3GPP TSG SA WG4 Meeting #121 TDoc S4-221288

E-Meeting, 17th – 26th August 2022

**Title: Draft Reply LS to RAN3 on RAN visible QoE value**

**Response to: LS S4-221234 (R3-226014**

**Release: Rel-18**

**Work Item: NR\_QoE\_enh-Core**

**Source:** **3GPP SA4**

**To:** **3GPP RAN3, ITU-T SG12**

**Cc: 3GPP RAN2, 3GPP SA5**

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**Attachments: none**

# 1 Overall description

SA4 thanks RAN3 for your LS on RAN visible QoE value, and wishes to respond to the two questions from RAN3 regarding QoE metrics in SA4’s Rel-18 specifications on AR, MR and MBS.

**Question 1:**

**Can a RAN visible QoE value be defined that reflects the overall QoE of an ongoing service, assuming multiple QoE metrics taken into account, like MOS value for audio? In that respect, RAN3 notices that the TR 26.909 states:**

***"While MOS calculation in the client is possible, it severely limits the use of advanced network optimization, use of flexible MOS windowing, and also introduces problems when the MOS model calculation needs to be updated. A better solution is to make sure that the raw reported QoE metrics are enough to be able to calculate the final MOS value in the QoE server."***

**RAN3 wonders whether the above conclusion about MOS in TR 26.909 still holds.**

**SA4 reply**:

In general, SA4 believes that while in principle it is possible to define a RAN visible QoE value as described above by RAN3, the absence of the necessary standards makes it not feasible in practice at this stage. The above conclusion in TR 26.909 as cited by RAN3 still holds, and furthermore, additional factors for consideration are described below.

As background, please note that TR 26.909 containing the aforementioned statement was outcome of SA4’s Rel-14 IQoE work item based on analysis done in 2015-2016 of MOS-based QoE assessment work by ITU-T SG12’s (then) “Parametric non-intrusive assessment of TCP-based multimedia streaming quality” work item, a.k.a *P.NATS*. That ITU-T activity later became P.1203, “Parametric bitstream-based quality assessment of progressive download and adaptive audiovisual streaming services over reliable transport”.

Without going into excessive detail, SA4 wishes to point out some issues and concerns we have identified:

1. A measure of the overall QoE for an ongoing service must in principle estimate the experience of the human user of the service, on a ***subjective*** basis. For multimedia services this inherently means that the overall service QoE cannot be evaluated “instantly”, but rather must be based on data covering longer periods of time, i.e., at a “human (hence subjective) time-scale”. This input time-scale may vary from 10 seconds to the whole duration of the associated media content. In other words, the provided MOS information would likely not support real-time RAN resource optimization.
2. ITU-T P.1203, while addressing both individual short-term (e.g., at the seconds level) video and audio MOS estimation, as well as longer-term A/V MOS integration (minutes or longer, e.g., for the entire media session), its algorithms are somewhat outdated, and only cover H.264 up to HD quality.
3. There is related follow-up ITU-T work to P.1203 in P.1204. For example, the latter addresses MOS estimation for other, more modern codecs including H.265 and VP9, and up to 4K/UHD resolution. However, the required specification of individual quality assessment modules in P.1204 has not yet concluded in ITU-T SG12.
4. The downside of a simple MOS value for QoE is the inherent absence of granular information regarding the contributing components in the transmission chain. Besides quality degradation effects that occur in the device and network as mentioned in a), there could be other contributing factors to overall service quality – content offered only in low-resolution on the server, user subscription restrictions on allowed bitrates, etc. Therefore, given simply the end-to-end MOS value, SA4 suggests that RAN3 evaluate the means to determine, when quality degradation is detected, whether that is mainly attributable to the network itself, and if so, which network “knobs and dials” to adjust towards achieving dynamic and practical improvement in subjective QoE.
5. The MOS-based QoE assessment method of ITU-T, when applied to 3GPP, incurs additional processing overhead on the UE, especially at the application layer in executing the associated algorithms, the degree of which depends on the complexity of algorithm design.
6. As a general principle, MOS-based QoE characterization must be performed according to standardized algorithms. From SA4’s perspective, such is the scope of ITU-T (e.g., in P.1203/P.1204). Therefore, SA4 believes that its primary objective and task regarding QoE is to define the relevant raw QoE metrics for the application services in our scope, while the standardization of media QoE models should be the responsibility of ITU-T SG12.

Due to the RAN3 interest as indicated in your LS being tied to related ITU-T activity in P.1204, SA4 also copies this LS reply to ITU-T SG12, with inquiry on their plans for further work/completion of that work item.

**Question 2: If the above conclusion about MOS from TR 26.909 does not hold, is it feasible to define such a RAN visible QoE value that would be useful at the gNB?**

**SA4 reply**: Please refer to the above reply. Overall, SA4 wishes to defer a specific answer to this question at this stage, and would also like to seek feedback from ITU SG12.

# 2 Actions

**To RAN3**

**ACTION:** SA4 kindly asks RAN3 to take the above information into account, and provide feedback to SA4 if necessary.

**To ITU-T SG12**

**ACTION:** SA4 kindly requests ITU-T SG12 to check the above responses provided by SA4 to RAN3 and provide your comments and suggestions, along with any corrections. In addition, SA4 requests ITU-T SG12 to inform 3GPP (esp. SA4, RAN3 and RAN2) about your plans regarding the P.1204 work item.

# 3 Dates of next TSG SA WG 4 meetings

SA4#122 20th – 24th February 2023 EU

SA4#123 17th – 21st April 2023 TBD