**3GPP TSG RAN WG1 #105-e R1-2105956**

**e-Meeting, May 10th – 27th, 2021**

**Agenda item:** 7.2.11

**Source:** Moderator (NTT DOCOMO, INC.)

**Title:** Summary on Rel-16 NR UE features related discussion

**Document for:** Discussion and Decision

1. Introduction

This contribution summarizes the discussions and proposals in AI 7.2.11 regarding UE features for FGs not dedicated to a specific Rel-16 WI/TEI.

Based on the discussions summarized in Section 2, following is a part of the suggested email discussions/approvals for AI 7.2.11.

**FL proposal #1 of email discussion/approval:**

**[105-e-NR-UEFeature-Others-01] Email discussion/approval on UE features that are not dedicated to specific Rel-16 WI/TEI**

* **For FG22-10, add below sentence to the note.**
	+ **For *pdcch-MonitoringAnyOccasionsWithSpanGap*, the supported set (set1, set2 or set 3) for cross-carrier scheduling with the different SCSs in the scheduling cell and the scheduled cell is still based on the indicated value for the band of the scheduling cell.**

Companies are encouraged to check above FL proposal #1 and to provide feedback if any in below.

|  |  |
| --- | --- |
| Company | Comment |
| Huawei | Y |
| Apple | We are okay with the proposal  |
|  |  |

In the latest UE features list in [3], there is one necessary editorial correction on FG number as below. It can be reflected in the updated UE features list.

|  |  |  |
| --- | --- | --- |
| 10. NR-unlicensed | 10-33 | Semi-persistent CSI report on PUCCH for unlicensed spectrum |

There is a contribution having proposals regarding UE features in AI 7.2.10 [4]. Based on the discussion in Section 3, following can be a part of the suggested email discussions/approvals for AI 7.2.11 if RAN1 reaches consensus to do so in AI 7.2.10.

**FL proposal #2 of email discussion/approval:**

**[105-e-NR-UEFeature-MRDCCA-01] Email discussion/approval on UE features regarding MR-DC/CA enhancement**

* **For FG18-1/1a/1b. following proposals are discussed in 7.2.11 if some high-level consensus is achieved based on the discussion in AI 7.2.10.**
	+ **Change FR1-FR2 differentiation from ‘No’ to ‘Yes’**
	+ **Add a note ‘If UE indicates support for a frequency range, this capability is applicable for power sharing between MCG and SCG cells with UL in that frequency range’**
	+ **Ask RAN2 to modify the descriptions in TS38.306 accordingly**

Companies are encouraged to check above FL proposal #2 and to provide feedback if any in below.

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| --- | --- |
| Company | Comment |
|  |  |
|  |  |
|  |  |

1. Discussion on New FGs that are not dedicated to a specific Rel-16 work item/TEI
	1. FG 22-10

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 22. NR Others | 22-10 | Support of pdcch-MonitoringAnyOccasionsWithSpanGap in case of cross-carrier scheduling with different SCSs in the scheduling cell and the scheduled cell | Support of pdcch-MonitoringAnyOccasionsWithSpanGap in case of cross-carrier scheduling with different SCSs in the scheduling cell and the scheduled cell* Candidate values: {Interpretation2, Interpretation3}
 | 3-5b, 18-5 | Yes | N/A |  | Per UE | No | No | N/A | Candidate values: {Interpretation2, Interpretation3}If UE indicates Interpretation2, it supports 22-10 as long as pdcch-MonitoringAnyOccasionsWithSpanGap is supported for the band of the scheduling/triggering/indicating cell.If UE indicates Interpretation3, it supports 22-10 as long as pdcch-MonitoringAnyOccasionsWithSpanGap is supported in both the band of the scheduled/triggered/indicated cell and the band of the scheduling/triggering/indicating cell. | Optional with capability signalling |

Following proposal is made in a contribution.

|  |  |
| --- | --- |
| [1] | Below agreements were made in RAN1#104-e meeting. ***Agreement****Regarding the interpretation of UE capabilities in case of cross-carrier operation,* ***for cross-carrier scheduling with the same SCS in the scheduling cell and the scheduled cell****, RAN1 clarifies that support of* pdcch-MonitoringAnyOccasionsWithSpanGap *is based on both the support of this capability for the band of the scheduled/triggered/indicated cell and the support of this capability for the band of the scheduling/triggering/indicating cell.** *Note: For pdcch-MonitoringAnyOccasionsWithSpanGap, the supported set (set1, set2 or set 3) for cross-carrier scheduling with the same SCS in the scheduling cell and the scheduled cell is still based on the indicated value for the band of the scheduling cell.*

***Agreement******For cross-carrier scheduling with different SCSs in the scheduling cell and the scheduled cell****, RAN1 introduces new Rel-16 UE capability to clarify the interpretation of* pdcch-MonitoringAnyOccasionsWithSpanGap *in case of cross-carrier operation.** *The detailed design of this new Rel-16 UE capability is to be discussed under Rel-16 UE feature session.*

***Agreement****LS to RAN2 on interpretation of UE features in case of cross-carrier operation is endorsed in* [*R1-2102085*](https://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_91e/Docs/R1-2102085.zip)FG 22-10 was introduced to reflect the second agreement listed above. However, one minor issue to clarify for the FG is whether the number of spans/span-gap follow those of the scheduling cell or scheduled cell. We propose to follow the same principle as CCS with same SCS case (like the note in first agreement above). **Proposal : For FG 22-10, add below sentence to the note column:****For *pdcch-MonitoringAnyOccasionsWithSpanGap*, the supported set (set1, set2 or set 3) for cross-carrier scheduling with the different SCSs in the scheduling cell and the scheduled cell is still based on the indicated value for the band of the scheduling cell.** |

Based on the above, following proposal can be discussed in RAN1#105-e meeting.

### **Discussion point #1**

* **For FG22-10, add below sentence to the note.**
	+ **For *pdcch-MonitoringAnyOccasionsWithSpanGap*, the supported set (set1, set2 or set 3) for cross-carrier scheduling with the different SCSs in the scheduling cell and the scheduled cell is still based on the indicated value for the band of the scheduling cell.**
1. Discussion on UE features for MR-DC/CA enhancement
	1. FG 18-1/1a/1b

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 18. MR-DC/CA enhancement | 18-1 | Basic UL power sharing for DC | Semi-static power sharing mode1 between MCG and SCG cells of same FR for NR dual connectivity. |  | Yes | N/A |  | Per BC | N/A | N/A | N/A | Absence means intra-FR DC is not supported.  | Optional with capability signalling |
| 18. MR-DC/CA enhancement | 18-1a | Semi-static UL power sharing mode 2 for DC | Semi-static power sharing mode 2 between MCG and SCG cells of same FR for NR dual connectivity. | 18-1 | Yes | N/A |  | Per BC | N/A | N/A | N/A | Semi-static power sharing mode 2 between MCG and SCG cells of same FR is applicable only for synchronous NR dual connectivity | Optional with capability signalling |
| 18. MR-DC/CA enhancement | 18-1b | Dynamic UL power sharing for DC | Dynamic power sharing between MCG and SCG cells of same FR for NR dual connectivity.1. T\_offset
 | 18-1 | Yes | N/A |  | Per BC | N/A | N/A | N/A | 1) {short, long} | Optional with capability signalling |

Following proposal is made in a contribution in AI 7.2.10.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| [4] | In [1], an LS was received from RAN4 indicating that RAN4 does not introduce the parameter P-NR-FR2 in Rel-16. This parameter is related to NR-DC power control and used in RAN1 and RAN2 specs. In [2], an LS reply related to this was sent to RAN4, requesting further clarifications on how to handle power control for FR2-FR2 DC (i.e., DC where both MCG and SCG have cells with FR2 UL). UE capabilities related to NR-DC power control are currently captured in 38.306 as shown below. While the RRC configuration of power sharing made can be differentiated for FR1 and FR2 (i.e., using *nrdc-PCmode-FR1* or *nrdc-PCmode-FR2*), similar differentiation of UE capability is not present in current specs.**Current capability definitions from 38.306 vg40**

| ***Definitions for parameters*** | Per | M | FDD-TDDDIFF | FR1-FR2DIFF |
| --- | --- | --- | --- | --- |
| ***intraFR-NR-DC-PwrSharingMode1-r16***Indicates whether the UE supports intra-FR NR DC with semi-static power sharing mode1 between MCG and SCG cells of same frequency range as defined in TS 38.213 [11]. If this field is absent, the UE does not support intra-FR NR DC.  | BC | No | No | No |
| ***intraFR-NR-DC-PwrSharingMode2-r16***Indicates whether the UE supports semi-static power sharing mode2 between MCG and SCG cells of same frequency range for synchronous intra-FR NR DC as defined in TS 38.213 [11]. The UE indicating the support of this also indicates the support of *intraFR-NR-DC-PwrSharingMode1-r16.* | BC | No | No | No |
| ***intraFR-NR-DC-DynamicPwrSharing-r16***Indicates the UE support of dynamic power sharing for intra-FR NR DC between MCG and SCG cells of same frequency range with long or short offset as specified in TS 38.213 [11]. The UE indicating the support of this also indicates the support of *intraFR-NR-DC-PwrSharingMode1-r16.* | BC | No | No | No |

Given current status with *p-NR-FR2* decision by RAN4, the UE capability definitions should be modified such that UE can indicate support for a particular power sharing mode for FR1 only (i.e., applicable only to cells with FR1 UL in MCG and SCG) without indicating it as supported for FR2.This can be achieved by enabling FR1-FR2 differentiation for these capabilities so that if UE indicates ‘yes’ for a FR, the capability is applicable for power sharing between MCG and SCG cells with UL in that FR. This separates the capability for FR1 NR-DC reporting and additionally provides forward compatibility if RAN4 continues discussion for p-NR-FR2 and p-UE-FR2 in Rel17. **Proposed modification**

| ***Definitions for parameters*** | Per | M | FDD-TDDDIFF | FR1-FR2DIFF |
| --- | --- | --- | --- | --- |
| ***intraFR-NR-DC-PwrSharingMode1-r16***Indicates whether the UE supports intra-FR NR DC with semi-static power sharing mode1 between MCG and SCG cells of same frequency range as defined in TS 38.213 [11]. If this field is absent, the UE does not support intra-FR NR DC. If UE indicates support for a frequency range, this capability is applicable for power sharing between MCG and SCG cells with UL in that frequency range | BC | No | No | ~~No~~ Yes |
| ***intraFR-NR-DC-PwrSharingMode2-r16***Indicates whether the UE supports semi-static power sharing mode2 between MCG and SCG cells of same frequency range for synchronous intra-FR NR DC as defined in TS 38.213 [11]. The UE indicating the support of this also indicates the support of *intraFR-NR-DC-PwrSharingMode1-r16.*If UE indicates support for a frequency range, this capability is applicable for power sharing between MCG and SCG cells with UL in that frequency range | BC | No | No | ~~No~~Yes |
| ***intraFR-NR-DC-DynamicPwrSharing-r16***Indicates the UE support of dynamic power sharing for intra-FR NR DC between MCG and SCG cells of same frequency range with long or short offset as specified in TS 38.213 [11]. The UE indicating the support of this also indicates the support of *intraFR-NR-DC-PwrSharingMode1-r16.*If UE indicates support for a frequency range, this capability is applicable for power sharing between MCG and SCG cells with UL in that frequency range | BC | No | No | ~~No~~Yes |

Our understanding is that in RAN2 it was decided in last meeting to wait for RAN1 input regarding the above capabilities. * Wait for RAN1 input on the support of power sharing for FR2+FR2 NR-DC, including changes to UE capabilities.

Since it is unclear at this point how the power limits will be specified by RAN4 for Rel17, we propose to indicate to RAN2 to modify the UE capabilities as shown above. |

Since the proposal is about updates on UE features list descriptions and 38.306 descriptions, the proposal should be discussed in AI 7.2.11 once some high-level consensus is achieved based on the discussion in corresponding maintenance agenda (AI 7.2.10). In that sense, we can have a placeholder for this proposal.

### **Discussion point #2**

* **For FG18-1/1a/1b. following proposals are discussed in 7.2.11 if some high-level consensus is achieved based on the discussion in AI 7.2.10.**
	+ **Change FR1-FR2 differentiation from ‘No’ to ‘Yes’**
	+ **Add a note ‘If UE indicates support for a frequency range, this capability is applicable for power sharing between MCG and SCG cells with UL in that frequency range’**
	+ **Ask RAN2 to modify the descriptions in TS38.306 accordingly**

Reference

[1] R1-2105790 Remaining details of Rel-16 NR UE features Ericsson

[2] R1-2105814 Remaining issues on NR Rel-16 UE features Nokia, Nokia Shanghai Bell

[3] R1-2104120 Updated RAN1 UE features list for Rel-16 NR after RAN1#104bis-e Moderators (AT&T, NTT DOCOMO, INC.)

[4] R1-2105789 Maintenance for Rel-16 MR-DCCA Ericsson