3GPP TSG-RAN WG2 Meeting #118 electronic R2-2206xxx

Online, May 9 – 20, 2022

Agenda Item: 6.10.3.2.1

Source: Ericsson

**Title: [AT118-e][101][NTN] RRC CR (Ericsson)**

Document for: Discussion, Decision

# Introduction

* [AT118-e][101][NTN] RRC CR (Ericsson)

Initial scope: continue the discussion on the NR NTN WI-specific RILs, also considering the submitted contributions

Initial intended outcome: Summary of the offline discussion with e.g.:

* List of resolved RILs
* List of RILs for online discussion
* List of RILs for further offline discussion

Deadline (for companies' feedback): Tuesday 2022-05-10 0800 UTC

Deadline (for rapporteur's summary in [R2-2206191](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2206191.zip)): Tuesday 2022-05-10 1000 UTC

Scope: continue the discussion on the NR NTN WI-specific RILs, also considering the submitted contributions

Intended outcome: Summary of the offline discussion with e.g.:

* List of proposals for agreement (if any)
* List of proposals that require online discussions
* List of proposals that should not be pursued (if any)

 Deadline (for companies' feedback): Monday 2022-05-16 16:00 UTC

 Deadline (for rapporteur's summary in R2-2206209): Monday 2022-05-16 18:00 UTC

Proposals marked "for agreement" in R2-2206209 not challenged until Tuesday 2022-05-17 08:00 UTC will be declared as agreed via email by the session chair (for the rest the discussion might continue online).

This is third round to Thursday CB:

**[AT118-e][101][NTN] RRC CR (Ericsson)**

Updated scope: continue the discussion on p7~p9 from [R2-2206209](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2206209.zip)

Updated intended outcome: Summary of the offline discussion with e.g.:

         List of proposals for agreement (if any)

         List of proposals that require online discussions

Deadline (for companies' feedback):  Wednesday 2022-05-18 18:00 UTC

Deadline (for rapporteur's summary in R2-2206508):  Wednesday 2022-05-18 20:00 UTC

Status: ongoing

# Contact Information

Respondents to the email discussion are kindly asked to fill in the following table.

|  |  |  |
| --- | --- | --- |
| Company | Name | Email Address |
| Ericsson | Helka-Liina Määttänen | Helka-liina.maattanen@ericsson.com |
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# Location reporting event D1:L011, H801,

Couple of RILs were raised in context of D1 report

**[RIL]**: L011 **[Delegate]**: LGE(SungHoon) **[WI]**: NTN **[Class]**: 2 **[Status]**: ToDo **[TDoc]**: None **[Proposed Conclusion]**:

**[Description]**: A cell triggering event D1 is not included in the measurement report

**[Proposed Change]**: In the current formulation, MeasurementReport triggered by event D1 does not include the cell meeting event D1 and its cell. So we propose to add the procedure text to include the cell meeting event D1. There are a couple of ways to enable this, and we think it is most straightforward to include the cell in cellsTriggeredList, as similar to other event cases.

**[Comments]**:

In the event D1, there is no cell that triggers the event so it is unclear how cells could be added based on the triggering. A related RIL, acknowledges this and proposes to add PCI in the D1:

**[RIL]**: H801 **[Delegate]**: Huawei (Lili) **[WI]**: NTN **[Class]**: 1 **[Status]**: ToDo **[TDoc]**: Yes **[Proposed Conclusion]**: v167

**[Description]**: For event D1, there is a reference location of neighbour cell, but the UE does not know which neighbour cell it corresponds to.

In fixed cell scenarios, there is no problem.

However in moving cell scenarios, the UE needs to predict the trajectory of the reference location based on the ephemeris of the neighbour cell. So UE should know which cell the reference location belons to.

**[Proposed Change]**: Add a PCI in the configuration of event D1 and modify the field description accordingly.

We will submit a Tdoc addressing this issue.

However, it is unclear what is the use of the PCI here. Network knows which location it has configured as ”target cell location” and the event has measID associated. Thus, when report is sent, network knows which event triggered it. Note that it is not actually mandated that the reference location2 is associetd to any actual cell. It is just a location coordinate. Secondly, it should be further elaborated what does the UE do with the information of the PCI.

Note that WI is closed and only corrections or small additions that can be seen as FFS can be handled.

Previous round, the following comments were provided on behalf of current specification not needing any changes on this:

Current specification works. UE triggers measurement report for event D1 based on distance. So, UE can’t decide which cell can be included in the *cellsTriggeredList*. And adding the PCI to indicate the cell associated to reference location is not needed. For moving cell, NW can update the reference location in event D1

Agree, we believe there is no need to associate the reference location with any particular cell/PCI. When the location-based event will trigger, the UE will report measurements, where cell ID can be found.

Then, there has been arguments that UE would need to determine PCI related to the D1 event but there has not been any which discussion or conclusion. D1 is an coordinate on Earth and does not have to be specific to any cell. As there is no cell associated the L011 seems redundant.

Purpose of the D1 is as follows:

1. Event triggered-based UE location reporting are configured by gNB to obtain UE location update of mobile UEs in RRC\_CONNECTED

*That means it is not meant to track cells but UE location.*

The location based event is also primarily for fixed cells and handling moving cells-even for idle mode- is not discussed in Rel-17

There is also the following comment:

Firstly, we think RAN2 should first discuss whether to confirm the following working assumption at RAN2#115e.

1. Specify that measurement reports can be configured to be piggybacked with location report when location based event triggers it

If the working assumption is not confirmed, then we agree with Ericsson that we don’t see any issue here.

However, if the working assumption is confirmed, then to piggyback RSRP/RSRQ, PCI information might be needed so that UE knows for which cell it needs to include RSRP/RSRQ.

However, independent of whether this is agreed or not, there is still no need to associated PCI to the event. If UE detects a cell it uses the PSS/SSS to determine the PCI before measuring anyway.

Given the above, the same question is repeated. If a company still thinks a specification change is needed, please explain and further elaborate to revert the above explanation why rapporteur thinks both RILs can be rejected.

**Q4: Please give your view whether a) current specification works b) there is issue that needs to corrected.**

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| --- | --- | --- |
| Company | 1. Current specification works
 | 1. There is an issue that needs to be fixed, please explain why there is an issue and what is the resolution.
 |
| Ericsson | yes |  |
| vivo | For H801, we think current specification works. | The issue described in L011 is meaningful to us. In the legacy procedure, the meaning of the leaving condition is applicable for an RSRP-based event is that the entering condition is applicable for the event first and then the leaving condition is applicable. If the measurement result of a cell is consistently less than (or larger than) the configured threshold, it does not mean that the leaving condition is satisfied. In this case, if *reportOnLeave* is set to true for the corresponding reporting configuration, UE shall not initiate the measurement reporting procedure.For eventD1, RAN2 agreed that report on leave for event D1 is supported. So the same principle should be applied. We think introducing *cellsTriggeredList* as legacy is a straightforward way.  |
| Lenovo | For H801, we think the explanation from rapporteur is reasonable and thus no need to add PCI. | For L011, we are OK to add the procedure text to include the cell meeting event D1. |
| Intel | yes |  |
| Xiaomi | yes | To vivo, in the TP of R2-2205224, UE evaluates the leaving condition just for the *VarMeasReport* within the *VarMeasReportList*. It means the entering condition is fulfilled for the event first. Otherwise, the associated *VarMeasReport* is not included within *VarMeasReportList.*In the TP of R2-22052242> else if the *reportType* is set to *eventTriggered* and if the *eventId* is set to *eventD1* and if the leaving condition applicable for this event is fulfilled for the associated *VarMeasReport* within the *VarMeasReportList* for this *measId* during *timeToTrigger* defined within the *VarMeasConfig* for this event:3> if *reportOnLeave* is set to *true* for the corresponding reporting configuration:4> initiate the measurement reporting procedure, as specified in 5.5.5;3> remove the measurement reporting entry within the *VarMeasReportList* for this *measId*;3> stop the periodical reporting timer for this *measId*, if running; |
| Qualcomm | For H801 | Ok for L011. |
| Huawei, HiSilicon |  Yes, but (see comments in the next column) |  “ *The location based event is also primarily for fixed cells and handling moving cells-even for idle mode- is not discussed in Rel-17*” This explanation from the rapporteur is something we can buy. We think event D1 works well for fixed cells but not feasible for moving cells unless frequent reconfiguration is used.However, we are not sure whether it is the common understanding, as in the current spec moving cells are not excluded for event D1. |
| OPPO | Comments | We still think it depends on whether the following working assuming can be confirmed.1. Specify that measurement reports can be configured to be piggybacked with location report when location based event triggers it

It is true that UE could use PSS/SSS to determine PCI. As RRM measurement and location based event evaluation are dependent, for a cell meeting D1 event, UE could not know which cell it corresponds to.Therefore, if the above working assumption is confirmed, then to piggyback RSRP/RSRQ, PCI information might be needed so that UE knows for which cell it needs to include RSRP/RSRQ. |
| Samsung | Yes, agree with rapporteur’s explanation  |  |
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**Conclusion:**

There is clear support to reject RIL H801

**Proposal 7 RAN2 to agree to Propreject RIL H801**

Then, looking at comments so far for the second phase of offline 101 I noticed more than one company would like to propagree RIL L011:

**[RIL]**: L011 **[Delegate]**: LGE(SungHoon)  **[WI]**: NTN **[Class]**: 2 **[Status]**: ToDo **[TDoc]**: None **[Proposed Conclusion]**:

**[Description]**: A cell triggering event D1 is not included in the measurement report

**[Proposed Change]**: In the current formulation, MeasurementReport triggered by event D1 does not include the cell meeting event D1 and its cell. So we propose to add the procedure text to include the cell meeting event D1. There are a couple of ways to enable this, and we think it is most straightforward to include the cell in cellsTriggeredList, as similar to other event cases.

**[Comments]**:

However, as explained the D1 event does not actually have any target cells UE by definition, as it is coordinate on Earth merely. For this companies actually even agree and converge that there is no need to associate PCI to the event D1. **There is no definition for “cell meeting event D1”.**

In 5.5.4 we have

2> else if the *reportType* is set to *eventTriggered* and if the *eventId* is set to *eventD1* and if the entering condition applicable for this event, i.e. the event corresponding with the *eventId* of the corresponding *reportConfig* within *VarMeasConfig*, is fulfilled during *timeToTrigger* defined within the *VarMeasConfig* for this event:

3> include a measurement reporting entry within the *VarMeasReportList* for this *measId*;

3> set the *numberOfReportsSent* defined within the *VarMeasReportList* for this *measId* to 0;

3> initiate the measurement reporting procedure, as specified in 5.5.5;

and in 5.5.5 we have:

1>  if the *includeCommonLocationInfo* is configured in the corresponding *reportConfig* for this *measId* and detailed location information that has not been reported is available, set the content of *commonLocationInfo* of the *locationInfo* as follows:

2> include the *locationTimestamp*;

2> include the *locationCoordinate*, if available;

2> include the *velocityEstimate*, if available;

2> include the *locationError*, if available;

2> include the *locationSource*, if available;

2> if available, include the *gnss-TOD-msec*,

hence agreements so far have been captured. The WA to include also RSRP results is not confirmed so it is not discussed.

 If network wants RSRP results network would configure UE to report corresponding RSRP results based on RSRP events A1, A2 and so on.

Hence I suggest companies arguing for adding something for L011 to clarify what they think the definition of  **“cell meeting event D1”** is and to point to corresponding agreements to clarify the situation.

**Proposal 8 For concluding on L001 discuss whether there is agreed definition for “cell meeting event D1” and if not, agree to propreject RIL L001**

# TN-NTN mobility H800

H800:

Mobility from NTN to TN is supported. For condEvent D1, if the candidate cell is a TN cell, there should be no reference location for it. Besides, if the candidate cell is an NTN moving cell, the reference location is moving and the UE needs to predict it. The above issues should be made clear in the spec

In RAN2#115 the following is agreed:

3. RAN2 down priorities further enhacnements for connected mode for Rel-17 for TN-NTN mobility

Further, it seems the eventD1 may be misunderstood as it is reporting based on a location, a coordinate on Earth. In addition, there is no moving location target even discussed in Rel-17. D1 and T1 even CHO events are primarly for Earth fixed cells. Hence the proposal is to reject RIL H800.

**Q4: Please give your view whether RIL H800 can be rejected**

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| --- | --- | --- |
| Company | Reject yes/no | Exact specification cahnge if not rejected(mandatory) |
| Ericsson | yes |  |
| vivo | Yes with comments. We share the understanding with rapp that moving location of target cell is not discussed in Rel-17, so we propose to reject the proposal about predicting the movement of reference location. But we think there is a need to clarify that *condEventD1* can only be configured by an NTN serving cell towards an NTN candidate cell. |  |
| Lenovo | Yes |  |
| Intel | yes |  |
| Xiaomi | Yes. RAN2 has agreed same CHO trigger conditions and RRM events can be used within NTN and NTN-TN mobility provided these are supported by the UE. So, CondEvent D1 can also be used for NTN-TN mobility and whether to use it up to NW implementation. |  |
| Qualcomm | Yes, for TN cell, may be eventD1 is not so important?  |  |
| Apple | Yes |  |
| Huawei, HiSilicon |  |  If companies agree that event D1 and condEvent D1 are not used in moving cell scenarios, it’s ok not to mention the UE behavior of “predicting the movement of reference location”. However, it should be made clear in the spec that “ *condEventD1* can only be configured by an NTN serving cell towards an NTN candidate cell.” Exposing the reference location of a TN cell bring security issues. Note that this is not an enhancement for TN-NTN mobility, it is just clarifying the enhancement of condEvent D1 is not applicable to TN-NTN mobility. |
| OPPO | Yes |  |
| Samsung | Yes |  |
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**Conclusion:**

There is clear support to reject RIL H800. There is comment to clarify *”condEventD1* can only be configured by an NTN serving cell towards an NTN candidate cell.” However, it is not clear what does this mean. E.g. NTN cell configured D1 threshold location around its own cell edge, lets say directly South from the center. Then, if in that area there are NTN cell and multiple TN cells. Now, when there is no association of event D1 to any particular target cell, there is no security issues either.

**Proposal 9 RAN2 to agree to Propreject RIL H800**

# Third round

The main discussion point seems to be that whether enevtD1 has cells that are related to it or not. Or, in other words, if there are cells that are triggered due to event D1.

Let’s take an example where UE has such RRC configuration where the RRM configuration consists only one MeasID that links MO and reportConfig. This reportConfig only configures eventD1 for the UE. Note, that there is now no RSRP/RSRQ related events configured for the UE in this example.

Now, the MO, by definition does have frequency in it. However, If UE receives such confguration, does it start detecting cells? Here the question is not about does it start detecting cells because of an implementation but does the configuaryion make UE detect cells?

If it does not, it seems rather clear that eventD1 does not have cells associated to it and hence would not have anything to inlcude in a cellstriggered list.

If UE does start detecting cells, how would the UE determine which and when a cell triggers based on eventD1? Note that evetD1 entering condition is about UE’s location versus the configured thershold location. For example, UE might move the opposite direction and see cells and potentially start detecting PCIs based on PSS/SSS, if it has the receiver scanning that frequency with it’s autocorrelation fucntion.

**Q1: I your view, does UE start detecting and possibly also measuring cells if MO is configured with such reportconfig that does not have RSRP/RSRQ related event configured? That is, the above example configuration**

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| --- | --- | --- |
| Company | yes/no | If yes, which part of specification tells UE to detect? Or detect and measure? |
| Ericsson | No need to |  |
|  Huawei, HiSilicon | Prefer no, but see comments in the next column. | We prefer to make things simple since WI is declared completed.However, if UE does not detect or measure neighbor cells, RAN2 needs to figure out how to treat the following working assumption from RAN2 #115-e:*Specify that measurement reports can be configured to be piggybacked with location report when location based event triggers it*Possible solutions: 1) not confirm the working assumption2) only serving cell measurement results are piggybacked3) “available” measurement results are piggybacked, but it is unclear yet what “available” means… |
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**Conclusion:**

**Q2: If you answered yes, what is the definition of the cell/PCI on that frequency that is associated to eventD1?**

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| Company |  | Explain the definition/method how UE sees a cell/PCI to be associted to the event |
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**Conclusion:**

Then, eventD1 is not optimized for moving cells. As it would be weird to specify that certain configuration cannot be used in certain deplyment it is not adviced to attempt specifying such. However, if companies want, it can be minuted in chairnotes that eventD1 is not optimized, or designed for moving cell scenario.

**Q3: Should it be minuted in chairnotes that eventD1 is not optimized, or designed for moving cell scenario**

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| --- | --- | --- |
| Company | Yes/no | Comments/rewordings |
| Ericsson |  | Would be ok to have statement  |
|  Huawei, HiSilicon | Yes | We think it would be beneficial to capture this understanding to avoid any further debate on moving cells scenarios.The location-based event does not work well in moving cell scenarios as either the NW needs to update the reference location frequently or the UE needs to predict the movement of the reference location. |
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**Conclusion:**

Finally, RAN2 shouold conclude on RILS H801, L011 and H800:

**Proposal 7 RAN2 to agree to Propreject RIL H801**

**Proposal 8 For concluding on L011 discuss whether there is agreed definition for “cell meeting event D1” and if not, agree to propreject RIL L011**

**Proposal 9 RAN2 to agree to Propreject RIL H800**

**Q4a: Please give your view whether to agree on RIL801 and what is the resolution if any**

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| --- | --- | --- |
| Company | Yes/no | If yes, what is the \_exact\_ resolution in 38.331 (that is insert a TP in case you respond yes) |
| Ericsson | no |  |
|  Huawei, HiSilicon | We can accept not pursuing [H801] if the clarification in Q3 is made. |  |
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**Q4b: Please give your view whether to agree on L011 and what is the resolution if any**

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| Company | Yes/no | If yes, what is the \_exact\_ resolution in 38.331 (that is insert a TP in case you respond yes) |
| Ericsson | no |  |
|  Huawei, HiSilicon | no |  |
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**Q4c: Please give your view whether to agree on RIL800 and what is the resolution if any**

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| Company | Yes/no | If yes, what is the \_exact\_ resolution in 38.331 (that is insert a TP in case you respond yes) |
| Ericsson | no |  |
|  Huawei, HiSilicon | Yes | At least it needs to be clarified that condEvent D1 cannot be applied to TN cells.Even if consensus can be reached that reference location 2 is not associated to a neighbor cell (which requires some modification to the current field description of reference location 2), we still think if the serving cell is a TN cell, it should not configure condEvent D1 because the reference location 1 is likely to represent the center of the cell coverage.Exposing this information of a TN cell is very risky.***condExecutionCond***The execution condition that needs to be fulfilled in order to trigger the execution of a conditional reconfiguration for CHO, CPA, intra-SN CPC without MN involvement or MN initiated inter-SN CPC. When configuring 2 triggering events (Meas Ids) for a candidate cell, network ensures that both refer to the same *measObject.* If network configures *condEventD1* or *condEventT1* for a candidate cell network configures a second triggering event *condEventA3, condEventA4* or *condEventA5*. *condEventD1* can only be configured by an NTN serving cell towards an NTN candidate cell. Network does not configure both *condEventD1* or *condEventT1* for the same candidate cell. For CPAC, the *RRCReconfiguration* message contained in *condRRCReconfig* cannot contain the field *scg-State*. |
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# Conclusion