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Title: Discussion of the Future of P.CQO-L/-E

1 Motivation

During the last SG12 meeting in November, 2009 the Rapporteurs of Q.15 asked the interested parties of Q.15 to contribute to P.CQO-L/-E. This is because recent activities in Q.15 had slowed down and the wish for more guidance in that project was expressed from several parties.

The purposes of this contribution are firstly to recapitulate the project goals briefly. Secondly it highlights a number of questions which have not been answered yet (not necessarily a complete list), but which are crucial in the standardization progress of P.CQO-L/-E. Even though some of the questions might have been discussed already they might be of new relevance due to a changed situation: availability of new objective models (P.OLQA), pending project review etc.

Thirdly this document elaborates why Q.15 should retire P.CQO-L and continue with P.CQO-E instead.

2 Recapitulation

P.CQO-L is the working title for an objective model, predicting the conversational quality in a telephone conversation. The model may output quality scores for listening quality, talking quality, interactional quality and an overall conversational quality score. P.CQO-L currently specifies two modes of operation depending on the type of input signals, namely …

- a wave-signal based model, and
- a packet based model.

P.CQO-L was specified to cover only a limited scope of test scenarios. The main limitations are:

- operation only on narrow-band voice signals,
- model development only from already existing i.e. standardized objective quality models, with the exception of the talking quality model (wave-signal based model).

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- (further limitations can be found in [1])

The intention of limiting the scope of P.CQO-L was to quickly come to a solution, of which we can now say – after almost five years of discussions and draftings (first meeting started in June 2005) – that is a goal that has not been met.

P.CQO-E - the enhanced model - in contrast, is not limited to the constraints mentioned above. P.CQO-E was intended to be developed at a later stage to either complement P.CQO-L or even replace it.

3 Project Review

After almost five years working on P.CQO-L/-E it might be useful to review its current status and make decisions on future actions.

3.1 Achievements

The discussions we had over the past years lead to a number of achievements which are relevant to all P.CQO-xx approaches. Here just a brief overview:

1. Agreement on the three main impacting factors of conversational quality, i.e. Listening, Talking and Interactional quality. A definition for Interactional Quality is still pending.
2. Successful definition of a subjective test methodology for conversational testing, suitable for developing an objective model.
3. A few databases based on the above methodology (or on similar methodologies) are available and are already used for training existing models.
4. Numerous new definitions of terms used in conversational contexts were identified helping to clarify the use of the technology in conversational quality measurements.
5. A fair amount of analysis has gone into the most important use cases for an objective conversational model, of which we could extract at least four useful applications (see [1] section 5.1.4). Previous versions [3] of this document provide a complete list of options and use cases.

3.2 Open Issues

This section highlights open issues of the current project status. The section includes an excerpt from [1].

Open technical issues:

1. Based on the results presented by NTT in COM12 C146 Study Period 2005-2008 there is a need to further investigate what the interaction quality proposed by FT implies, since this has a potential to be essential for the development of the P.CQO model. There is no existing Recommendation for Interactional Quality available neither for objective nor subjective measurements.
2. Open issues with respect to the subjective test (see Annex A of [1]):
   - There was a proposal to add a question on difficulty,
   - proposal to give more guidance on each level of the interaction quality scale,
   - suggestion to reach a sufficient statistical confidence by having enough conditions in each test,

- need for clarification on figure 1 about order in which questions asked after phase 1 (COM12 TD107 WP2 SP 2005-2008). The discussion was mainly lead by France Telecom and NTT.

3. What are model's input signals? Parameters only or Wav-files / PCAP-files.
4. When computing the conversational quality experienced by a party A who does not hear echo when the other party B does hear echo, do we a) assume that the party B has not heard echo, or b) do we take that echo into account, i.e. by using the measured echo? Option (b) is more accurate and the subjective experiment design described in Annex A of [1] will provide the data required to validate this situation.

Open organizational issues:

1. Who is proponent now?
2. Terms of reference?
3. Testplans for training and validation?
4. What is the required amount of databases for validation?
5. What is the time schedule?
6. What are the minimum requirements for P.CQO?
7. Implementer's Guide for P.CQO required, i.e. explaining the requirements for the processing of live calls (capturing, recording requirements, synchronization, segmenting files).

4 Analysis

After about five years of working on this project its complexity should have become apparent – hopefully not only to the active parties in Q.15. There are still a number of major issues to be clarified before P.CQO-L/-E could be finalized. Limiting the scope of P.CQO-L to using only existing standards [1, 3] apparently did not help finishing it quickly. Neither did it help to develop a wave-signal based model in parallel to a packet stream based model to be put in the same standard.

The scope of P.CQO-L can also be found very limiting in that a few companies have already solutions in their works or even on the market with features that exceed those currently specified in the draft recommendation of P.CQO-L.

Therefore SG12 might want to reevaluate whether developing P.CQO-L is too limiting now since its major goal to standardize an objective conversational model quickly could not be achieved nor does it seem to meet future market requirements.

5 Proposal

In order to reduce the P.CQO project complexity and thus speeding up the development process for a good objective conversational quality model it might be worthwhile looking at splitting the models into a wave-signal based and a packet based model. While the wave-signal based model could be developed first, the packet based model could be developed as a framework standard - like P.564 - based on the wave-signal based model, later.

It should also be reevaluated why retiring P.CQO-L today might be preferable, while focusing on P.CQO-E from now on. Working on P.CQO-E would result in a standard that might actually be appli-

cable for testing of future and not only past networks, for example due to its capabilities of testing wideband signals (including listening, talking and interactional quality domains!).

Therefore the proposal of this document can be outlined as follows:

1. P.CQO-L should be considered as obsolete, and
2. P.CQO-E needs to be specified instead.
3. P.CQO-E should be developed in two steps:
    a. Development and standardization of a wave-signal based model first, and the
    b. Development of a packet based model as a framework standard later.

6 References

[1] ITU-T TD23, March 2009: Draft Recommendation for P.CQO-L

[2] ITU-T COM12-10-E, November 2000: Proposed draft Recommendation on the perceptual echo and sidetone quality measure (PESQM), an objective method for talking quality assessment

[3] ITU-T COM 12-TD49 (Geneva,), Co-Editors, Initial Draft Recommendation for P.CQO-L

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