**Response LS to SA4 new 5QIs.**

**Current Status**

* 7 companies have commented on the following proposal: “In addition to the response LS from RAN1#104-bis-e in April 2021 to SA2 and SA4 (cc: RAN2) in R1-2104117, RAN1 would like to provide the following information in response to the LS from SA4, based on additional evaluation results: the new SA4 5QIs values can be supported by NG-RAN.”
	+ Four companies (OPPO, MTK, HW, QC) are okay with the proposal.
	+ One company (Ericsson) would like to await results from more companies before sending another LS response.
	+ ZTE’s proposal: Assuming that if one packet in a frame occur error, the frame is regarded as a wrong frame, it is concluded that NG-RAN is able to support the new SA4 5QIs values #1 and #2. RAN1 would also like to point out that support of new SA4 5QIs values #1 and #2 beyond 45Mbps is not guaranteed according to evaluations in RAN1 #105-e
	+ Nokia proposal: In addition to the response LS from RAN1#104-bis-e in April 2021 to SA2 and SA4 (cc: RAN2) in R1-2104117, RAN1 would like to provide the following information in response to the LS from SA4, based on additional evaluation results: ~~the new SA4 5QIs values can be supported by NG-RAN.~~ even though RAN1 hasn’t performed extensive evaluations with the very parameters presented by SA4 (5QIs), we assume that these values can still be supported by NG-RAN in some setups.

**Proposed agreement:**

* In addition to the response LS from RAN1#104-bis-e in April 2021 to SA2 and SA4 (cc: RAN2) in R1-2104117, RAN1 would like to provide the following information in response to the LS from SA4, based on additional evaluation results: even though RAN1 hasn’t performed extensive evaluations with the very parameters presented by SA4 (5QIs), we assume that these values can still be supported by NG-RAN in some setups.

**PDB value of the stream in UL AR aggregating streams of scene, video, data, and audio, i.e., Stream 2 in Option 1 and 3, and Option 2.**

**Current Status**

* 60 ms (9 companies): QCOM, Samsung, vivo, MTK, Xiaomi, ZTE, DCM, Ericsson, Intel
* 10 ms (7 companies): Apple, LG, DCM, InterDigital, OPPO, CATT, Nokia
* 15 ms (6 companies): LG, DCM, InterDigital, OPPO, CATT, Nokia
* 40ms (1 company): Ericsson
* Defer the decision to Aug meeting: HW

**FL note**: It is critical to make a decision on this in RAN1#105-e as it is a parameter for baseline simulations. Given that (i) there is no clear majority, and (ii) the following comment makes sense: PDB of 60ms for the aggregated stream of scene, video, data, and audio may be too long, although it should be much larger than PDB of 10ms for pose/control. Therefore, FL propose 40ms as baseline.

**Proposed agreement:**

* PDB value of the stream in UL AR aggregating streams of scene, video, data, and audio, i.e., Stream 2 in Option 1 and 3, and Option 2.
	+ 40ms (baseline), 10/15/60ms (optional)

**Dual-eye buffer evaluation for DL video stream**

**Current Status**: The below proposal is supported by most of the companies. Wording changes highlighted in red are made to address some companies’ comments.

**Proposed agreement:**

For DL video stream, separate packet arrivals in time for dual-eye buffer can be optionally evaluated, based on the single stream model by doubling the packet arrival rate and halving the packet size compared to the single stream, while all other parameters (e.g., jitter, PDB) are the same as for single stream.

* For companies who are evaluating separate packet arrivals in time for dual-eye buffer in addition to single stream (baseline), it is recommended to evaluate at least the following scenarios in the table. It is encouraged to evaluate additional baseline/optional scenarios/configurations.

|  |  |  |
| --- | --- | --- |
| Application | AR/VR 30Mbps |  |
| Deployment scenario | Dense Urban for FR1,InH for FR2 |  |
| Traffic model | Single stream | Separate packet arrival for dual-eye buffer |  |
| Data rate (Mbps) | 30 | 30 |  |
| Packet size distribution | Truncated Gaussian distribution |  |
| Mean packet size (Bytes) | 62500 | 31250 | Data rate / FPS / 8 [bytes] |
| STD of packet size (Bytes) | 6563 | 3281 | 10.5% x mean packet size |
| Max packet size (Bytes) | 93750 | 46875 | 150% x mean packet size |
| Min packet size (Bytes) | 46875 | 23437 | 50% x mean packet size |
| Packet arrival interval (ms) | 1000/60 | 1000/120 |  |
| PDB (ms) | 10 |  |

**Two streams traffic model: Option 1**

**Current Status**: It has been discussed over multiple meetings and the below was agreed in RAN1#104bis-e. It is supported by several companies, while some companies have concerns.

* Option 1: I-frame + P-frame
	+ Option 1A: slice-based traffic model
	+ Option 1B: Group-Of-Picture (GOP) based traffic model
* Companies should strive to align the parameter values for the options chosen as much as possible.

**Proposed agreement:**

For the optional evaluation scenario, two streams of I-frame and P-frame for DL video stream, the traffic models described in the below table are assumed.

* FFS: Parameter values of $α$, A, B, C, D, E, F, G, H
* For companies who are evaluating this option, it is recommended to evaluate at least the following scenario: AR/VR, 30Mbps, Dense Urban for FR1 and InH for FR2. It is encouraged to evaluate additional baseline/optional scenarios/configurations.

|  |  |  |
| --- | --- | --- |
| **Two data streams, i.e. M1 = 2** | **Option 1A: slice-based** | **Option 1B: GOP-based** |
| I-stream | P-stream | I-stream | P-stream |
| **Packet modelling** | Slice-level | Frame-level |
| **Traffic pattern** | Both streams are periodic at 60 fps with the same jitter model as for single stream.  | Follow the GOP structure, where GOP size K = 8 with the same jitter model as for single stream. |
| **Number of packets per stream at a time** | 1 | N-1 | I-frame: 1 or 0P-frame: 0 or 1At each time instant, there is either only one I-stream packet or only one P-stream packet |
| N = 8: the number of slices per frame. |
| **Average data rate per stream** | $$R\_{I}=R\*\frac{α}{N-1+α}$$ | $$R\_{P}=R\*\frac{N-1}{N-1+α}$$ | $R\_{I}=R\*\frac{α}{K-1+α}$  | $R\_{P}=R\*\frac{K-1}{K-1+α}$  |
| * R: average data rate of a single stream video
* $α$: average size ratio between one I-frame/slice and one P-frame/slice, e.g. $α$ = 1.5, 2, 3
 |
| **Packet size distribution** | Truncated Gaussian distribution |
| Mean = $\frac{R\_{I}}{FPS}$ | Mean = $\frac{R\_{P}}{FPS\*(N-1)}$ | Mean = $R\_{I}\*\frac{K}{FPS}$ | Mean = $R\_{P}\*\frac{K}{FPS\*(K-1)}$ |
| * [STD, Max, Min]: [10.5, 150, 50]% of Mean packet size
* FPS is the frame rate of the single stream video
 |
| **PER, PDB** | [PER\_I, PER\_P] = [A %, B %][PDB\_I, PDB\_P] = [C ms, D ms] | [PER\_I, PER\_P] = [E %, F %][PDB\_I, PDB\_P] = [G ms, H ms] |

**Common baseline**

**Current Status**: Given that there are a number of simulation scenarios/configuration, i.e., combinations of applications, data rates, PDB, etc., it is challenging to compare simulation results among companies. In this regard, it would be beneficial to define a reduced set of parameter values to facilitate comparison of results from more companies.

**Proposed agreement:**

When companies are submitting evaluation results to RAN1, it is recommended to submit results at least the following parameters in the below table.

* Note 1: This is only intended to have more results from more companies at least for the corresponding configuration. RAN1 agreements regarding baseline vs. optional for simulation scenarios, configurations, parameters, remain the same.
* Note 2: Companies are encouraged to submit results for other baseline/optional configurations as much as they can.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | Data rate [Mbps] | Packet arrival rate[ms] | PDB[ms] |
| DL | AR/VR | 30 | 60 | 10 |
| CG | 30 | 60 | 15 |
| UL | VR/CG: Pose/control | 0.2 | 250 | 10 |
| AR: Option 1 (single stream model) | 10 | 60 | 40 (?) |