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| **Telecommunication Standardization Bureau** | | ITU logo |
|  | | Geneva, 18 July 2014 |
| Ref: | **TSB Circular 107**  COM 16/SCN | - To Administrations of Member States of the Union |
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| E-mail: | [tsbsg16@itu.int](mailto:tsbsg16@itu.int) | **Copy:**  - To ITU-T Sector Members;  - To ITU-T Associates;  - To ITU-T Academia;  - To the Chairman and Vice-Chairmen of Study Group 16;  - To the Director of the Telecommunication Development Bureau;  - To the Director of the Radiocommunication Bureau |
| Subject: | **Approval of merging Questions 16/16 and 18/16 into revised Question 18/16** | |

Dear Sir/Madam,

1 At the request of the Chairman of Study Group 16 (*Multimedia coding, systems and applications*), I have the honour to inform you that, in accordance with the procedure described in Resolution 1, Section 7, § 7.2.2, of WTSA (Dubai, 2012), Member States and Sector Members present at the last meeting of Study Group 16, which was held in Sapporo, Japan, from 30 June to 11 July 2014 inclusive, agreed by reaching consensus to merge Questions 16/16 and 18/16 into the following revised Question:

*Question 18/16 - Signal processing network functions and equipment (*see Annex 1)

2 **Question 18/16 is therefore approved.**

3 The resulting Recommendations are assumed to fall under the alternative approval process (AAP).

Yours faithfully,

Malcolm Johnson  
Director of the Telecommunication  
Standardization Bureau

**Annex: 1**

ANNEX 1  
(to TSB Circular 107)

Text of revised Question 18/16

**1. Question 18/16 – Signal processing network functions and equipment**

(Merged Q16/16 and Q18/16)

**Motivation**

This Question deals with Signal Processing Network Equipment (SPNE) including network-based speech enhancement devices such as electrical network echo control, acoustic network echo control, automatic level control devices, and voice  enhancement devices  It also deals with the implementation and interaction aspects of signal processing network equipment/terminals for transporting voice and voiceband traffic in networks.

With the increased popularity of packet-based networks using Internet Protocol (IP), more and more speech traffic is expected to be carried over these transport networks. Therefore, it will also be observed a significant amount of voice and voiceband data traffic going through signal processing network equipment , such as gateways,  circuit multiplication equipment and standalone network speech enhancement devices that interconnect the GSTN and packet networks as well as interconnect different packet networks. For this reason, there is a need to ensure a high quality of service for voice and voiceband data carried in part or wholly via IP networks.

The purpose of this Question is to:

* enhance existing Recommendations (e.g. G.160, G.168, and G.169) to ensure that adequate performance with emerging packet-based networks is maintained. As echo cancellers are increasingly embedded into gateways it will be necessary to review the applicability of G.168 to these devices and to develop either a separate Recommendation or Annex to G.168 to ensure that any specific requirements for these embedded echo cancellers are taken into account;
* enhance signal compression and processing (including channel multiplexing) techniques in a new generation of voice gateway functions to accommodate new types of signals and services;
* enhance system controls to maintain end-to-end signal qualities as high as possible;
* develop Recommendations that include performance requirements and test methodologies that will help ensure that the correct and appropriate functionality is present in the equipment. It is not intended to define new protocols, but eventually new requirements for these protocols;
* develop the logic and protocol requirements needed for the control and coordination of signal processing functionalities in the networks and terminals;
* study the interaction of SPNE, between different SPNE/terminals, between SPNE and terminals, and between SPNE/terminals and transmission systems;
* ensure the consistency of Recommendations in the area of SPNE.

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

* impact of speech processing issues (e.g. speech coding, voice enhancement) related to SPNE on overall network performance;
* specification and Recommendation of functionality, interfaces, performance requirements and functional tests to provide good network performance for transport network equipment for interconnecting various type of networks;
* identify protocols and Internet interworking functions needed to be supported;
* support of functionality needed to ensure minimal end-to-end delay;
* impact of evolving terminal equipment (such as text telephones, modems, facsimile and wireless terminals) on voice quality for terminal equipment and multimedia terminals including home gateways;
* optimization of voice gateway functionality for transporting voice and voiceband data traffic;
* interactions between: similar and different SPNE/terminals, voiceband signals and SPNE
* SPNE and end-terminal equipment, and SPNE and transmission systems;
* techniques to ensure high-quality SPNE and terminals Recommendations;
* enhancement of existing or development of new Recommendations to ensure that these interactions do not impair service;
* logic and protocol requirements needed for control and coordination of signal processing functionalities in the networks and terminals. Such logic may be used to get the optimal arrangements of signal processing functionalities in the networks and terminals in a connection, or to configure their parameters for optimum performance;
* the availability of general evaluation procedures;
* interaction between: similar and different SPNE/terminals, SPNE and other voiceband traffic technologies including text telephony, SPNE/terminals and transport systems, and SPNE/terminals in networks that include satellite links;
* the interaction of acoustic echo control devices with SPNE/terminals;
* the effect of tandem signal processing avoidance and methods of minimizing the impact of these effects (e.g. codec bypass or tandem-free operation) on in-path SPNE/terminals;
* the methodology and technique to minimize the undesirable interactions among SPNEs and SPNEs with terminals to achieve better voice quality (e.g. dynamic coordination of signal processing functions);
* study for SPNE/terminals used in next generation networks (SPNE/terminals interworking between GSTN and packet/IP networks);
* evaluation of the corresponding ITU‑T Recommendations;
* to ensure the interoperability between SPNE, e.g. dynamic coordination, data relay
* to consider any additions to Recommendations that may help to measure and reduce the impact of climate change. Examples include reduced power consumption of hardware and hardware tools, and reduced complexity of algorithms;
* functional characteristics and requirements that are necessary for network-based speech enhancement devices (e.g. network and acoustic echo cancellers, automatic level control, automatic listener enhancement, noise reduction) to provide good performance in existing GSTN and emerging ATM/IP and cellular networks;
* conformance tests and requirements that are necessary to ensure good performance of speech enhancement devices and how can they be enhanced to better correlate with subjective test results;
* performance of speech enhancement devices in GSTN, ATM/IP, cellular and other wireless environments with speech, facsimile and voiceband data signals, text telephones, signalling tones, call-processing tones, etc.;
* hardware and software tools that are necessary to support the testing of speech enhancement devices;
* realistic echo paths and test signals that are required for testing speech enhancement devices;
* design of in-path speech enhancement equipment so as not to interfere with tandem codec avoidance mechanisms (e.g. codec bypass or tandem-free operation);
* requirements of speech enhancement devices to minimise any degradations in performance due to tandeming;
* requirements for speech enhancement devices to operate with wideband signals;
* impact of testing with voice-over-packet interfaces (e.g. IP) and overcoming of any associated problems;
* performance of speech enhancement devices under system load conditions.

**3. Tasks**  
  
Tasks include, but are not limited to:

* improving voice performance for various gateways including vehicle and home gateways (e.g. implementation of tandem avoidance mechanisms of speech processing functions);
* guidelines to perform tests for measuring performance of signal processing functionalities (e.g. embedded echo cancellers) of a gateway equipment;
* coordination of activities verifying the consistency of SPNE/terminal Recommendations;
* develop guidelines on the preferred locations of SPNE in networks;
* addressing performance issues between SPNE/terminals and other voiceband traffic types including text telephony;
* develop draft new Recommendation(s) on control logic for SPNE and between SPNE and terminals; on mechanism for dynamic and soft coordination of SPNE/terminals to achieve optimal end-to-end voice quality; and on provision of information and requirements for SPNE;
* maintain and further develop ITU‑T G.160, G.161, G.161.1, G.164, G.165, G.168, G.169, Q.115-series, G.799.2, G.776.1, and G.776.4;
* enhancement of ITU-T G.799.1/Y.1451.1 to include support of ATM networks for GSTN interface;
* revision of ITU-T G.799.3 (IP-to-IP Gateway) that can be used for the bulk interconnection of voice and voiceband data traffic of two network operators;
* maintenance of ITU‑T G.763, G.764, G.765, G.766, G.767, G.768, G.769/Y.1242, G.799.1/Y.1451.1, G.799.3 and I.733;
* develop guidelines for the application of speech enhancement devices (e.g. echo cancellers in conference bridges) to be included in the respective Recommendations above;
* develop new Recommendation or Annex to ITU-T G.168 covering test methodologies and the requirements of embedded echo cancellers;
* progress new work item on Do No Harm tests for speech enhancement functions.

An up-to-date status of work under this Question is found in the SG16 work programme (<http://itu.int/ITU-T/workprog/wp_search.aspx?sp=15&q=18/16>).

**4. Relationships**

**Recommendations**

* ITU-T G.108.2, G.114, G.131, G.136, G.160-series, G.173, G.175, G.177, G.710- and G.720-series, G.760-series, G.827, G.828, P.330, P.340, P.342, P.1010, P.1100, P.1110, P.501, P.502, P.82, P.84, P.800, P.831, P.835, P.840, P.862-series, Q.50-series, Q.55/16, Q.56/16, Q.115‑series, S.1522, T.30, T.38, V.18, V.20-series, V.32, V.34, V.150.x-series, V.151, V.152.

**Questions**

* 1/16 and 21/16 on multimedia systems, terminals, protocols and architectures;
* 3/16 and on media gateway control;
* 7/16 and 10/16 on speech coding algorithms;
* 15/16 on voiceband signal compression protocols;
* 27/16 on vehicle gateway platform.

**Study groups**

* ITU‑T SG2 on operational aspects of networks and performance and network management;
* ITU‑T SG11 on signalling requirements and protocols;
* ITU‑T SG12 on speech performance;
* ITU‑T SG13 on IP-based networks, NGN, FN and Internetworking;
* ITU‑T SG15 on core network architecture, and management and control of transport systems and equipment;
* ITU‑R SGs 4 and 5 on voice on mixed terrestrial/satellite networks.

**Other bodies**

* Broadband Forum on ATM, MPLS and frame relay transport;
* ETSI TISPAN, 3GPP, 3GPP TSG SA4, 3GPP2 and TIA on mobile networks, mobile network architectures, tandem-free operation and the logic and protocol requirements needed for the control and coordination of signal processing functionalities in the networks and terminals;
* IETF on IP transport, applications, speech service control, and operation and management;
* ISO, IEC.

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