**3GPP TSG RAN WG1 #101 R1-2004684**

**e-Meeting, May 25th – June 5th, 2020**

Agenda Item: 6.2.1.1

Source: Moderator (Qualcomm Incorporated)

Title: Feature Lead Summary of Maintenance for group MWUS

Document for: Discussion and Decision

# 1 Introduction

In the agenda item, 3 contributions have been submitted, listed in the reference section. They discussed two issues, which are summarized in Sect. 2 and the proposal for further email discussion is in Sect. 3.

# 2 Discussion

## 2.1 Alignment of non-group WUS between specifications

The corresponding RRC signaling in the running CR of TS 36.331 [1] is as follows:

|  |  |  |  |
| --- | --- | --- | --- |
| *GWUS-Config* information element  …  GWUS-Config-r16 ::= SEQUENCE {  …  commonSequence-r16 ENUMERATED {g0, g126} OPTIONAL, -- Need OR  *…*   | *GWUS-Config* field descriptions | | --- | | ***commonSequence***  Presence of the field indicates common WUS sequence is configured. Value *g0* indicates common WUS sequence for the shared WUS resource corresponds to *g = 0*, and value *g126* indicates common WUS sequence for the shared WUS resource corresponds to *g = 126*, see TS 36.211 [21]. | | ***…*** |   *…* |

The related description in Sect. 6.11B.1 of TS 36.211 is as follows:

“The common MWUS sequence shall be determined by unless the resource is shared with non-group MWUS and common MWUS is configured to be non-group MWUS in which case .”

There are two alternatives, proposed to align non-group WUS between RAN1 and RAN2 specifications:

Alt1 [2]: Maintain current spec in Sect. 6.11B.1 of TS 36.211.

Alt2 [3]: Endorser TP2.1 for Sect. 6.11B.1 of TS 36.211.

|  |
| --- |
| <TP2.1 for Sect. 6.11B.1 of TS 36.211>  In resource that is not shared with non-group MWUS, the common MWUS sequence shall be determined by . In resource that is shared with non-group MWUS, the common MWUS sequence is determined by higher layer [9]. |

## 2.2 Alignment of WUS resource locations between RAN1 agreement and RAN2 specification

In RAN1#99, the defined WUS resource locations has been agreed as

**Agreement**

For WUS resources with up to 2-FDM and up to 2-TDM, define the WUS resource ID mapping order as WUS resource ID 0, 1 in same time location and 0, 2 in same freq location

|  |  |  |  |
| --- | --- | --- | --- |
| freqLocation of WUS resource 0 | n0 | n2 | n4 |
| WUS resource locations | |  |  |  |  | | --- | --- | --- | --- | | *f* | 2 | 0 |  | |  | 3 | 1 |  | |  |  |  | *t* | | Alt1:   |  |  |  |  | | --- | --- | --- | --- | | *f* | 3 | 1 |  | |  | 2 | 0 |  | |  |  |  | *t* |   Alt2:   |  |  |  |  | | --- | --- | --- | --- | | *f* |  |  |  | |  | 2 | 0 |  | |  | 3 | 1 | *t* |   Alt1 if NB is below  center carrier; otherwise Alt2. | |  |  |  |  | | --- | --- | --- | --- | | *f* |  |  |  | |  | 3 | 1 |  | |  | 2 | 0 | *t* | |

RAN1’s intention that WUS resources are allocated on PRBs towards the center of the carrier and not towards the edge of the carrier since that would increase strain on spectrum mask requirements. However, in the Table 7.5.x-1 of the most recent CR [6] of TS 36.304 (shown below with the affected elements highlighted) does not reflect the intended functionality.

**Table 7.5.x-1: WUS Resource frequency location**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***WUS Resource***  ***()*** | ***Frequency location of WUS Resource ID 0*** | | | |
| ***n0*** | ***n2*** | | ***n4 (Note 1)*** |
| ***NB below centre frequency*** | ***NB above centre frequency*** |
| WUS Resource 1 | n2 | n0 | n4 | n2 |
| WUS Resource 2 | n0 | n2 | n2 | n4 |
| WUS Resource 2  (Note 2) | n4 | n4 | n0 | n0 |
| WUS Resource 3 | n2 | n0 | n4 | n2 |
| Note 1: This column is applicable if wus-Config is present.  Note 2: This row is applicable for the resource pattern ID 7  Editor Note : It is FFS whether further updates needed for WUS Resource ID 0 =n2. | | | | |

In order to capture the intended functionality in the specification, the content of the two columns can simply be interchanged such that below-center narrowbands use WUS frequency locations n2 and n4 whereas above-center narrowbands use WUS frequency locations n0 and n2 [4], with the following proposal as:

* **Proposal [4]:** Send LS to RAN2, clarifying the intention behind the agreement for frequency allocation below and above center frequency and asking RAN2 to implement the intended functionality as suggested in TP2.2.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| <TP2.2 for Table 7.5.x-1 of TS 36.304>  Table 7.5.x-1: WUS Resource frequency location   |  |  |  |  |  | | --- | --- | --- | --- | --- | | ***WUS Resource***  ***()*** | ***Frequency location of WUS Resource ID 0*** | | | | | ***n0*** | ***n2*** | | ***n4 (Note 1)*** | | ***NB below centre frequency*** | ***NB above centre frequency*** | | WUS Resource 1 | n2 | n4 | n0 | n2 | | WUS Resource 2 | n0 | n2 | n2 | n4 | | WUS Resource 2  (Note 2) | n4 | n0 | n4 | n0 | | WUS Resource 3 | n2 | n4 | n0 | n2 | | Note 1: This column is applicable if wus-Config is present.  Note 2: This row is applicable for the resource pattern ID 7  Editor Note : It is FFS whether further updates needed for WUS Resource ID 0 =n2. | | | | | |

# 3 Proposed scope for email discussion

It is proposed to have two email discussions as follows:

**Proposal: The scope of email discussion for RAN1#101 is as follows:**

* **Email discussion #1: Alignment of non-group WUS between RAN1 and RAN2 specification.**
  + **Alt1: Maintain current spec in Sect. 6.11B.1 of TS 36.211.**
  + **Alt2: Endorse TP 2.1 for Sect. 6.11B.1 of TS 36.211.**
* **Email discussion #2: Alignment of WUS resource locations between RAN1 agreement and RAN2 specification.** 
  + **Discuss whether to send LS to RAN2, clarifying the intention behind the agreement for frequency allocation below and above center frequency and asking RAN2 to implement the intended functionality as suggested in TP2.2.**

# References

R1-2002512

1. [R2-2003923](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109bis-e/Docs/R2-2003923.zip), “Miscellaneous Rel-16 eMTC corrections”, Qualcomm Incorporated, RAN2#109bis-e, April 2020
2. R1-2004672 (replacing [R1-2003790](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_101-e/Docs/R1-2003790.zip)), “Clarification of group WUS for MTC,” ZTE, RAN1 #101-e, May 2020
3. [R1-2004167](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_101-e/Docs/R1-2004167.zip), “Corrections on UE-group wake-up signal,” Huawei, HiSilicon, RAN1 #101-e, May 2020
4. [R1-2004654](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_101-e/Docs/R1-2004654.zip), “Corrections for UE-group wake-up signal for LTE-MTC,” Ericsson, RAN1 #101-e, May 2020

1. [R2-2003920](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109bis-e/Docs/R2-2003920.zip), “Corrections to WUS group for eMTC,” Nokia, RAN2 #109bis, April 2020.