

| Implementors' Guide | Date | Status | Title |
| --- | --- | --- | --- |
| [G.729 (2012) IG](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=14418) | 2017-10-27 | In force | Coding of speech at 8 kbit/s using conjugate-structure algebraic-code-excited linear prediction (CS-ACELP) |
| [H.248.x IG](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=13314) | 2017-10-27 | In force | H.248 Sub-series Implementors' Guide  |

TABLE 13
Study Group 16 – Technical Papers

| Designation | Date | Status | Title |
| --- | --- | --- | --- |
| [FSTP.ACC-WebVRI](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16632) | 2020-07-03 | In force | Guideline on web-based remote sign language interpretation (VRI) |
| [FSTP.SS-OTA](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16689) | 2021-04-30 | In force | Standardization survey for over-the-air updating in vehicle |
| [FSTP-ACC-ALD](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=15038) | 2020-07-03 | In force | Overview of assistive listening systems |
| [FSTP-ACC-RCS (V2)](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=15080) | 2019-10-17 | In force | Overview of remote captioning services |
| [FSTP-ACC-RCS (V1)](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=13332) | 2018-07-20 | Superseded | Overview of remote captioning services |
| [FSTP-CONF-F921](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=14347) | 2018-07-20 | In force | Checklist compliance protocol and indicators for audio-based network navigation system for persons with vision impairment |
| [FSTP-SLD-UC](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=17158) | 2022-01-28 | In force | Gap analysis: Use cases of safe listening devices |
| [FSTP-VS-ECSR](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=17019) | 2022-01-28 | In force | Requirements for event centre server in video surveillance systems |
| [HSTP.ACC-UC](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16997) | 2021-04-30 | In force | Use cases for inclusive media access services |
| [HSTP.CONF-H702](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=13322) | 2017-01-27 | In force | Conformance testing specification for ITU-T H.702 |
| [HSTP.CONF-H764](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=13250) | 2019-03-29 | In force | Conformance testing specification for H.764 |
| [HSTP.DLT-RF](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16353) | 2019-10-17 | In force | Distributed ledger technology: Regulatory framework |
| [HSTP.DLT-Risk](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16658) | 2022-01-28 | In force | DLT-based application development risks and their mitigations |
| [HSTP.DLT-UC](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16354) | 2019-10-17 | In force | Distributed ledger technologies: Use cases |
| [HSTP.DS-Gloss](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=13267) | 2020-07-03 | In force | Digital signage: Glossary and definitions |
| [HSTP.IPTV-GUIDE.1](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=13319) | 2017-10-27 | In force | IPTV service deployment scenarios in high-speed broadband era |
| [HSTP-CONF-H870](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=14906) | 2021-04-30 | In force | Testing of personal audio systems for compliance with ITU-T H.870 |
| [HSTP-DIS-UAV](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=13303) | 2018-07-20 | In force | Use cases and service scenarios of disaster information service using unmanned aerial vehicles |
| [HSTP-H810](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=14410) | 2017-10-27 | In force | Introduction to the ITU-T H.810 Continua Design Guidelines |
| [HSTP-H810-XCHF](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=14411) | 2017-10-27 | In force | Fundamentals of data exchange within ITU-T H.810 Continua Design Guideline architecture |
| [HSTP-H810-XCHF](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=14082) | 2017-01-27 | Superseded | Fundamentals of data exchange within ITU-T H.810 Continua Design Guideline architecture |
| [HSTP-H812-FHIR (V2)](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16352) | 2019-10-17 | In force | Interoperability design guidelines for personal connected health systems: Services interface: FHIR Observation Upload for trial implementation |
| [HSTP-H812-FHIR (V1)](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=14412) | 2017-10-27 | Superseded | Interoperability design guidelines for personal connected health systems: Services interface: FHIR observation upload for trial implementation |
| [HSTP-VID-WPOM](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16701) | 2020-07-03 | In force | Working practices using objective metrics for evaluation of video coding efficiency experiments |

TABLE 14
Study Group 16 – Technical Reports

| Designation | Date | Status | Title |
| --- | --- | --- | --- |
| None |

TABLE 15
Study Group 16 – Other publications

| Publication | Date | Status | Title |
| --- | --- | --- | --- |
| None |

ANNEX 2

Proposed updates to the Study Group 16 mandate and Lead Study Group roles

**(WTSA Resolution 2)**

The following are the proposed changes to the Study Group 16 mandate and Lead Study Group roles agreed at the last Study Group 16 meeting in this study period, based on the relevant portions of WTSA-16 Resolution 2.

Annex A
(to Resolution 2 (Rev. Geneva, 2022))

Part 1 – General areas of study

**...**

**ITU‑T Study Group 16**

**Multimedia and related digital technologies**

ITU‑T Study Group 16 is responsible for studies relating to ubiquitous multimedia applications, multimedia capabilities, multimedia services and multimedia applications for existing and future networks.

This encompasses information and communication technologies for multimedia systems, applications, terminals and delivery platforms; accessibility for digital inclusion; ICTs for active assisted living; human interfaces; multimedia aspects of distributed ledger technologies; media and signal coding and systems; and digital multimedia services in various verticals (health, culture, mobility, etc.).

NOTE – When ITU-T SG16 was created in 1996, one of its mandates was to continue ITU-T SG1's studies on multimedia services. Accordingly, reference to "services" in the context of SG16 mandate is to be understood as "multimedia services".

**...**

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

**...**

SG16 Lead study group on multimedia technologies, applications, systems and services
Lead study group on IP-based television services and digital signage

Lead study group on human factors and ICT accessibility for digital inclusion
Lead study group on multimedia aspects of automotive related intelligent services
Lead study group on multimedia aspects of digital health
Lead study group on digital culture
Lead study group on multimedia aspects of DLT technologies and its applications

**...**

Annex B
(to Resolution 2 (Rev. Geneva, 2022))

Points of guidance to ITU‑T study groups for development
of the post-2021 work programme

**...**

ITU‑T Study Group 16

ITU‑T Study Group 16 will work on the following items:

* terminology for various multimedia services;
* operation of multimedia systems and applications, including interoperability, scalability and interworking over different networks;
* ubiquitous multimedia services and applications;
* multimedia aspects of digital services;
* multimedia systems and services accessibility for digital inclusion;
* development of multimedia end-to-end architectures, including vehicle gateway for intelligent transport system (ITS);
* high-layer protocols and middleware for multimedia systems and applications, including IP-based television services (managed and non-managed networks), Internet-based streaming media services and digital signage;
* media and signal coding;
* multimedia and multimode terminals;
* human-machine interaction;
* signal processing network equipment and terminals, gateway implementations, and characteristics;
* quality of service (QoS), quality of experience (QoE) and end-to-end performance in multimedia systems;
* security of multimedia systems and services;
* multimedia aspects of distributed ledger technologies and its applications;
* digital multimedia services and applications in various vertical industries;
* AI-enabled multimedia applications.

In developing its studies, SG16 will take into consideration societal and ethical aspects of intelligent applications.

ITU-T SG16 will work collaboratively with all stakeholders working in the standardization areas under ITU-T SG16, in particular with ITU-T SG2, SG9, SG12 and SG20 and other ITU SGs, other UN agencies, ISO, IEC, industry forums and consortia, and regional and international standards-development organizations (SDO).

**...**

Annex C
(to Resolution 2 (Rev. Geneva, 2022))

List of Recommendations under the responsibility of the respective
ITU‑T study groups and TSAG in the 2022-2024 study period

(No modifications are proposed by SG16 to the list of Recommendations under its responsibility.)

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