3GPP TSG-RAN WG2 #113-e R2-2102058

Electronic Meeting, 25th Jan – 5th Feb 2021

Agenda Item: 6.7.3 UE capability corrections

Source: Huawei, HiSilicon

Title: Report of [Post113-e][214][DAPS] Correction on inter-node signalling for DAPS UE capability coordination (Huawei)

Document for: Discussion, Decision

# 1 Introduction

This document is the summary of the following email discussion:

* [Post113-e][214][DAPS] Correction on inter-node signalling for DAPS UE capability coordination (Huawei)

Scope: Try to agree to the CR based on [R2-2102347](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_113-e/Docs/R2-2102347.zip) and clarify technical issues raised. If no technical issues are identified, provide agreed CR.

Intended outcome: Agreed CR (if possible)

Deadline: Short

The main intention is to identify if there are technical issues with CR R2-2102347. If no technical issues are identified, we will try to agree to this CR.

# 2 Discussion

## 2.1 Background

Regarding whether source/target indication is based on UE capability signalling or inter-node RRC signalling, RAN2 decided to further consider inter-node signalling based solution in RAN2#112e:

* Some support but some companies are not convinced.
* Postponed. Companies are requested to come back next time with concrete proposals with no UE impacts (i.e. only inter-node signalling).

In the offline discussion [AT113-e][212][MOB] UE capability corrections for LTE and NR mobility (Nokia) in RAN2#113 [1], we continued discussing about candidate solutions and we had three options on table as below:

**Option 1: Not pursue the topic.**

**Option 2: Consider simplify the signalling to share the source band and source FSpCC.**

**Option 3: The source indicates the allowed BCs, selected band entry and selected FSpCC to target**

During this offline discussion, most companies’ views converged to simplified option 2 and proponent companies prepared a CR [2] for formal agreement. According to companies’ online/offline feedback, the following companies were fine to have this CR, including:

Huawei, HiSilicon, Nokia, Nokia Shanghai Bell, ZTE Corporation, Sanechips, MediaTek, Qualcomm, Intel, LG Electronics.

But there was still concern about if there was technical issues with CR R2-2102347, so we perform this 1-week email discussion to further discuss with respect to the guideline below:

* 1-week email to try to agree to the CR if possible (unless any technical issues are identified, the CR will be agreed)

## 2.2 Technical discussion

In this CR R2-2102347 [2], the key part is that source informs the target the source FeatureSetDownlinkPerCC-Id and FeatureSetUplinkPerCC-Id as follows.

ConfigRestrictInfoDAPS-v16xy ::= SEQUENCE {

sourceFeatureSetPerDownlinkCC FeatureSetDownlinkPerCC-Id,

sourceFeatureSetPerUplinkCC FeatureSetUplinkPerCC-Id

}

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| --- |
| ***configRestrictInfoDAPS* field descriptions** |
| ***sourceFeatureSetPerUplinkCC/sourceFeatureSetPerDownlinkCC***  Indicates an index referring to the position of the *FeatureSetUplinkPerCC/FeatureSetDownlinkPerCC* selected by source in the *featureSetsUplinkPerCC/featureSetsDownlinkPerCC*. |

This is assistance information to help target gNB determine which FSpCC UE capability is used in source cell, with the knowledge of source cell and target cell’s band information from HANDOVER REQUEST message, then target gNB can select a band combination for DAPS which contains corresponding source band, target band, uplink and downlink source FSpCCs.

One concern raised in offline-[AT113-e][212] was that it’s not clear how the target can know which featuresetcombination and which feature set the source is using only by this FSpCC assistance information. But other companes thought this minimum signalling is a compromise, and it is still possible for taget gNB to make a conservative configuration for UE in target cell, with the assumption that more UE resource is occupied by source. In this way the combination of the configurations will not exceed UE capability.

To sum up, this source FSpCC assistance information is to ease network implementation, i.e. avoid FSpCC level ambiguity, thus it helps find a suitable target cell configuration during DAPS handover. This solution may not be so complete, but it can still make some benefit meanwhile with the minimum specification impact.

**Question**: **Is there technical issues with this CR R2-2102347? Opponent companies are requested to provide identified technical issues here, and proponent companies can also provide comments.**

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| Company | Any technical issues identified or other comments |
| Ericsson | There are two problems with option 2.  Problem 1: Multiple matching band combinations  There may be more than one band combination in the *supportedBandCombinationList* that contain the source and target band and the uplink and downlink source FSpCCs, and the target may not be able to determine which one of these the source is using. This causes a problem for any capability that is signalled on the band combination level (e.g. *interFreqDynamicPowerSharingDAPS*), as seen in the following example:  BC1: Band X + Band Y, *interFreqDynamicPowerSharingDAPS* = *short*  BC2: Band X + Band Y, *interFreqDynamicPowerSharingDAPS* = *long*  In this example the target does not know if the source is using BC1 or BC2 and hence it doesn’t know if it should use the long or short value for the *interFreqDynamicPowerSharingDAPS* capability.  Problem 2: Multiple matching feature set combinations  Even if there is only one matching band combination that band combination may still have multiple feature set combinations that contain the uplink and downlink source FSpCCs. For example:  BC1: Band X + Band Y => {FSC A, FSC B}  FSC A and B correspond to the different rows in the feature set combination matrix for BC1:  X Y  FSC A FS-X1 D/U FS-Y1 D/U  FSC B FS-X2 D/U FS-Y2 D/U  In this example both FS-X1 D/U and FS-X2 D/U contain the uplink and downlink source FSpCCs indicated by the source and hence the target doesn’t know which of FSC A and B the source is using. This would cause a problem for any capability that is signalled on the feature set level (e.g. *supportedSRS-Resources* in feature set uplink). Continuing the above example, if the two uplink feature sets associated with the target band, FS-Y1 U and FS-Y2 U, have different values for the *supportedSRS-Resources* capability:  FS-Y1 U: *supportedSRS-Resources* = n  FS-X2 U: supportedSRS-Resources = m  the target node will not know which value to use.  With option 3 the above problems do not arise because the source only includes the band and feature set combinations that are compatible with its configurations. |
| Huawei, HiSilicon | The problems mentioned by Ericsson can be resolved by network implementation, i.e. network can make conservative target cell configurations to guarantee that the combination of configurations don’t exceed UE capability.  Regarding problem 1, the p-DAPS-Target-r16 is decided by source gNB, so this maximum value is not decided by target gNB. But anyway target gNB can make a conservative power control in target cell so that the sum of uplink power don’t exceed UE’s upper boundary.  Regarding problem 2, target gNB can assume more SRS resources have been occupied by source, then enable less SRS resources in target cell during DAPS.  So in our view there are no blocking issues with this CR. |
| Nokia, Nokia Shanghai Bell | Agree with Huawei’s feedback above. |
| ZTE | Agree with Huawei’s comment. And considering option 2 is a compromised solution to achieve the minimum spec impact and simpler NW implementation on target capability selection, we think it’s better to have it than specifying nothing. |
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**Summary:**

The real discussion point is what assistance information for DAPS UE capability coordination is needed.

In CR R2-2102347, the source uplink/downlink FSpCC ID is proposed to be indicated from source gNB to target gNB. Based on companies’ online/offline feedback, we don’t see technical issues with this assistance information itself and most participant companies are fine to have this CR, including:

Huawei, Nokia, ZTE Corporation, MediaTek, Qualcomm, Intel, LG Electronics.

But there is still one concern that whether other assistance information is still needed, e.g. band combination and feature set selected by source gNB.

In order to reflect the whole picture of companies’ views, the following proposals are made:

**Proposal 1: CR R2-2102347 is agreed.**

**Proposal 2: RAN2 to continue discussion on whether other inter-node assistance information is needed for DAPS UE capability coordination.**

# 3 Conclusion

Based on the discussion in the previous section we propose the following:

**Proposal 1: CR R2-2102347 is agreed.**

**Proposal 2: RAN2 to continue discussion on whether other inter-node assistance information is needed for DAPS UE capability coordination.**

# 4 Reference

1. R2-2102446 Summary of [AT113-e][212][MOB] UE capability corrections for LTE and NR mobility (Nokia) Nokia discussion Rel-16 NR\_Mob\_enh-Core, LTE\_feMob-Core
2. R2-2102347 Correction on inter-node signalling for DAPS UE capability coordination Huawei, HiSilicon, Nokia, Nokia Shanghai Bell, ZTE Corporation, Sanechips CR Rel-16 38.331 16.3.1 2468 - F NR\_Mob\_enh-Core

# Annex

# In order to ease possible offline discussions, all delegates having provided input in this document are requested to fill the following table.

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| --- | --- | --- |
| Company | Name | Email Address |
| Ericsson | Oscar Ohlsson | oscar.ohlsson@ericsson.com |
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