**3GPP TSG-RAN WG1 Meeting #110bis-e *R1-2210658***

**e-Meeting, October 10th – 19th, 2022**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  | **38.213** | **CR** | **DRAFT** | **rev** |  | **Current version:** | **17.3.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **X** | Core Network |  |

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| ***Title:***  | Corrections on UE power saving enhancements for NR in TS 38.213 |
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| ***Source to WG:*** | Moderator (MediaTek), Ericsson, Nokia, Nokia Shanghai Bell, vivo, ZTE, Sanechips |
| ***Source to TSG:*** | RAN1 |
|  |  |
| ***Work item code:*** | NR\_UE\_pow\_sav\_enh-Core |  | ***Date:*** | 2022-10-19 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-17 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
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| ***Reason for change:*** | 1. Rel-17 procedures of SSSG switching / PDCCH skipping are not applicable if the Rel-16 configuration, *searchSpaceGroupIdList*, is not configured, which is incorrect dependency.
2. For a UE configured with Rel-17 SSSG switching only, the Rel-16 PDCCH monitoring procedure regarding UE is not provided *SearchSpaceSwitchTrigger* for a serving cell will still be applied, which leads to unexpected UE behaviour.
3. Current wording of PDCH skipping behaviour when SR is triggered determines the UE behaviour only active DL BWP of the serving cell or on SpCell. RAN2 spesification however determines that the skipping should be ignored in all serving cells of the corresponding Cell Group.
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| ***Summary of change:*** | 1. Correct the condition for the case where the procedures of SSSG switching are not applicable and provide the condition for the case where the procedures of PDCCH skipping are not applicable.
2. Clarify that the Rel-16 PDCCH monitoring procedure regarding UE is not provided *SearchSpaceSwitchTrigger* for a serving cell is only applied when the Rel-16 configuration, *searchSpaceGroupIdList*, is configured.
3. Clarify that the agreed behaviour for PDCCH skipping when SR is sent (in PUCCH or via RACH) is applied to all serving cells of the corresponding Cell Group.
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| ***Consequences if not approved:*** | 1. Rel-17 procedures of SSSG switching / PDCCH skipping are not applicable even when the corresponding configuration, *searchSpaceGroupIdList-r17* / *PDCCHSkippingDurationList*, is configured.
2. Unexpected PDCCH monitoring behaviour for a UE configured with Rel-17 SSSG switching only.
3. Missaligned UE behaviour with respect to RAN2 spesification.
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| ***Clauses affected:*** | 10.4 |
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|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **N** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **N** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **N** |  O&M Specifications | TS/TR ... CR ...  |
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| ***Other comments:*** |   |
|  |  |
| ***This CR's revision history:*** |  |

## 10.4 Search space set group switching and skipping of PDCCH monitoring

A UE can be provided

* a group index for a respective Type3-PDCCH CSS set or USS set by *searchSpaceGroupIdList* for PDCCH monitoring on a serving cell,
* a group index for a respective Type3-PDCCH CSS set or USS set by *searchSpaceGroupIdList-r17* for PDCCH monitoring on an active DL BWP of a serving cell.

If the UE is not provided *searchSpaceGroupIdList* or *searchSpaceGroupIdList-r17* for a search space set, the following procedures that are based on search space set group switching are not applicable for PDCCH monitoring according to the search space set.

A UE can be provided a set of durations by *PDCCHSkippingDurationList* for Type3-PDCCH CSS set or USS set for PDCCH monitoring on an active DL BWP of a serving cell. If the UE is not provided *PDCCHSkippingDurationList*, the following procedures related to skipping of PDCCH monitoring are not applicable.

If a UE is provided *cellGroupsForSwitchList*, indicating one or more groups of serving cells, the following procedures apply to all serving cells within each group; otherwise, the following procedures apply only to a serving cell for which the UE is provided *searchSpaceGroupIdList*.

When a UE is provided *searchSpaceGroupIdList*, the UE resets PDCCH monitoring according to search space sets with group index 0, if provided by *searchSpaceGroupIdList*.

A UE can be provided by *searchSpaceSwitchDelay* a number of symbols $P\_{switch}$ where a minimum value of $P\_{switch}$ is provided in Table 10.4-1 for UE processing capability 1 and UE processing capability 2 and SCS configuration $μ$. UE processing capability 1 for SCS configuration $μ$ applies unless the UE indicates support for UE processing capability 2.

Table 10.4-1: Minimum value of $P\_{switch}$ [symbols]

|  |  |  |
| --- | --- | --- |
| $$μ$$ | Minimum $P\_{switch}$ value for UE processing capability 1 [symbols] | Minimum $P\_{switch}$ value for UE processing capability 2 [symbols] |
| 0 | 25 | 10 |
| 1 | 25 | 12 |
| 2 | 25 | 22 |
| 3 | 40 | - |
| 5 | 160 | - |
| 6 | 320 | - |

A UE can be provided, by *searchSpaceSwitchTimer*, a timer value for a serving cell that the UE is provided *searchSpaceGroupIdList* or, if provided, for a set of serving cells provided by *cellGroupsForSwitchList*. The UE decrements the timer value by one after each slot based on a reference SCS configuration that is the smallest SCS configuration $μ$ among all configured DL BWPs in the serving cell, or in the set of serving cells. The UE maintains the reference SCS configuration during the timer decrement procedure.

If a UE is provided by *SearchSpaceSwitchTrigger* a location of a search space set group switching flag field in a DCI format 2\_0, as described in clause 11.1.1, for a serving cell where the UE has active DL BWP with SCS configuration $μ$

- if the UE detects a DCI format 2\_0 and a value of the search space set group switching flag field in the DCI format 2\_0 is 0, the UE starts monitoring PDCCH according to search space sets with group index 0, and stops monitoring PDCCH according to search space sets with group index 1, for the serving cell

- at the beginning of the first slot that is at least $P\_{switch}$ symbols after the last symbol of the PDCCH with the DCI format 2\_0 when $μ\in \left\{0, 1, 2, 3\right\}$

- at the beginning of the first slot, of a group of $X\_{s}$ slots, that is at least $P\_{switch}$ symbols after the last symbol of the PDCCH with the DCI format 2\_0 when $μ\in \left\{5, 6\right\}$

- if the UE detects a DCI format 2\_0 and a value of the search space set group switching flag field in the DCI format 2\_0 is 1, the UE starts monitoring PDCCH according to search space sets with group index 1, and stops monitoring PDCCH according to search space sets with group index 0, for the serving cell

- at the beginning of the first slot that is at least $P\_{switch}$ symbols after the last symbol of the PDCCH with the DCI format 2\_0, when $μ\in \left\{0, 1, 2, 3\right\}$

- at the beginning of the first slot, of a group of $X\_{s}$ slots, that is at least $P\_{switch}$ symbols after the last symbol of the PDCCH with the DCI format 2\_0 when $μ\in \left\{5, 6\right\}$

and the UE sets the timer value to the value provided by *searchSpaceSwitchTimer*

- if the UE monitors PDCCH for a serving cell according to search space sets with group index 1, the UE starts monitoring PDCCH for the serving cell according to search space sets with group index 0, and stops monitoring PDCCH according to search space sets with group index 1, for the serving cell

- at the beginning of the first slot that is at least $P\_{switch}$ symbols after a slot where the timer expires or after a last symbol of a remaining channel occupancy duration for the serving cell if indicated by DCI format 2\_0 when $μ\in \left\{0, 1, 2, 3\right\}$

- at the beginning of the first slot, of a group of $X\_{s}$ slots, that is at least $P\_{switch}$ symbols after a slot where the timer expires or after a last symbol of a remaining channel occupancy duration for the serving cell if indicated by DCI format 2\_0 when $μ\in \left\{5, 6\right\}$

If a UE is provided *searchSpaceGroupIdList* and is not provided *SearchSpaceSwitchTrigger* for a serving cell,

- if the UE detects a DCI format by monitoring PDCCH according to a search space set with group index 0, the UE starts monitoring PDCCH according to search space sets with group index 1, and stops monitoring PDCCH according to search space sets with group index 0, for the serving cell

- at the beginning of the first slot that is at least $P\_{switch}$ symbols after the last symbol of the PDCCH with the DCI format when $μ\in \left\{0, 1, 2, 3\right\}$,

- at the beginning of the first slot, of a group of $X\_{s}$ slots, that is at least $P\_{switch}$ symbols after the last symbol of the PDCCH with the DCI format when $μ\in \left\{5, 6\right\}$

the UE sets the timer value to the value provided by *searchSpaceSwitchTimer* if the UE detects a DCI format by monitoring PDCCH in any search space set

- if the UE monitors PDCCH for a serving cell according to search space sets with group index 1, the UE starts monitoring PDCCH for the serving cell according to search space sets with group index 0, and stops monitoring PDCCH according to search space sets with group index 1, for the serving cell

- at the beginning of the first slot that is at least $P\_{switch}$ symbols after a slot where the timer expires or, if the UE is provided a search space set to monitor PDCCH for detecting a DCI format 2\_0, after a last symbol of a remaining channel occupancy duration for the serving cell if indicated by DCI format 2\_0 when $μ\in \left\{0, 1, 2, 3\right\}$

- at the beginning of the first slot, of a group of $X\_{s}$ slots, that is at least $P\_{switch}$ symbols after a slot where the timer expires or, if the UE is provided a search space set to monitor PDCCH for detecting a DCI format 2\_0, after a last symbol of a remaining channel occupancy duration for the serving cell if indicated by DCI format 2\_0 when $μ\in \left\{5, 6\right\}$

**<Unchanged part omitted>**

When the PDCCH monitoring adaptation field indicates to a UE to skip PDCCH monitoring for a duration on the active DL BWP of a serving cell, the UE starts skipping of PDCCH monitoring at the beginning of a first slot that is after the last symbol of the PDCCH reception providing the DCI format with the PDCCH monitoring adaptation field. If the UE transmits a PUCCH providing a positive SR after the UE detects a DCI format providing the PDCCH monitoring adaptation field indicating to the UE to skip PDCCH monitoring for the duration on the active DL BWP of the serving cell, the UE resumes PDCCH monitoring starting at the beginning of a first slot that is after a last symbol of the PUCCH transmission in all serving cells of the corresponding Cell Group. During the time of *ra-ResponseWindow* or *msgB-ResponseWindow* or the duration where *ra-ContentionResolutionTimer* is running, the UE shall not skip PDCCH monitoring on SpCell. If UE transmits a RACH due to positive SR, the UE shall not skip PDCCH monitoring on any serving cell of the corresponding Cell Group during the time of *ra-ResponseWindow* or *msgB-ResponseWindow* or the duration where *ra-ContentionResolutionTimer* is running. If the DRX group of the serving cell is configured and enters outside Active Time, the UE terminates PDCCH skipping for the serving cell.

**<Unchanged part omitted>**