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

e-Meeting, May 10th – 27th, 2021

Agenda Item: 8.5

Source: Qualcomm

Title: Email discussion/approval for the reply LS to R1-2102306

Document for: Discussion

# 1 Introduction

SA2 sent an LS (R1-2102306) to RAN1 about Scheduling Location in Advance to reduce Latency:

SA2 has technically endorsed the attached CR to TS 23.273 to support scheduling of location of a target UE in advance using a scheduled location time at which location measurements for the target UE would be obtained by the UE (in the case of DL measurements) and/or NG-RAN (in the case of UL measurements). The scheduled location time is provided by a requesting LCS Client, AF or the UE and transferred to the LMF, which then interacts with the NG-RAN and/or UE to schedule the location measurements at the scheduled location time. The resulting location (e.g. as calculated based on the location measurements by the UE or LMF) is then provided to a recipient LCS Client, AF or the target UE, depending on the type of location request. Use of a scheduled location time allows latency to be reduced since effective latency only commences at the scheduled location time and can exclude time spent prior to this for sending the location request and scheduling the location measurements.

SA2 believes that RAN1 and RAN2 may be planning to supporting a similar capability as documented in an LS sent by RAN2 to RAN1 in R2-2102125 (“LS to capture Text Proposal for TR 38.857”) which includes an attachment R2-2102124 (“Text Proposals of latency enhancements”) with the following bullet item:

- “Latency reduction related to the reporting and request of positioning assistance data (e.g., via location scheduling in advance of the time of when the location is needed)”

Accordingly, SA2 would like to **ask RAN1 and RAN2 whether support can be provided for a scheduled location time as part of Rel-17 and as defined in the attached CR to TS 23.273.** SA2 also invite RAN1 and RAN2 to provide any other comments on support of this feature which may be applicable to support in 5GC.

**To RAN1, RAN2**

**ACTION:** SA2 kindly asks RAN1 and RAN2 to provide a response to the question above once RAN1 and RAN2 are in a position to answer.

The following related contributions are related to the discussion of the LS above:

Related contributions:

1. [R1-2104643](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_105\Docs\R1-2104643.zip) Draft reply LS to SA2 on Scheduling Location in Advance Qualcomm Incorporated
2. [R1-2105937](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_105\Docs\R1-2105937.zip) Discussion on scheduling location in advance to reduce latency Huawei, HiSilicon
3. R1-2104362 Discussion on latency enhancement for NR positioning vivo
4. R1-2104674 Enhancements for Latency Improvements for Positioning Qualcomm Incorporated
5. R1-2104908 NR Positioning Latency Reduction Intel Corporation

During the preparation phase it was identified to perform an Email Discussion/Approval during this meeting.

# Background of the SA2 LS

In some scenarios, a UE, LCS Client or AF that is requesting the location of a target UE may know a time at which the location should be obtained. Some examples of this are as follows.

- Periodic Location: With a periodic deferred 5GC-MT-LR, the location of a UE is obtained at fixed periodic intervals. Clearly, the location time is then known in advance.

- IIot Location: In a factory or warehouse with moving tools, components, packages etc., there could be a precise expectation of when a moving tool, component or package etc. will reach a specific location or will have completed a specific movement or operation. It may then be useful or critical to locate the tool, component or package etc. to confirm the expectation and make any further adjustments.

- Scheduled Location: The location of UEs may sometimes be scheduled to occur at specific times in the future. For example, vehicles on a road may all be located at the same time to provide an indication of traffic congestion as well as to assist with V2X. People, containers, transportation systems etc., may also be located at certain common times.

In the scenarios above, the objective is to determine where the UE is located at the scheduled location time. The known time (referred to as a scheduled location time) can be provided in advance to reduce the effective latency in providing location results.



# Progress in RAN2 with regards to this issue

RAN2 discussed the LS from SA2 at RAN2#113bis and sent a reply LS in [6] asking a few questions for clarification to SA2:

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| RAN2 discussed the subject matter and have some questions for clarification to enable us to better understand the feature. Before RAN2 can decide on support of the feature as defined in the SA2 endorsed CR 0151r1 to TS 23.273 in S2-2102047, RAN2 would first like to understand what the CR describes. Please see below for RAN2 questions:  1. Definition of "scheduled location time":  The definition of scheduled location time is not fully clear to RAN2 since the SA2 endorsed CR describes the scheduled location time differently in different parts of the CR and there is a different description of scheduled location time in the SA2 LS itself. RAN2 would like to have a clear definition of scheduled location time first as this may impact what is signalled to UE and/or NG-RAN. Please see below for detailed comments:  In section 4.1c it says "The request includes the scheduled location time T" which is described as the start of location preparation phase. So, time T is the scheduled location time.  Section 4.1c also says "the scheduled location time allows an external LCS Client, AF or the UE to specify a time in the future at which a current location of the UE is to be obtained". However, in Figure 4.1c-1, the time when the LCS client, AF or UE obtains the location is T+t2. The time T in the figure is shown as the time at which the UE or NG-RAN obtains the location measurements.  The SA2 LS description also states "…support scheduling of location of a target UE in advance using a scheduled location time at which location measurements for the target UE would be obtained by the UE (in the case of DL measurements) and/or NG-RAN (in the case of UL measurements)". This seem to align with the time T in Figure 4.1c-1 which show it as a scheduled measurement time.  In section 6.3.1, step 25 describes the scheduled location time as the time at which the LMF must obtain the UE location, not the time at which the LCS client receives the location or the time at which the LMF schedules the measurement.  2. In section 6.1.2, there is the following editor’s note:  "Editor's note: Feedback from RAN is needed to verify whether location measurements can be scheduled to occur at a UE or NG-RAN at a specific scheduled location time."  Please clarify the requirement whether measurements in UE/NG-RAN need to be scheduled at the scheduled location time received from 5GC or at a time before the scheduled location time received from 5GC.  3. Can SA2 clarify the time format used for the scheduled location time T which is provided to an LMF (e.g., UTC, etc.)?  4. For a Deferred 5GC-MT-LR for periodic location events, RAN2's understanding is that a scheduled location time may apply for the first periodic location report only. For each succeeding periodic location report, the  "scheduled location time" is equivalent to the periodic reporting interval. Please confirm whether RAN2's understanding is correct, or whether different location times T can apply for succeeding periodic location reports.  5. Clause 4.1c says "A scheduled location time can be used with a 5GC-MT-LR, 5GC-MO-LR or deferred 5GC-MT-LR for periodic *or triggered* location events."  RAN2 would like to understand how a scheduled location time can be applicable to triggered location events given its sporadic nature. |

# Summary of views based on RAN1 t-doc submissions

The summary based on inputs from the contributions in RAN1 #105 is given below:

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| **Company** | **Proposals** |
| Qualcomm [1][4] | Proposal 1: Send a draft Reply LS:   * RAN1 thanks SA2 for their LS on Scheduling Location in Advance to reduce Latency. * RAN1 discussed the subject matter and agrees that scheduling location in advance is within the positioning enhancement work item objective, and RAN1 will target supporting this feature in Rel-17 positioning enhancement time frame in alignment with the CR received from SA2.   Proposal 2: For UE-based positioning, a UE is expected to report a location estimate which is valid for the requested “Location Time”.  Proposal 3: For UE-assisted/network-based Positioning, support LMF sending a “Time-domain Window” configuration(s) to both UE and gNBs that define the time at which the measurements are expected to be obtained.   * Each window is defined with a start/End configuration * If startTime is provided, the device (UE/gNB) is expected to perform measurements and reporting that start no earlier than the startTime. * If EndTime is provided, the device (UE/gNB) is expected to perform measurements no later than the EndTime.   Proposal 4: With regards to the requested Time-domain measurement Window:  Study further the UE behavior when a limited number (or none) of PRS instances appears within a configured time-domain window. |
| vivo [2] | Proposal 1:   * Physical layer latency reduction should be independent of scheduled location time. * The method with scheduled location time can be considered as a further optimization to be discussed in Rel-17 if scheduled location time is supported. |
| Huawei | *Observation 1: RAN1 understands that the feature developed by SA2 does not require additional normative work for UL methods, but may require normative work for DL and DL+UL methods, which is led by RAN WG2.*  *Observation 2: We cannot see the “latency reduction” of any kind provided by TS 22.261, TR 38.857, or S2-2102047, but consider it rather as an explicit location time decoupled from the arrival time of the LCS request message.*  *Observation 3: Tolerance of T is required considering the radio interface fluctuation.*  Based on the observations, we have the following proposal to reply to SA2.  *Proposal 1: Reply to SA with the following content:*   |  | | --- | | RAN1 assumes that scheduling location in advance is within the positioning enhancement work item objective, and RAN1 thinks that supporting this feature in Rel-17 positioning enhancement time frame is up to RAN2.  However, currently RAN1 does not see a clear definition of latency, which can be reduced from scheduling location in advance.  In addition, RAN1 believes that the tolerant of T is required considering the nature of radio interface. | |
| Intel [9] | Proposal 4:   * For NR positioning latency reduction,   + Continue discussion on scheduling location and DCI based signaling mechanism once more details are clarified by SA2 with respect to definition and potential pre-configuration of scheduling location information for NR positioning |

# Discussion Phase 1 (Closed)

Questions to attempt to reach a common understanding of the feature?

**Question 1:**

* Do you consider the scheduling location in advance feature one potential positioning enhancement that is within the scope of the WI objectives of Rel-17?

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| Company | Answer |
| Nokia/NSB | If the feature can really result in reduction in latency, then it is within the scope of the WI objectives of Rel-17. We do not see the scheduled location provides any latency gain in signalling on any interface between LCS client all the way up to UE. On the other hand it increases the signalling now due to additional LPP and NRPPa signalling of time T and it increases the processing in LMF, gNB and UE. So, we do not see a latency gain in the solution and so we do not see it being within the scope of the WI objectives of Rel-17. |
| ZTE | In our view, this topic is irrelevant of positioning latency reduction. The scheduled location time is more like a location information report that should measured within a specific time window and reported at a specific time, which may be implemented by configuring a proper response time for the location information report. It may have spec impact in RAN2. Therefore, we think it’s outside the WI objectives of Rel-17. If RAN2 identifies spec impacts that is needed to specify, we can further discuss whether WID can be updated to include “scheduled location time”. |
| Huawei, HiSilicon | We do not see the latency reduction gain, but rather consider this enhancement as an explicit location time decoupled from the arrival time of the LCS request message for immediate location. |
| vivo | Strictly speaking, scheduling location in advance simply move the time required for positioning request around and make it not count as part of total latency. At least for PHY layer, there’s no real latency reduction.  It is up to RAN2 whether they want to consider this as an enhancement. |
| OPPO | Share similar views as other companies that we don’t see latency reduction from RAN1 perspective |
| Lenovo, Motorola Mobility | Share similar views this is not a latency reduction enhancement. This is rather a feature to shift the location configuration and scheduling signalling ‘T’ time units in advance (the individual procedures incur the same amount of latency) before performing measurements. The actual latency for the various signalling components remains the same as in Rel-16. |
| CATT | We failed to see the role of the scheduling location in advance feature for latency reduction. However, it looks like this feature is similar to Measurement Time window which discussed in 8.5.1 but with different motivations. |
| Qualcomm | For the scenarios that location time is known in advance, we understand the latency reduction is happening by decoupling the preparation/configuration phase from the actual measurement phase.   * The latency of each components remain the same, but some are done in advance, so in an actual system, and compared to rel-16 procedures, the latency reduction will be observed.   Configuring a different response time will not enable this feature. If that was possible, SA2 would not have worked on specifying a new feature in their specifications.   * When the UE gets a response time, a UE is expected to start measuring right away, and the response time corresponds to the “worst-case” response from the UE. The response time does NOT say, when the UE/gNBs should do the measurements, rather says, the latest time a UE/gNB should provide a response. * Lets say, the LCS wants to know UE’s location exactly 1 min from now. In current spec, the LCS would have to “approximate" how much time all the preparation phase will need, and include a large enough response time. Since it is not clear when the UE will do measurements, (e.g. at 500 msec mark), then the reported timestamps will not be for the time the LCS wants the measurements.   For the above reasons, we can see the latency reduction in those scenarios.  Also, related RAN1 specification changes are already being discussed in the other subagendas, (e.g. configured measurement window), and therefore we consider this feature to be in scope. |
| SONY | We consider pre-scheduling of location reporting is decoupled from latency reduction. Furthermore, pre-scheduling of location reporting is not within the scope of Rel-17 |
| InterDigital | We do not latency reduction for pre-scheduling of location reporting. We recognize benefits in pre-scheduled location reporting (e.g., the LCS can obtain locaiton information at a specified time). |

**Question 2:**

* Do you agree that, from RAN1 perspective, support can be provided for a scheduled location time as part of Rel-17 and as defined in the attached CR to TS 23.273? If not, please provide an explanation.

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| Company | Answer |
| Nokia/NSB | No. Please clarify first what the impact is to RAN1 specifications for the solution as defined in the attached CR to TS 23.273. The proposal overall needs clarification. On the other hand, if this solution impacts measurements we are wondering how it impacts the UE measurement performance defined by RAN4 and any RAN1 defined UE measurement behaviour (e.g., in 38.214). |
| ZTE | No. We need to decide whether this is within the WI objectives of Rel-17 first. Then what’s the expected RAN1 specification impact? |
| Huawei, HiSilicon | We believe whether this can be supported depends majorly on RAN2. |
| Vivo | We don’t see any RAN1 impact and don’t think RAN1 should decide whether to support or not. It is up to RAN2 whether they want to consider this as an enhancement in Rel-17. |
| OPPO | It is not clear what the impact on RAN1 spec is. |
| Lenovo, Motorola Mobility | No, at this stage we don’t see any impact to the measurement and processing procedures. As noted in RAN2’s LS there are quite a few open issues regarding this feature, e.g. the basic definition of scheduled location time, which needs further clarification and any RAN1 support cannot be made at this stage. |
| CATT | We think scheduled location time can be discussed together with measurement time window as part of Rel-17 in 8.5.1 but with different motivations. |
| Qualcomm | There can potentially be RAN1 agreements that facilitate the feature further (e.g. configured measurement window already discussed in other subagendas), which can be done by RAN1, strictly speaking not for the purpose of the “scheduled in advanced feature”, but still applicable to that scenario also. |
| SONY | So far, we do not see any RAN1 impact. We consider there may be RAN2 impact. The RAN1 impact may depend on the progress in RAN2 |
| InterDigital | The main impact will be in RAN2. Once the details becomes more clear in RAN2, potential impacts in RAN1 may be discussed. |

**Question 3:**

* Could there be potential impacts to RAN1 work and/or specifications to support or enable this feature?

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| Company | Answer |
| Nokia/NSB | Possibily, yes. UE measurement behavior may need to be defined. There are also on going discussions on configuratble time windows in RAN1 which appear may be related however those enhancements have initially been targeted for Rx/Tx timing error mitigation.  From the RAN2 reply LS it seems clear there is not common understanding among companies and WGs what is being proposed and what specification work is needed. |
| ZTE | It’s outside current WID. We also think it’s different from what we have discussed for multiple measurement instances in AI 8.5.1. The multiple measurement instances are to address timing error shift. |
| Huawei, HiSilicon | We believe whether the measurement window can be used also depends on whether T-info can be provided to the UE/NG-RAN, which is subject to RAN2 decision. |
| Vivo | We have not identified any potential RAN1 impact yet. |
| OPPO | Not clear what RAN1 impact is |
| Lenovo, Motorola Mobility | No identified RAN1 impact. The LMF configured response time already encapsulates the time between receipt of *RequestLocationInformation* and transmission of *ProvideLocationInformation*, i.e., the time between T and T+t2 in SA2 CR. The Measurement window discussed in other AIs such 8.5.1 and 8.5.5 have motivations related to time drift tracking via timestamp reporting and LOS/NLOS measurements, respectively. |
| CATT | We think the RAN1 impact of this feature is similar with that of measurement time window, which need to specify the time windows, in which the UE or TRP measurement instances are obtained. For example, configure and indicate the start time and length of the time window. |
| Qualcomm | There can potentially be RAN1 agreements that facilitate the feature further (e.g. configured measurement window already discussed in other subagendas), which can be done by RAN1 not only for the purpose of the “scheduled in advance feature”.  If the feature is supported, a configured measurement window will be needed, this will have also RAN1 impact. For example, we would have to say in Ran1 that the UE is expected to measure PRS resources within the measurement.  There are already proposals in other subagendas that include these within RAN1 scope; not for the purpose of the scheduling in advance feature, but still, these proposals will enable this feature further.  The fact that a enhancement already discussed in RAN1 (e.g. configured measurement window) can enable multiple enhancements within RAN1 and other groups, is not a problem for us. Some features are general enough that can enable multiple aspects |
| SONY | We have not identified RAN1 impact |
| InterDigital | The potential impact will be in RAN2, i.e., LPP signalling. Perhaps we can wait for RAN2 guidance. |

**Question 4:**

* Any additional comments you would like to provide?

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| Company | Comments |
| Nokia/NSB | Perhaps the proponents could clarify the RAN1 expected impact and the gains that would be achieved. |
| Huawei, HiSilicon | We should consider the tolerance of T due to the uncertainty of radio interface. |
| Vivo | It’s no clear to us about the intention of question 1 to 3. Are they intended to be part of reply LS from RAN1 to SA2? BTW, is the common understanding that RAN1 will for sure have a reply LS to SA2 considering RAN2 alerady replied? |
| Qualcomm | In the “Actions” requested by SA2, it says, “once RAN1 is in a position to answer”. If RAN1 is not yet ready in a position to answer, then there will not be a need to reply now. |
| SONY | Perhaps we can formulate our response: „*RAN1 thanks SA2 for the LS and have discussed the pre-scheduling feature. Based on the discussion RAN1 fundamental latency reductions on the actual positioning measurements, RAN1 cannot see any impact on RAN1.*“ |

# Summary of Phase 1

In this section, i am trying to summarize in a few words the main aspect pointed out from each company in order to try to find common ground.

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| **Question 1:**   * Do you consider the scheduling location in advance feature one potential positioning enhancement that is within the scope of the WI objectives of Rel-17?   **Summary of Answers**   * No latency reduction is expected by the SA2 CR, and therefore it is not within the scope of the RAN1’s WI objectives   + Nokia/NSB, ZTE, OPPO, Lenovo, Motorola, Sony * No latency reduction is expected by the SA2 CR, but consider it a potential enhancement   + Huawei/HiSilicon * No latency reduction is expected by the SA2 CR from RAN1 perspective; Up to RAN2 if they want to consider it as an enhancement.   + Vivo, InterDigital * No latency reduction is expected by the SA2 CR. The feature looks similar to the Measurement Time Window feature discussed in RAN1.   + CATT * Latency reduction can be observed by the SA2 CR in some scenarios. The feature looks related to the Measurement Time Window feature discussed in RAN1   + Qualcomm |

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| **Question 2:**   * Do you agree that, from RAN1 perspective, support can be provided for a scheduled location time as part of Rel-17 and as defined in the attached CR to TS 23.273? If not, please provide an explanation.   **Summary of Answers**   * No   + Nokia/NSB, ZTE, * Up to RAN2 to decide whether to support it or not   + Huawei/HiSilicon, Sony, InterDigital, Lenovo/Motorola Mobility * RAN1 should not decide whether to support or not the feature   + vivo * From RAN1 perspective, support can be provide using the measurement time window feature.   + CATT, Qualcomm |

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| **Question 3:**   * Could there be potential impacts to RAN1 work and/or specifications to support or enable this feature?   **Summary of Answers**   * Potential Yes – related to the Measurement Time window   + Nokia/NSB, CATT, Qualcomm * Outside the WID   + ZTE * Up to RAN2   + Huawei/HiSilicon, InterDigital * Not identified any potential RAN1 impact yet   + Vivo, OPPO, Lenovo/Motorola Mobility, Sony |

# Phase 2: Draft reply LS Discussion

By looking at the replies above, it seems that there is majority support that it is not within RAN1 Rel-17 objectives to decide the support or not of the feature. Furthermore, from the replies above, and given that RAN2 has already replied that they are “considering the support of the feature” (As written in their reply LS: “*Before RAN2 can decide on support of the feature”)* and asking specific clarifications questions, and SA2 has already technically endorsed the CR, it may seem acceptable to conclude that we leave it up to other WGs to decide about the feature.

A majority of companies do not see RAN1 impact from the SA2 CR. Some companies see similarities of the enhancements needed for this feature with the enhancements considered for other RAN1-centric enhancements (and specifically the Measurement Time Window) that is also being discussed in RAN1. Based on the above, I suggest the following draft reply, together with a selection of alternatives for the last bullet as shown below.

***Question (as a reminder):*** SA2 would like to ask RAN1 whether support can be provided for a scheduled location time as part of Rel-17 and as defined in the attached CR to TS 23.273

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| ***FL Draft Proposal for the reply LS:***   * *RAN1 thanks SA2 for their LS on Scheduling Location in Advance.* * *RAN1 is currently discussing potential enhancements within the approved WID RAN1’s objectives and, after discussing the subject matter, believes that,*    + *it is not within RAN1 WG Rel-17 WID’s objectives to decide whether the feature should be supported or not within the Rel-17 time frame, and leaves this decision up to other WGs.*   + *It also believes that*     - *Alt. 1: the SA2 CR does not appear to have a RAN1 specification impact.*     - *Alt. 2: the SA2 CR may have RAN1 specification impact. Further discussion may be needed from RAN1 perspective, depending on the progress of the normative work.* |

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| Company | Comments on the above Draft Proposal for reply LS |
| InterDigital | In Alt 2., should it be worded as follows?  *Alt. 2: the SA2 CR may have RAN1 specification impact. Further discussion in other WGs may be needed from RAN1 perspective, depending on the progress of the normative work.* |
| vivo | Our preference is Alt.1 for the reply LS to SA2 as we don’t need to speculate future RAN1 discussion. |
| CATT | We are fine with the FL draft proposal for the reply LS. And we prefer Alt.2. |
| Nokia/NSB | We propose to update the reply as shown below (picking Alt 2):   * *RAN1 thanks SA2 for their LS on Scheduling Location in Advance.* * *RAN1 is currently discussing potential enhancements within the approved WID RAN1’s objectives and, after discussing the subject matter, believes that,*    + *There is no latency gain of the proposed enhancement from RAN1 perspective*   + *In RAN1’s current understanding of the SA2 enhancement, it is not within RAN1 WG Rel-17 WID’s objectives to decide whether the feature should be supported or not within the Rel-17 time frame.*   + *It also believes that*     - *the SA2 CR may have RAN1 specification impact. Further discussion may be needed from RAN1 perspective, depending on the progress of the normative work.* |
| OPPO | We are fine with the proposal if Alt.1 is selected. A modified version of Alt.1 may be more acceptable for the proponents of Alt.2, which only focus on the current status and avoid touching any work of other WGs in the future.  Alt.1: RAN1 hasn’t identified any RAN1 specification impact of SA2 CR so far. |
| Huawei, HiSilicon | We think it is important to point out whether the latency reduction SA2 claimed can be verified by RAN1, which is why I think what Nokia added is valuable. Otherwise, RAN1 may ask the following question to SA2:   * Which definition of latency has SA2 assumed that can be reduced using the proposed enhancement?   In addition, when RAN1 decides whether the measurement time window can be used, it is important to point out that the lcoation at the exact time T may not be always available, because e.g. RAN may not guarentee that the reference signal for positioning can be configured to transmit/receive at the exact time T. RAN1 may also ask the following question to SA2:   * The reference signal for positioning may not be guarenteed to transmit/receive at some exact time. What is SA2’s assumption on the tolarence of location time T? |
| Apple | Do not support Alt 2 (OK with Alt1) |
| ZTE | We prefer Nokia’s reformulation. In addition, our preference is to support Alt.1 as modified by OPPO.  Firstly, we should reply SA2 that RAN1 doesn’t see the positioning latency reduction as claimed by SA2.  Secondly, whether to support scheduled time window may be decided by RAN2, since RAN2 has replied the LS. Before RAN2 makes the decision to support this feature, RAN1 doesn’t have to spend dedicated time on this. |
| Qualcomm | We do not support adding that there is no latency reduction; as we are saying, it is not within RAN1 scope & objectives to judge/technically-debate that. Companies are encouraged to debate that in SA2, or other WGs.  We support Alt. 2.  With regards to HW comments: Since we are saying that it is not within RAN1 to decided to support or not the feature, i don’t see the need to ask questions about which “latency” they used, or the “tolerance T”. Either way, the tolerance was brought up already to SA2, and i think it is being considered, and already RAN2 has asked several questions about definition of scheduled time, format, etc, that will have to be addressed by SA2. |
| Lenovo, Motorola Mobility | Support Alt.2 but share similar views with other companies in adding a statement highlighting that there are no identified RAN1 latency reduction gains. If this feature is found to have any RAN1 impacts that can be investigated at a later stage pending further progress by SA2/RAN2. |
| SONY | We need to send the LS with one of the alternatives only. Our preference is Alt.2 with modification:  *the SA2 CR may have RAN1 specification impact. However, further discussion and progress in other WGs are needed to identify RAN1 specification impact.* |
| Futurewei | The fact is at the current time, there is no RAN1 impact that RAN1 can identify. As such, the reply should be strictly to the current status (Alt 1). Using ‚may‘ as in Alt 2 is misleading and would be better to noty have Alt 1 nor 2 is that is the case. |

# Phase 3: Updated Draft reply LS Discussion

***FL Draft Proposal for the reply LS***

* *RAN1 thanks SA2 for their LS on Scheduling Location in Advance.*
* *RAN1 is currently discussing potential enhancements within the approved WID RAN1’s objectives and, after discussing the subject matter, believes that,* 
  + *in RAN1’s current understanding of the SA2 CR, it is not within RAN1 WG Rel-17 WID’s objectives to decide whether the feature should be supported or not within the Rel-17 time frame, and leaves this decision up to other WGs.*

**Discussion Point 1: Decide whether to include in addition to the above text the following:**

* + ***Alt. 1A****: It also believes that there is no latency gain of the proposed enhancement from RAN1 perspective.*
  + ***Alt. 1B:*** *Not include a statement about latency gains from RAN1 perspective.*

**Discussion Point 2: Decide whether to include in addition to the above text one of the following Alternatives:**

* + ***Alt. 2A:*** *It also believes that the SA2 CR does not appear to have a RAN1 specification impact.*
  + ***Alt. 2B:*** *It also believes that the SA2 CR does not appear to have a RAN1 specification impact so far.*
  + ***Alt. 2C:*** *It also believes that the SA2 CR may have RAN1 specification impact. However,* *further discussion* *and progress in other WGs* *is* *needed* *before identifying potential RAN1 specification impact.*

**Discussion Point 3: Decide whether to include one or more of the options to the LS:**

* + ***Opt. 3A:*** *Which definition of latency has SA2 assumed that can be reduced using the proposed enhancement?*
  + ***Opt. 3B:*** *The reference signal for positioning may not be guaranteed to transmit/receive at some exact time. What is SA2’s assumption on the tolerance of location time T?*

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| Company | Comments on the above Draft Proposal for reply LS |
| Qualcomm | Point 1: 1B  Point 2: 2C  Point 3: Do not include any of the options |
| Futurewei | P1: 1B  P2: 2B  P3: Neither |
| Nokia/NSB | P1: 1A. We should at a minimum say RAN1 has no consensus that there are latency gains as it seems the majority of companies share this view.  P2: Perfer 2C but we are okay with 2B as it says so far.  P3: 3A unless we reply on the latency as part of P1 then there is no need. |
| OPPO | Point 1: Either is ok for us  Point 2: 2B is the first preference, 2A is the second preference  Point 3: Neither |
| ZTE | P1: 1A  P2: 2B, we can also accept 2C, as both alternatives are saying that RAN1 haven’t identified spec impact so far. We should wait the decision from SA2/RAN2.  P3: Neither. |
| Lenovo, Motorola Mobility | P1:1A  P2: 2B  P3: No need to add either options |
| Huawei, HiSilicon | P1: 1A  P2: 2B  P3: OK with neither if we reply 1A. But to our understanding, SA2 is also discussing a reply LS and asking RAN whether this can reduce the LCS latency, and what SA2 assumed for LCS latency may not be aligned with the latency that RAN1 is interested in. Otherwise, we think the definition of latency for clarification is needed. |
| CATT | P1:1B  P2: 2C  P3: Neither options are needed |
| SONY | P1: 1B  P2: 2C  P3: Neither |
| vivo | P1: 1A  P2: either 2A or 2B  P3: Neither |
| Apple | P1: 1B  P2: 2B  P3: Neither |

# Summary of Phase 3

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| * RAN1 thanks SA2 for their LS on Scheduling Location in Advance. * RAN1 is currently discussing potential enhancements within the approved WID RAN1’s objectives and, after discussing the subject matter, believes that,   + in RAN1’s current understanding of the SA2 CR, it is not within RAN1 WG Rel-17 WID’s objectives to decide whether the feature should be supported or not within the Rel-17 time frame, and leaves this decision up to other WGs. |
| **Discussion Point 1:** Decide whether to include in addition to the above text the following:   * + Alt. 1A: It also believes that there is no latency gain of the proposed enhancement from RAN1 perspective.     - **Support: Nokia/NSB, OPPO, ZTE, Lenovo/Motorola, Huawei/HiSilicon, vivo (6)**   + Alt. 1B: Not include a statement about latency gains from RAN1 perspective.     - **Support: Qualcomm, Futurewei, OPPO, CATT, Sony, Apple (6)** |
| **Discussion Point 2:** Decide whether to include in addition to the above text one of the following Alternatives:   * Alt. 2A: It also believes that the SA2 CR does not appear to have a RAN1 specification impact.   + **Support: OPPO (2nd choice), vivo (2)** * Alt. 2B: It also believes that the SA2 CR does not appear to have a RAN1 specification impact so far.   + **Support: Futurewei, Nokia/NSB (2nd choice), OPPO (1st choice), ZTE(1st choice), Lenovo/Motorola, Huawei/HiSilicon, vivo, Apple (8)** * Alt. 2C: It also believes that the SA2 CR may have RAN1 specification impact. However, further discussion and progress in other WGs is needed before identifying potential RAN1 specification impact.   + **Support: Qualcomm, Nokia/NSB (1st choice), ZTE(2nd choice), CATT, Sony (5)** |
| **Discussion Point 3:** Decide whether to include one or more of the options to the LS:   * + Opt. 3A: Which definition of latency has SA2 assumed that can be reduced using the proposed enhancement?   + Opt. 3B: The reference signal for positioning may not be guaranteed to transmit/receive at some exact time. What is SA2’s assumption on the tolerance of location time T?   + **Include: Huawei/HiSilicon (if 1A is added), Nokia for 3A**   + **Do not include: Qualcomm, Futurewei, OPPO, ZTE, Lenovo/Motorola, CATT, Sony, vivo, Apple** |

Based on the summary above, as a FL, I would like to propose for GTW discussion to include only the aspects that all companies that replied seem to have consensus. It should also be noted that the answer below provides an explicit answer the question that SA2 asked, so as FL, i think it will be enough. Either way, if other WGs decide the support, they will likely send an additional LS to RAN1, and we could continue the discussion then.

***Question (as a reminder):*** SA2 would like to ask RAN1 whether support can be provided for a scheduled location time as part of Rel-17 and as defined in the attached CR to TS 23.273

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| ***FL Draft Proposal for the reply LS:***   * *RAN1 thanks SA2 for their LS on Scheduling Location in Advance.* * *RAN1 is currently discussing potential enhancements within the approved WID RAN1’s objectives and, after discussing the subject matter, believes that,*    + *in RAN1’s current understanding of the SA2 CR, it is not within RAN1 WG Rel-17 WID’s objectives to decide whether the feature should be supported or not within the Rel-17 time frame, and leaves this decision up to other WGs.* |

# References

1. [R1-2104643](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_105\Docs\R1-2104643.zip) Draft reply LS to SA2 on Scheduling Location in Advance., Qualcomm
2. [R1-2105937](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_105\Docs\R1-2105937.zip) Discussion on scheduling location in advance to reduce latency Huawei, HiSilicon
3. R1-2104362 Discussion on latency enhancement for NR positioning vivo
4. R1-2104674 Enhancements for Latency Improvements for Positioning, Qualcomm
5. R1-2104908 NR Positioning Latency Reduction, Intel Corporation
6. R2-2104420 Response LS on Scheduling Location in Advance to reduce Latency, RAN2.
7. [S2-2102047](https://www.3gpp.org/ftp/tsg_sa/WG2_Arch/TSGS2_143e_Electronic/INBOX/S2-2102047.zip) Addition of a Scheduled Location Time, Qualcomm