**3GPP TSG RAN WG1 Meeting #108-e R1-22xxxxx**

**E-meeting, February 21st – March 3rd, 2022**

**Source: Moderator (Samsung)**

**Title:** **Summary of [108-e-NR-CRs-13]: Clarification on PDCCH monitoring for Case 1-2**

**Agenda Item:** **7.1**

**Document for:** **Discussion and Decision**

# **Introduction**

This document is the summary of email discussion regarding the proposal in [1].

[108-e-NR-CRs-13] Issue#15 Clarification on PDCCH monitoring for Case 1-2 – Fred (Qualcomm)

* Relevant tdoc: R1-2202113
* Check point on February 23

# **Background**

At the RAN1#91 meeting, following agreements have been made:

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| **Agreements:*** For information, the following cases are clarified:
	+ Case 1: PDCCH monitoring periodicity of 14 or more symbols
		- Case 1-1: PDCCH monitoring on up to three OFDM symbols at the beginning of a slot
		- Case 1-2: PDCCH monitoring on any span of up to 3 consecutive OFDM symbols of a slot
			* For a given UE, all search space configurations are within the same span of 3 consecutive OFDM symbols in the slot
	+ Case 2: PDCCH monitoring periodicity of less than 14 symbols
		- Note: this includes the PDCCH monitoring of up to three OFDM symbols at the beginning of a slot
 |

The Case 1-2 was intended to support DSS operations. In DSS, LTE-CRS is mapped on some symbols and these symbols are not available for NR-PDCCH monitoring. Therefore, Case 1-2 enables a UE to monitor PDCCH on a single span of three contiguous OFDM symbols that is not limited to the first three consecutive OFDM symbols in a slot. The corresponding UE capability, *pdcch-MonitoringSingleOccasion*, has been specified for SCS 15kHz in TS 38.306 as follows [1].

| ***pdcch-MonitoringSingleOccasion***Indicates whether the UE supports receiving PDCCH in a search space configured to be monitored within a single span of any three contiguous OFDM symbols in a slot with the capability of supporting at least 44 blind decodes in a slot for 15 kHz subcarrier spacing. | UE | No | No | FR1 only |
| --- | --- | --- | --- | --- |

# **Problem description**

[1] pointed out that *pdcch-MonitoringSingleOccasion* is beyond what is necessary.

* According to TS 38.213 Table 13-11, the first symbol index of a PDCCH monitoring occasion for Type-0 CSS set in FR1 is {0, 1, 2, or $N\_{symb}^{CORESET}$}, where $N\_{symb}^{CORESET}$ is the number of symbols for CORESET #0. Therefore, as long as the UE monitors Type-0 CSS set in this cell (i.e., PCell), there is no case where the UE is configured with PDCCH monitoring other than the first 6 OFDM symbols of a slot.
* In DSS scenarios, LTE-CRS is present on some OFDM symbols and these symbols are not available for NR-PDCCH.

Considering the above two aspects, desired feature for Case 1-2 in DSS scenario is, in reality, limited to the followings – up to the 4th OFDM symbol of a slot.

 

(a) LTE-CRS 2 ports (b) LTE-CRS 4 ports

Fig.1 Symbols available for NR-PDCCH monitoring on a DSS carrier

In order to meet the market demand for NR-PDCCH monitoring other than the first 3 OFDM symbols in a slot in DSS operation in Rel-16, [1] proposes to update the description of *pdcch-MonitoringSingleOccasion* in Rel-16 spec as follows. With the change, a UE can declare support of the feature if the UE implements, and is tested with, PDCCH monitoring occasion within the first four OFDM symbols in a slot.

| ***pdcch-MonitoringSingleOccasion***Indicates whether the UE supports receiving PDCCH in a search space configured to be monitored within a single span of any three contiguous OFDM symbols that are within the first four OFDM symbols in a slot with the capability of supporting at least 44 blind decodes in a slot for 15 kHz subcarrier spacing. | UE | No | No | FR1 only |
| --- | --- | --- | --- | --- |

# **Comments received during preparation phase**

During the preparation phase, following comments have been received for the proposal in [1]:

* The proposed change is NBC (ZTE)
* Spec is not broken and the change is not essential (Nokia, Intel)
* Case 1-2 is not limited to DSS use-case (Intel)
* Scheduling flexibility is restricted (Samsung)
* Case 1-2 can be configured on SCell, in which case Type-0 CSS set is not relevant (Huawei)

# **1st round discussion**

Q1: Do you agree that there is a need to support PDCCH monitoring with a single span of three contiguous OFDM symbols that is within the first four OFDM symbols in a slot for DSS on PCell in Rel-16?

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| Company | Yes/No | Comment |
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Q2: Do you agree that the current description of *pdcch-MonitoringSingleOccasion* “single span of any three consecutive OFDM symbols in a slot” requires UE to support, and be tested with, various PDCCH monitoring occasions that are not within the first four OFDM symbols in a slot?

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| Company | Yes/No | Comment |
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Q3: Do you agree that a capability signalling that can indicate support of PDCCH monitoring within a single span of any three contiguous OFDM symbols that is within the first four OFDM symbols in a slot for DSS on PCell is necessary in Rel-16?

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| Company | Yes/No | Comment |
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Q4: Do you see the need of PDCCH monitoring with single span of any three consecutive OFDM symbols in a slot on SCell? If so, please explain the use-case and benefit.

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| Company | Yes/No | Comment |
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Q5: Do you see the need of PDCCH monitoring with single span of any three consecutive OFDM symbols in a slot for non-DSS scenarios on PCell? If so, please explain the use-case and benefit.

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| Company | Yes/No | Comment |
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Q6: Do you agree that the description of *pdcch-MonitoringSingleOccasion* in Rel-16 spec should be updated to “Indicates whether the UE supports receiving PDCCH in a search space configured to be monitored within a single span of any three contiguous OFDM symbols that are within the first four OFDM symbols in a slot with the capability of supporting at least 44 blind decodes in a slot for 15 kHz subcarrier spacing.”?

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| Company | Yes/No | Comment |
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Q7: Do you have a real NBC issue if the description of *pdcch-MonitoringSingleOccasion* is changed as in Q6? If so, please explain examples where the change causes NBC issue.

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| Company | Yes/No | Comment |
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Q8: If you see a real NBC issue, do you accept to introduce a new UE capability indicating support of PDCCH monitoring within a single span of any three contiguous OFDM symbols that are within the first four OFDM symbols in a slot in Rel-16?

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| Company | Yes/No | Comment |
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# **2nd round discussion**

# **Summary and conclusion**

# **Reference**

1. R1-2202113, Clarification on PDCCH monitoring for Case 1-2, Qualcomm Incorporated