3GPP TSG-RAN WG2 Meeting #109bis-e Tdoc R2-2003927

Electronic meeting, 20th – 30th April 2020

Agenda Item: 7.1.7

Source: Ericsson

Title: Report on [AT109bis-e][412][eMTC] Standalone deployment – open issues

Document for: Report

# 1 Introduction

This is a report based on discussions during RAN2#109bis-e on Standalone deployment for eMTC, the current version includes summary material submitted before the meeting start and the questions to companies are implemented on top of the summary discussion:

**[AT109bis-e][412][eMTC] Standalone deployment - Open issues (Ericsson)**

Scope: Remaining open issues on standalone deployment.

Intended outcome: Report including a list of proposals categorized as agreeable, need further discussion etc.. The outcome can be provided in R2-2003927.

Deadline: Friday, Apr. 24th 10:00 UTC

**From summary document** [**R2-2003792**](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_109bis-e/Docs//R2-2003792.zip)**:**

Latest agreements related to this AI from RAN2#109-e are following:

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| RAN2#109\_e agreements:  In standalone deployment, if a UE considers itself to be in enhanced coverage with S criteria of normal coverage fulfilled, absolute priorities for cell reselection are used (i.e. UE does not switch to ranking as it would when in enhanced coverage due to S-criteria). |

The following documents have been submitted to RAN2#109bis-e in AI 7.1.7 Stand-alone deployment:

[R2-2003354](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_109bis-e/Docs//R2-2003354.zip) Remaining issues for LTE-M standalone deployment Ericsson discussion LTE\_eMTC5-Core

[R2-2003771](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_109bis-e/Docs//R2-2003771.zip) Finalization of TP for cell selection at standalone cell Nokia, Nokia Shanghai Bell discussion Rel-16 Late

This document summarizes these two tdocs and proposes a way forward to conclude this discussion topic.

# 2 Discussion

The following is currently captured in TS 36.304:

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| If cell selection criteria S in normal coverage is fulfilled for a cell, UE [may] consider itself to be in enhanced coverage if *SystemInformationBlockType1* cannot be acquired but UE is able to acquire *MasterInformationBlock, SystemInformationBlockType1-BR* and *SystemInformationBlockType2*. |

The highlighted text above has been discussed in a number of earlier meetings, but no conclusion has been reached yet. Some companies prefer "may" and some companies prefer "shall" in the highlighted location.

In [R2-2003771](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_109bis-e/Docs//R2-2003771.zip) arguments for "may" are presented in a summary from an earlier email discussion (during RAN2#109-e)

* There can be situations where UE is unable to acquire SIB1 but is able to acquire SIB1-BR other than Standalone operation, thus mandatory behavior would impact other use cases as well.
* UE should not be mandated to camp in enhanced coverage in standalone cell as there may be lower ranked cells providing normal coverage operation, which could be preferable for the UE.

In [R2-2003354](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_109bis-e/Docs//R2-2003354.zip) and [R2-2003771](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_109bis-e/Docs//R2-2003771.zip) the following arguments are presented for mandating camping in enhanced coverage / i.e. use "shall" instead:

* The condition in above specification text is only valid for standalone case.
  + [R2-2003354](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_109bis-e/Docs//R2-2003354.zip): The discussed text is only applicable in standalone cell as in normal cell the condition is in contradiction with itself.
  + [R2-2003771](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_109bis-e/Docs//R2-2003771.zip): Proposes to further clarify the discussed text to make it applicable only to standalone.
* TS 36.300 specifies that UEs should consider to be in enhanced coverage if functionality related to enhanced coverage is used.
* The discussed specification text doesn't mandate the UE to camp in standalone cell when other (lower ranked) cells are available, in more detail:
  + [R2-2003354](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_109bis-e/Docs//R2-2003354.zip): Based on agreement in RAN2#109-e, absolute priorities can be used for inter-frequency cases. Additionally, conditions in 5.3.1 in TS 36.304 makes it possible for UE to exclude cells for re-selection if SIB1 is not found.
  + [R2-2003771](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_109bis-e/Docs//R2-2003771.zip): The discussed text only refers to whether UE considers itself to be in enhanced coverage in standalone cell, UE can choose normal cell during re-selection regardless.

The following proposals are provided in the tdocs submitted for RAN2#109bis-e based on the arguments:

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| [R2-2003354](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_109bis-e/Docs//R2-2003354.zip), Ericsson | [**Proposal 1:** Change "[may]" in TS 36.304 to "shall"](#_Toc37363730)  [**Proposal 2:** RAN2 to discuss whether further clarification is needed in TS 36.304 for cases where neighboring cells are on same frequency and other cell provides normal coverage operation or for cases with different frequencies but same priority.](#_Toc37363731) |
| [R2-2003771](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_109bis-e/Docs//R2-2003771.zip), Nokia | **Proposal 1**: Modify “may” to shall in the TP related to cell selection behavior for standalone cell.  **Proposal 2**: RAN2 to discuss additional clarification to the above TP to indicate its applicability only for standalone case. |

To conclude this discussion, address the remaining concerns and finalize the specification(s) accordingly, the first two proposals are to confirm RAN2's intention regarding the wanted UE behaviour i.e. that it would be possible to camp in non-standalone cell in normal coverage instead of camping in standalone cell even when the coverage is better for the latter, and that the text from TS 36.304 discussed above applies only to the standalone case:

1. RAN2 intention is that non-BL UE should be able to select non-standalone cell to camp over standalone cell on the same frequency even when the coverage is better for the latter.

Company views on Proposal 1 (note there is question related to possible changes later):

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| **Company** | **Agree with intention in P1?** | **Comments** |
| Huawei, HiSilicon | Yes and no | Not necessarily a design target, but a natural consequence - UE should just follow the cell reselection criteria and cell suitability. UE may fail SIB1 reception and succeed SIB1-BR reception in a non-standalone cell In this case UE may consider the cell not suitable and select another suitable cell. It is impossible for UE to know whether this is a „real“ failure, or if the cell is standalone, unless we introduce an indication in MIB – so we have to make this an optional behaviour whether UE considers itself in enhanced coverage, or treats the cell as not suitable. |
| Nokia | No | During cell selection, UE start checking the suitability of cells starting from UE having highest receive level. If the strongest cell ( standalone cell) satisfies the cell selection criteria it should camp onto the cell instead of attempting to select another cell which is non standalone. SIB1-BR includes information about LTE control region usage for standalone cell. This information can be used to know whether the cell is standalone or not. |
| Ericsson | Yes | Agree with HW that this is more of a consequence of the standalone cell case.  However, we disagree with the interpretation that in the case UE would fail SIB1 reception, but does succeed in SIB1-BR reception should still consider itself to be in normal coverage – in this case the UE would need to use enhanced coverage functionality to access the cell, and as specified in TS 36.300 23.7b:  *"A UE in enhanced coverage is a UE that requires the use of enhanced coverage functionality to access the cell.*"  In any case, if this happens, we think the UE should be able to select a cell for normal coverage operation in case operating in enhanced coverage is not preferred. For same frequency case priorities are not used, so we are OK to further clarify this in the specification.  We'd also note that in TS 36.304 5.3.1 UE may already choose not to re-select a cell where SIB1 cannot be acquired – we think this can be used by the UE to re-select to a cell providing normal coverage instead during the cell re-selection process. |
| Intel | Yes and No | Agree with Huawei that the UE can consider itself in enhanced coverage, or treats the cell as not suitable, or even camp on the cell in normal coverage. We do not see a need to restrict the UE behaviour. |

1. RAN2 understands that the new condition introduced in TS 36.304 applies only when camping in a standalone cell.

Company views on Proposal 2, if you think otherwise please elaborate and please explain if you think changes are needed in the current formulation to capture the understanding:

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| **Company** | **Agree with P2?** | **Comments** |
| Huawei, HiSilicon | no | We think it also be applied in general, e.g. for non-BL UE. |
| Nokia | Yes | In our understanding the new condition added was meant to specify the cell selection for UE in standalone cell. Additional clarification can be added for the same. |
| Ericsson | Yes | The text is intended for only standalone case and in our interpretation it also only applies to standalone case.  If SIB1 cannot be acquired, the cell is either standalone cell or the coverage is not good enough – in the latter case it is contradictory that UE would consider itself to be in normal coverage, but unable to acquire SIB1. Thus we think the condition already applies only to standalone.  If this is not clear enough, we can consider further clarifiyng the text. |
| Intel | no | Again, we do not see the need to restrict the UE behavior. Furthermore, the UE does not know whether the cell is standalone or non-standalone. So it is irrelevant |

A further point for discussion is whether above proposals require clarifications or changes in the specifications. Both [R2-2003354](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_109bis-e/Docs//R2-2003354.zip) and [R2-2003771](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_109bis-e/Docs//R2-2003771.zip) argue that Proposal 1 would be the current behaviour already, however based on earlier discussions it doesn't seem to be the view of all of the companies involved in the discussion, therefore it should be clarified online or over email discussion. Similarly, for Proposal 2 the tdocs provide arguments for this being the case already, but this should be clarified online or over email as well.

Based on above and the proposals in the submitted tdocs, the following is proposed for further discussion:

1. Update "[may]" to "shall" in TS 36.304. Further discuss whether outcome of discussion related Proposals 1 and 2 require clarifications in TS 36.304.

Company views on P3, note that the answer can be conditional on addressing e.g. issues raised in discussion for P1 and P2:

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| **Company** | **Is P3 (conditionally) agreeable?** | **Comments** |
| Huawei, HiSilicon | no | We think the square brackets can be removed, and the case of being unable to acquire SIB1 should be made e.g. |
| Nokia | Yes with some clarification | Information in SIB1-BR related to standalone cell can be used to clarify the sentence when it is changed to  „shall“ |
| Ericsson | Yes |  |
| Intel | no | We should keep the “may“ to avoid any restriction to UE behaviour. |

As a follow-up, conditional to the change in P3 and intention in P1, it should be considered what changes, if any, are needed in TS 36.304.

For P1, the companies who submitted tdocs seem to think there would not be changes needed, based on clause 5.3.1 in TS 36.304 and/or that the text would only apply when UE considers to be in enhanced coverage in standalone cell, i.e. not limit the UE in any way to select other cells in normal coverage. Please elaborate in the following if you disagree with these views:

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| **Company** | **If P3 is agreed, what changes are needed, if any, to implement the intention in P1?** |
| Huawei, HiSilicon | We don’t think P3 can be agreed, because it is possible that UE fails SIB1 reception but succeeds SIB1-BR reception even in a non-standalone cell. The most straightforward way is to keep „may“ |
| Nokia | For the above situation we can add clarification that it is applicable for standalone cell. |
| Ericsson | We can further clarify 1) cell reselection to normal coverage cell and 2) applicability of the condition to standalone only, although we think this is the case already.< |
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# 3 Summary

The current summary is based on [R2-2003792](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_109bis-e/Docs//R2-2003792.zip) and can be updated after further discussion

The following proposals were made in the previous section, to be discussed online or further detailed discussion over email during RAN2#109bis-e:

[Proposal 1 RAN2 intention is that non-BL UE should be able to select non-standalone cell to camp over standalone cell on the same frequency even when the coverage is better for the latter.](#_Toc37931240)

[Proposal 2 RAN2 understands that the new condition introduced in TS 36.304 applies only when camping in a standalone cell.](#_Toc37931241)

[Proposal 3 Update "[may]" to "shall" in TS 36.304. Further discuss whether outcome of discussion related Proposals 1 and 2 require clarifications in TS 36.304.](#_Toc37931242)

# References

1. [R2-2003354](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_109bis-e/Docs//R2-2003354.zip), "Remaining issues for LTE-M standalone deployment", Ericsson, RAN2#109bis-e
2. [R2-2003771](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_109bis-e/Docs//R2-2003771.zip), "Finalization of TP for cell selection at standalone cell", Nokia, Nokia Shanghai Bell, RAN2#109bis-e
3. [R2-2003792](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_109bis-e/Docs//R2-2003792.zip), "Summary of AI 7.1.7 Standalone operation", Ericsson, RAN2#109bis-e

# Appendix

Companies are welcome to provide any additional comments/issues regarding the summary and the topic in general:

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| **Company** | **Comments** |
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