3GPP TSG RAN WG1 #105-e R1-21xxxxx

e-Meeting, May 10th – 27th, 2021

Source: Moderator (Qualcomm)

Title: [105-e-NR-XR-01] Discussion on response LS to SA4 on Status Update on XR Traffic

Agenda Item: 8.14.1

Document for: Discussion and Decision

# Discussion

RAN1 received an LS in [1] from SA4 on Status Update on XR Traffic, copied in Section 2.

**Question: Please share your view on how to reply to the LS. Please feel free to propose answer.**

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| **Company** | **Comment** |
| ZTE, Sanechips | RAN1 would like to thank SA4 on the update of their progress in terms of VR1 traffic, Q trace based evaluation as well as considerations on RAN1 evaluation to push additional information including priority related packet importance into 5GS.RAN1 has so far finalized the traffic model for DL single stream and is in the course of discussing the DL multiple streams. One of the candidate options for DL multiple stream, i.e. FoV + omnidirectional stream is related to related to the ongoing discussing of VR1 traffic characteristic. Thus further SA input on the QoS setting including PDB/PER requirements for FoV and non-FoV streaming is needed.Given RAN1 agreement on traffic models, the following values required of SA test channels are derived from the baseline settingsDLVR/AR

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| --- | --- |
| Resource type | Delay-critical GBR |
| Packet Delay Budget  | 10 ms |
| Maximum Data Burst Volume | 30Mbps@60fps: 93750 Bytes45Mbps@60fps: 140625 Bytes |

CG

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| --- | --- |
| Resource type | Delay-critical GBR |
| Packet Delay Budget  | 15 ms |
| Maximum Data Burst Volume | 30Mbps@60fps: 93750 Bytes8Mbps@60fps: 25000 Bytes |

ULPose/Control

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| --- | --- |
| Resource type | Delay-critical GBR |
| Packet Delay Budget  | 10 ms |
| Maximum Data Burst Volume | 300 Bytes |

AR Video

|  |  |
| --- | --- |
| Resource type | Delay-critical GBR |
| Packet Delay Budget  | 60 ms |
| Maximum Data Burst Volume | 10Mbps@60fps: 125000 Bytes20Mbps@60fps: 250000 Bytes |

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| Ericsson | RAN1 would like to thank SA4 on the update of their progress in terms of VR1 traffic, Q trace based evaluation as well as considerations on RAN1 evaluation to push additional information including priority related packet importance into 5GS.RAN1 has agreed on a set of statistical traffic models and KPIs that can be used for the evaluations. For RAN1, using a common and stable baseline is central to the subsequent evaluation of NR Rel-16/17 features wrt XR, and RAN1 is currently getting ready to perform evaluations based on these conditions. Most likely, RAN1 will not be able to evaluate performance based on traffic models other than those agreed so far. Hence, we do not see that RAN1 needs any immediate support to define models based on P-traces. However, any feedback from SA4 on parameters chosen by RAN1 for the agreed statistical traffic models is welcome.1. RAN1 does not need any immediate support to define traffic models based on P-traces. RAN1 welcomes feedback (if any) from SA4 on the parameters chosen by RAN1 for the agreed statistical traffic models

With regard to the action 3) in the LS, SA4 seeks for support to define appropriate and representative test channels and looks for feedback and comments on the initial definition in clause 7.6 in S4-210614. Currently, RAN1 is not planning to produce results that could be used to develop test channels. The system simulation output will provide guidance on how many users can be simultaneously served in one cell while still maintaining adequate performance. So far, RAN1 is not planning to provide results that would describe the time-dynamics of packet delays and losses for a single user, and it is unlikely that RAN1 will be able to that in the near term: 1. RAN1 is not planning to provide results that would describe the time-dynamics of packet delays and losses for a single user.

Finally, the LS also discusses potential optimizations for XR-Traffic that relate to application traffic inpu. T So far, RAN1 has not yet discussed or reached any conclusion with regards enhancements or optimizations. We can acknowledge, on the other hand, that having application information could potentially be used to take decisions at the different protocol levels. How this information could be used and what decisions may be taken, is not something RAN1 can comment right now and requires cooperation among several WGs. In any case, SA4 may study the traffic characteristics of the application which could be made available to the network e.g. application data packet size, the number of IP packets belonging to a single application PDU, identification of the data packets belonging to an application PDU, latency for the application data packet, periodicity of the application data packet1. Input on the traffic characteristics of the application may be useful to the RAN.
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| Huawei, HiSilicon | Below are some views from our side on the actions in this SA4 LS (copied from our Tdoc R1-2105924).In summary, the reply LS to SA4 seems not urgent and we feel there is not enough time for companies to discuss and prepare the reply LS (if any) to SA4 in this meeting. So we suggest to postpone the discussion and reply LS (if any) to future meetings.==*(below are copied from our Tdoc R1-2105924)**For action 2): To inform SA4 in case support would be needed for defining and/or verifying statistical models based on P-Traces.*RAN1 has developed the statistical model for XR evaluation, which is different from the P-Trace based model. RAN1 has already agreed the parameters for statistical model based on the analysis of SA4 traces during RAN1#104-e [2] and RAN1#104b-e [3]. Therefore, there is no need to further verify the statistical model with SA4. ***Observation 1: RAN1 has already agreed the parameters for statistical model based on the analysis of SA4 traces. Therefore, there is no need to further verify statistical model with SA4.****For action 3): To kindly support SA4 in the definition of appropriate and representative test channels and provide feedback and comments on the initial definition in clause 7.6 of the PD.*SA4 has defined an initial test channel in clause 7.6 of the PD document [4] based on Packet Error Rate (PER) and packet delay, where the packet error model is modelled as independent and identically distributed (i.i.d.) losses independent of the packet size, the packet delay is modeled i.i.d. distribution between 0 and a max value. However, the initial test channel model developed by SA4 might be too simplified, which cannot reflect the real 5G air interface. Based on RAN1 system-level simulation, it is observed that the packet error and packet delay depend on various aspects, e.g. the deployment scenarios, antennas settings, wireless channel model, scheduling, HARQ-ACK, etc., which are very complicated. It may not be easy to approximate 5G air interface with a test channel.***Observation 2: The initial test channel defined by SA4 might be too simplified and cannot reflect the real 5G air interface. It may not be easy to approximate 5G air interface with a test channel.****For 4): To inform SA4 in case support would be needed for providing simulation and evaluation results for different test channels in order to identify the benefit of specific radio/QoS settings.*It is expected that RAN1 initial evaluation results will be reported by companies in RAN1#105-e. The simulation settings of RAN1 system-level evaluation are more practical compared with SA4 test channel. Therefore, observations/conclusions should be made based on RAN1 system-level evaluation results, rather than SA4 evaluation results based on the test channel.***Observation 3: Observations/conclusions should be made based on RAN1 system-level evaluation results, rather than SA4 evaluation results based on the test channel.*** |
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# SA4’s LS on Status Update on XR Traffic

3GPP TSG SA WG4 would like to inform 3GPP TSG RAN WG1 on our progress on XR Traffic for the purpose of evaluating the performance of XR application and traffic on 5G Systems and in particular the new radio.

For the study item, we envision completion date in September 2021. All information is collected in the Permanent Document (as attached). We will move all agreements for proper documentation in a newly assigned TR 26.926.

We have progressed work on the following topics since our latest communication:

* Improved traffic models for VR1
* Usage of Traces to develop statistical models
* Definition of test channels
* Updates to the quality evaluation framework
* Initial quality results based on test channels

In addition, after consultation with RAN1 colleagues, it was understood that RAN1 prefers statistical models for the purpose of doing simulations. However, RAN1 colleagues are also interested in identifying optimizations for XR-Traffic that relate to application traffic. Examples include, but are not limited to:

1. Video-slice and video frame awareness in the delivery.
2. Different QoS settings for different video frame/slice types such as I and P-frames
3. Understanding the timing requirements of application packets
4. Periodicity of traffic due to video frame patterns
5. Etc.

In order to support the above efforts, SA4 decided to produce traces according to the agreed format in clause 8.3.3.5 of the PD, but only the first four parameters should be considered for baseline simulations. In order to evaluate additional cross-layer options, the remaining parameters may be considered in enhanced simulations. Should SA4 or RAN1 see value in adding additional parameters, this can be done based on SA4 agreement. If the usage of such parameters is considered beneficial, the potential realization in a 5G System may be addressed in collaboration between SA4, RAN1 and possibly other 3GPP groups.

SA4 also agreed to evaluate application quality based on P’-Traces and cannot use statistical models. However, SA4 also works on the usage of traces to derive statistical models. If needed, SA4 offers support to develop and/or verify statistical models for specific setups and configurations, for example statistical models for different video frame/slice types.

SA4 also agreed to define and use test channels in order to evaluate the quality of different configurations and radio settings through test channels. As examples, SA4 configurations include the impact of different packetizations, different bitrates, different rate control schemes, different slice configurations and different error control mechanisms. In order to do so, SA4 welcomes support on the definition of suitable and representative test channels in terms of different parameters as documented in in clause 7.6 of the PD.

SA4 may also provide support to generate simulation and evaluation results for different test channels in order to identify the benefit of specific radio/QoS settings, if needed. SA4 is in the course of producing results following the Q-Trace format as defined in clause 8.3.3.7 of the PD.

SA4 appreciates the collaboration with RAN1 on these matters for 5G optimizations for XR services.

**ACTION:**

**To RAN1**

1. To take into account the information in this document.
2. To inform SA4 in case support would be needed for defining and/or verifying statistical models based on P-Traces.
3. To kindly support SA4 in the definition of appropriate and representative test channels and provide feedback and comments on the initial definition in clause 7.6 of the PD.
4. To inform SA4 in case support would be needed for providing simulation and evaluation results for different test channels in order to identify the benefit of specific radio/QoS settings.

# References

1. R1-2104023 LS on Status Update on XR Traffic, Qualcomm