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| The International Teleocmmunication Union - Connecting the World. | | **International telecommunication union**  **Telecommunication Standardization Bureau** | |  |
|  | | | Geneva, 19 December 2018 | |
| **Ref:** | **TSB Circular 140** SG9/SP | | **To:**  - Administrations of Member States of the Union | |
| **Tel:** | +41 22 730 5858 | |
| **Fax:** | +41 22 730 5853 | |
| **E-mail:** | [tsbsg9@itu.int](mailto:tsbsg9@itu.int) | | **Copy to:**  - ITU-T Sector Members;  - Associates of ITU-T Study Group 9;  - ITU Academia;  - The Chairman and Vice-Chairmen of Study Group 9;  - The Director of the Telecommunication Development Bureau;  - The Director of the Radiocommunication Bureau | |
| **Subject:** | **Merger of Question 3/9 into Question 1/9** | | | |

Dear Sir/Madam,

1 At the request of the Chairman of Study Group 9, *"Broadband cable and TV",* I have the honour to inform you that, in accordance with the provisions of Section 7, § 7.2.2, of Resolution 1 (Rev. Hammamet, 2016), by reaching consensus among those present:

– This Study Group, in its meeting in Geneva, 22-30 January 2018, agreed to merge Question 1/9 “*Transmission of television and sound programme signal for contribution, primary distribution and secondary distribution*” with Question 3/9 “*Digital programme delivery controls for multiplexing, switching and insertion in compressed bit streams and/or packet streams*”.

– Additionally, the name of the revised Question 1/9 was changed to “*Transmission and delivery control of television and sound programme signal for contribution, primary distribution and secondary distribution*”.

2 TSAG, in its meeting in Geneva, 26 February-2 March 2018, endorsed the merger of these Questions.

3 At its meeting in Bogotá, Colombia, 21-28 November 2018, Study Group 9 finally approved the merger including the new terms of reference of the resulting Question 1/9.

4 **Annex 1** contains the reasons for the merger, and Annex 2 contains the updated text of Question 1/9.

Yours faithfully,



Chaesub Lee  
Director of the Telecommunication  
Standardization Bureau

**ANNEX 1  
Reasons for merger of Question 1/9 and Question 3/9**

Taking into consideration that in this Study Period Q3/9 did not receive any contribution and that the Rapporteur position had been vacant, SG9 agreed to merge Q3/9 with Q1/9 and to revise the terms of reference of Q1/9 to include the applicable responsibilities of Q3/9. In this way, Q3/9 was merged into Q1/9 and the updated terms of reference are found in Annex 3.

**ANNEX 2  
Updated text of Question 1/9**

**Transmission and delivery control of television and sound programme signal for contribution, primary distribution and secondary distribution**

(Merge of Q1/9 and Q3/9)

**Motivation**

ITU‑T and ITU‑R are studying the standards to be used for digital television and sound programme signals transmission.

Television distribution operators such as cable television operators, video distributors and broadcasters normally receive several programme signals from different local or remote sources, and they switch the appropriate signal at the specified time to accommodate local advertisements, local programming, emergency messages, etc.

Bit-rate reduction processing of such digital signals is widely used both in studio installations and for direct broadcasting from terrestrial or satellite transmitters as well as for transmission, including transmission for contribution and for primary and secondary distribution, defined as:

* Contribution – Carriage of signals to production centres where post-production processing may take place;
* Primary distribution – Use of a transmission channel for transferring audio and/or video information to one or several destination points without a view to further post-processing on reception (e.g. from a continuity studio to a transmitter network);
* Secondary distribution – Use of a transmission channel for distribution of programmes to viewers at large (by over-the-air broadcasting or by cable television, including retransmission, such as by broadcast repeaters or by SMATV).

It is also important to study the operating requirements for programme delivery controls such as multiplexing, switching and insertion of compressed programme bit streams into different programme streams at content distribution functions such as cable television head-ends. Cost effective and operationally efficient solutions should be found to meet those requirements.

To facilitate the international exchange of programmes and to rationalize the design of equipment, it is desirable to continue to study the methods used for digital source coding of such signals, as defined by other standardization bodies such as Study Group 16.

Indeed, the challenge is to find a balanced compromise among the various factors that interplay in the specification of the transmission method to be preferred for each application. For instance, a compromise must be found among:

* required availability of the service;
* required quality of the picture and sound delivered to the user;
* total latency of the signal in the transmission chain;
* differential latency of the audio and video signals (lip-sync) in television transmission;
* recommended bit-rate reduction method and profile;
* bit rate needed in the channel to deliver the service.  
    
  NOTE 1 – lip-sync is defined as the "operation to provide the feeling that the speaking motion of the displayed person is synchronized with that person's voice. The minimization of the relative delay between the visual display of a person speaking and the audio of the voice of the person speaking. The objective is to achieve a natural relationship between the visual image and the aural message for the viewer/listener".

Delivery controls such as multiplexing, switching and/or insertion should satisfy the following requirements:

* would not cause disruptive disturbances to home decoders;
* would not incur in programme quality losses attendant to repeated compression encoding and decoding, while at the same time meeting the specified operating requirements;

In addition, these solutions would satisfy the above requirements even when the various bit streams:

* are not synchronized to each other;
* use different bit rates and resolutions;
* conform to different picture formats and profiles;
* conform to different compression standards;
* are encapsulated in TS, MMT or other stream format;
* are conveyed over various types of networks after multiplexing (only applies to MMT).

The studies cover not only television and sound programme signals but also the service delivery of emerging advanced video systems such as UHDTV, HDR, 3D, multi-view and free-viewpoint video over a variety of transport means, including IP-based ones.

(Measurement and control of quality of service is covered by SG12).

**Question**

Study items to be considered include, but are not limited to:

* Which source coding methods and which interfaces can be recommended for the transmission of digital television and sound programme signals for purposes of contribution over digital transmission circuits and chains?
* Which solutions, from those studied by ITU‑R Study Group 6, should be recommended for point-to-point contribution transmission of UHDTV and HDR programme material over physical connections?
* Which source coding methods can be recommended for the transmission of digital television and sound programme signals for purposes of primary and secondary distribution over digital transmission circuits and chains?
* What are the appropriate multiplexing arrangements (component, service, higher level protocols) for the applications above?
* What are the service availability requirements and how do they translate into methods of protection against digital transmission errors for those applications?
* Which requirements must be imposed on the various parameters that interplay to determine the performance of the transmission service, such as QoS, picture and sound quality, signal latency, etc., in order to ensure that the transmission service provides adequate performance for those applications using a reasonable amount of resources, such as a reasonable amount of bit-rate?
* Which provisions can be made to preserve lip-sync when the audio and video components of a television programme undergo different delays through the transmission chain?
* What are the appropriate transmission methods for uncompressed digital television and sound programme signals when they are used for contribution purposes?
* What are the functional and operational requirements of the various applications that must be met for delivery control of different compressed programme bit streams and/or packet streams, i.e., TS or MMT, on the output channel of television distribution systems such as multiplexing, switching, and insertion?
* Which technical solutions can be recommended to allow the delivery control, such as multiplexing, switching and insertion, of different compressed programme bit streams and/or packet streams, i.e., TS or MMT, on the output channel of television distribution systems?
* What are the appropriate system model, requirements and transmission methods for UHDTV, HDR, 3D (stereoscopic/autostereoscopic/hologram), multi-view and free-viewpoint video signals using different transport means?
* Do the UHDTV and HDR applications and the related quality levels, that will be identified by ITU‑R Study Group 6, adequately cover all the applications of UHDTV and HDR, and the related quality levels identified within Study Group 9, and if they do not, which additional applications should be taken into account?
* What enhancements to existing Recommendations are required to provide energy savings directly or indirectly in information and communication technologies (ICTs) or in other industries? What enhancements to developing or new Recommendations are required to provide such energy savings?
* What is an appropriate way to convey large volume UHDTV and HDR signal from field to broadcaster station?
* What mechanism is required for physical layer to enable IP-multicast for large volume data such as UHDTV and HDR signal?

**Tasks**

Tasks include, but are not limited to:

* Preparation of a number of new draft Recommendations by the year 2020, which will specify the methods to be used for the transmission and delivery controls of advanced video programmes for purposes of contribution and of primary distribution, and over the digital cable television infrastructure, depending on the contributions received, and on progress in the work of the appointed Rapporteur(s);
* While studies of UHDTV and HDR may include characteristics in the terms of reference of Study Group 9 that are common to motion pictures, Study Group 9 recognizes that aspects specifically relating to motion pictures should be based on standards developed by motion picture expert groups.

An up-to-date status of work under this Question is contained in the Study Group 9 work programme (http://itu.int/ITU-T/workprog/wp\_search.aspx?sp=16&q=1/9).

**Relationships**

**Recommendations**

* ITU-T H.261, H.262, H.263, H.264, H.265
* ITU-T H.222.0
* ITU-T J-series (e.g. J.83, J.181, J.183, J.189, J.195-196, J.280, J.380-series, J.382)
* ITU-R BT.1769, BT.1121-1, BT.1548-2

**Questions**

* 4, 7 and 9/9

**Study groups**

* ITU-T SG 12 (Questions 18 and 19/12)
* ITU-T SG 16 (Questions 6 and 7/16)
* ITU-R SGs 4, 5 and 6

**Standardization bodies**

* AES
* DVB
* ETSI TC Cable
* IEC TC100
* IEEE
* ISO/IEC JTC1/SC29/WG11
* JCTEA
* SCTE
* SMPTE

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