**3GPP TSG-RAN2 Meeting 119-e** **R2-220xxxx**

**Online, 17th – 29th August, 2022**

**Agenda item: 8.15**

**Source: Huawei, HiSilicon**

**Title: Summary of** **[AT119-e][310][R18 Others - Low Latency] LS on Low latency (Huawei)**

**Document for: Discussion and Decision**

1. Introduction

* **This is the summary of below offline discussion. Reply LS to SA2 will be prepared based on the results of this discussion.**
* [AT119-e][310][R18 Others - Low Latency] LS on Low latency (Huawei)

Discuss LS response on Low latency

Deadline: To be set by rapporteur

* **Reference contributions:**

1. R2-2208007 Proposed response to SA2 LS R2-2203930 on low latency Nokia, Nokia Shanghai Bell discussion Rel-18 FS\_5TRS\_URLLC
2. R2-2207043 Draft reply LS on RAN feedback for low latency Qualcomm Incorporated LS out Rel-18 FS\_5TRS\_URLLC To:SA2 Cc: RAN1, RAN3
   1. *(moved from 8.5.1)*
3. R2-2207768 Consideration on meeting very low latency requirement in TDD ZTE Corporation, Sanechips, China Southern Power Grid Co., Ltd discussion Rel-17 NR\_IIOT\_URLLC\_enh-Core R2-2205732
4. R2-2207775 [DRAFT] Reply LS on RAN feedback for low latency ZTE Corporation, Sanechips LS out Rel-17 NR\_IIOT\_URLLC\_enh-Core R2-2205734 To:SA2 Cc:RAN3
5. R2-2206963 LS on RAN feedback for low latency (S2-2201767; contact: Huawei) SA2 LS in Rel-18 FS\_5TRS\_URLLC To:RAN2 Cc:RAN1, RAN3
6. R2-2208134 Discussion on RAN feedback for low latency Ericsson discussion Rel-18
7. R2-2208687 Discussion on RAN feedback for low latency enquired by SA2 Huawei discussion Late
8. R2-2208688 Draft reply LS on RAN feedback for low latency Huawei LS out Rel-18 FS\_5TRS\_URLLC To:SA2 Cc:RAN1, RAN3 Late

* **Contact list**

|  |  |  |
| --- | --- | --- |
| Name | Company | Email |
| Tao Cai | Huawei, HiSilicon | tao.cai@huawei.com |
|  |  |  |

1. Discussion

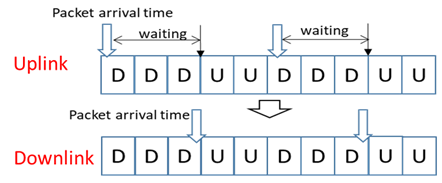
## 2.1 Regarding Q1

In Q1, SA2 asks:

1. What are the possible values for the periodicity of the TDD cycle that RAN can support? This question is related to Problem 1.

The problem 1 is described as

"One potential problem considering low latency applications is that the arrive time of the packets may not fit well with the TDD cycle used in the network. RAN just receives the traffic flow periodicity and burst arrival times but cannot influence them. For example, if a downlink packet arrives at an uplink slot, then it has to wait for the first downlink slot to be transferred and vice versa (please see Figure 1). This creates additional delay (e.g. more buffering time) to the traffic flows. This can be an issue for QoS Flows requiring PDB 5 ms or lower."



According to the contributions of this meeting, there are several categories of answers for SA2 Q1, besides all suggest to answer " the possible values for the periodicity of the TDD cycle that RAN can support ":

**Option 1: Besides answer supported TDD cycle, e.g., {0.5ms, 0.625ms, 1ms, 1.25ms, 2ms, 2.5ms, 3m, 4m, 5ms, 10ms}, also answer to SA2 that, due to various reasons, for example, packets arriving to the gNB will experience buffering (i.e. resulting in increased delay) if their time of arrival is not aligned with the transmission opportunities of the TDD subframe, there is need to adjust burst arrival time in TDD scenario.**

**Option 2: Besides answer supported TDD cycle, e.g., {0.5ms, 0.625ms, 1ms, 1.25ms, 2ms, 2.5ms, 3m, 4m, 5ms, 10ms}, also answer to SA2 that, no issue of scheduling delay considering TDD UL-DL cycle/pattern thus there is no need to adjust burst arrival time in TDD scenario.**

**Option 3: Only answer supported TDD cycle, e.g., {0.5ms, 0.625ms, 1ms, 1.25ms, 2ms, 2.5ms, 3m, 4m, 5ms, 10ms}.**

**Question 1, which option(s) above would your company support?**

|  |  |  |
| --- | --- | --- |
| Company | Option(s) | Further comments |
|  |  |  |
|  |  |  |

## 2.2 Regarding Q2

In Q2, SA2 asks:

1. SA2 could not conclude whether a similar issue existing in FDD scenario (i.e. Problem 2) as Problem 1. Please RAN2 confirm whether it exists or not.

According to the contributions, most companies think there is no similar issue for FDD, and one possible issue is indicated. There are below options for answer to SA2 Q2.

**Option 1: There is no need to adjust burst arrival time in FDD scenario as in FDD there is no the UL-DL symbols pattern issue.**

**Option 2: There are possible issues, e.g. the granularity of periodicity for SPS and ConfiguredGrant is same for FDD and TDD which may have impact on the service delay.**

**Question 2, which option above would your company support?**

|  |  |  |
| --- | --- | --- |
| Company | Option | Further comments |
|  |  |  |
|  |  |  |

## 2.3 Regarding Q3

In Q3, SA2 asks:

3) Does RAN see any additional aspects that SA2 should consider for the study?

According to the contributions, there are following additional aspects raised by companies:

**Aspect 1) If the arrival time does not match the radio resource pattern (e.g. TDD-UL-DL symbols pattern), i.e. the arrival time of DL QoS flow is UL symbol, or the arrival time of UL QoS flow is DL symbol, the transmission will be delayed.**

**Aspect 2) If the service is with very low latency requirement and the arrival time jitter is large, it will bring large challenge to RAN node. SA2 can consider further enhancement, e.g., de-jitter mechanism in CN to try to make sure that the packets arrive at RAN node just before it can be sent over Uu interface.**

**Aspect 3) the appropriate staggering of BAT can provide significant benefits for system capacity as well as power consumption with XR applications, so the relevant mechanisms for RAN to adjust BAT is highly recommended.**

**Question 3, Which aspect(s) would your company agree/disagree to suggest SA2 for further consideration?**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Company | Aspect 1 | Aspect 2 | Aspect 3 | Further comments |
| e.g. company-name | Agree/disagree | Agree/disagree | Agree/Disagree |  |
|  |  |  |  |  |

**[Summary]**

## Conclusion