**3GPP TSG RAN WG1 Meeting #106bis-e R1-210xxxx**

**e-Meeting, October 11th-19th, 2021**

**Agenda Item: 5.1**

**Source: Moderator (Huawei)**

**Title: [Draft] Summary#1 of email discussion [106bis-e-NR-SCell-Dropping] on reply LS to R1-2108701**

**Document for: Discussion and Decision**

# Introduction

A RAN4 LS [1] asks RAN1 three questions on UL power control of SCells in NR-CA, as copied below.

|  |
| --- |
| ***Reference:******[1] R4-2103410, “LS on Scell dropping”, RAN4 #98-e******1. Overall Description:****RAN #92-e tasked RAN4 to further discuss on Scell dropping issue. Discussion on Scell dropping of CA is triggered by a measurement problem found in MoP(maximum output power) of FR2 intra-band UL CA and later commented the same unexpected SCell dropping issue is found problematic also in field operation (R4-2112826). Meanwhile, it is also confirmed by RAN4 that the problem also exists for FR1 CA. The background and suggestion on CA measurements are captured in [1] and sent to RAN5.* *In TS 38.213, the transmission priority rule for CA is specified based on physical channel, and also with: “In case of same priority order and for operation with carrier aggregation, the UE prioritizes power allocation for transmissions on the primary cell of the MCG or the SCG over transmissions on a secondary cell”. Thus, the UE is always required to drop the power on cell with lower priority when the configured power on cell with high priority occupies all power ability of the UE.* *In order to advance the above discussions, RAN4 would like to ask RAN1 following questions:****Question 1:*** *Whether UE drop Scell power according to the priority rule defined in 38.213 is considered as an issue from RAN1 perspective.****Question 2:*** *Whether UE drop Scell power according to the priority rule defined in 38.213 has been addressed from 16 or 17? If not, what expected solution(s) are?****Question 3:*** *If the problem above is solved in RAN4 specifications with solution by higher layer configuration, e.g. introduce additional UE-specific configuration of power limits on Pcmax,f,c for each CC to prevent SCell dropping (see e.g. R4-2112826 or R4-2114551 for details), is there any expected RAN1 spec impact or possible conflict with UE behaviour defined in RAN1 specifications?* |

As per chairman’s guidance, a reply LS is discussed and is expected to complete by October 18.

[106bis-e-NR-SCell-Dropping] Discuss incoming LS on SCell dropping issue of CA for a possible reply LS by October 18 – Frank (Huawei)

# Discussions

## Q1: Whether UE drop Scell power according to the priority rule defined in 38.213 is considered as an issue from RAN1 perspective.

Based on the contribution papers [2-7], companies have different views with respect to the question. To be specific, some companies concern about RAN1 specification impact and expect that the priority rule defined in 38.213 since Rel-15 should be unchanged. Therefore, to address such concern, whether the priority rule should be kept or not could be discussed.

### Question 1-1: Whether UE drop Scell power according to the priority rule defined in 38.213 is considered as an issue from RAN1 perspective. Whether the priority rule defined in TS 38.213 should be kept unchanged or not.

Companies’ views are very welcome.

|  |  |
| --- | --- |
| *Company* | *View* |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

## Q2: Whether UE drop Scell power according to the priority rule defined in 38.213 has been addressed from 16 or 17? If not, what expected solution(s) are?

Please note that there are **some proposed solutions in [6], R4-2112826 and R4-2114551.**

E.g. in [6]

|  |
| --- |
| **Proposal 2:*** Introduce a higher-layer parameter for relative power offset to reflect the priority difference for concurrent UL transmissions in case of power-limited.
* For UL-CA power-limited handling, the UE allocates transmission powers to the concurrent transmissions taking into account the total available power and the relative power offset.

**Proposal 3:*** Adopt either of the following UL-CA power-limited handling:
	+ Option 1:
		- Find K that satisfies $K×\left\{P\_{req\\_U1}+P\_{tmp\\_U2}\right\}\leq P\_{CMAX}$
			* where $P\_{tmp\\_U2}=min\left\{P\_{req\\_U2}, δ×P\_{req\\_U1}\right\}$, and
			* $P\_{req\\_U1}$ and $P\_{req\\_U2}$ are the requested transmission powers for U1 and U2 before power-limited handling, respectively
		- Transmit power for U1 is given by $P\_{U1}=min\left\{P\_{req\\_U1}, K×P\_{req\\_U1}\right\}$
		- Transmit power for U2 is given by $P\_{U2}=min\left\{P\_{req\\_U2}, P\_{CMAX}-P\_{U1}\right\}$
	+ Option 2:
		- Find K that satisfies $K×\left\{P\_{req\\_U1}+P\_{tmp\\_U2}\right\}\leq P\_{CMAX}$
			* where $P\_{tmp\\_U2}=min\left\{P\_{req\\_U2}, δ×P\_{max⁡\\_U2}\right\}$, and
			* $P\_{req\\_U1}$ and $P\_{req\\_U2}$ are the requested transmission powers for U1 and U2 before power-limited handling, respectively, and $P\_{max⁡\\_U2}$ is the maximum available power for U2 when there is no concurrent transmission(s) (e.g., PCMAX,f,c)
		- Transmit power for U1 is given by $P\_{U1}=min\left\{P\_{req\\_U1}, K×P\_{req\\_U1}\right\}$
		- Transmit power for U2 is given by $P\_{U2}=min\left\{P\_{req\\_U2}, P\_{CMAX}-P\_{U1}\right\}$
 |

Companies’ views are very welcome.

|  |  |
| --- | --- |
| *Company* | *View* |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

## Q3: If the problem above is solved in RAN4 specifications with solution by higher layer configuration, e.g. introduce additional UE-specific configuration of power limits on Pcmax,f,c for each CC to prevent SCell dropping (see e.g. R4-2112826 or R4-2114551 for details), is there any expected RAN1 spec impact or possible conflict with UE behaviour defined in RAN1 specifications?

Companies’ views are very welcome.

|  |  |
| --- | --- |
| *Company* | *View* |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

## Draft text for reply LS

TBD

## Other Issues

Issues or comments that do not fit in any of the previous sections of this document can be provided in this section.

|  |  |
| --- | --- |
| *Company* | *View* |
|  |  |
|  |  |
|  |  |
|  |  |

# Conclusions

TBD

# References

1. R1-2108701 LS on scell dropping issue of CA, RAN4, Huawei
2. R1-2108947 Draft reply LS on Scell dropping issue of CA vivo
3. R1-2109048 Discussion on "LS on scell dropping issue of CA" OPPO
4. R1-2109139 [Draft] Reply LS on Scell dropping issue of CA ZTE
5. R1-2110135 Draft Reply to RAN4 LS on SCell dropping issue of CA Ericsson
6. R1-2110162 Discussion on LS on SCell dropping issue of CA Qualcomm Incorporated
7. R1-2108776 Reply LS on Scell dropping issue of CA Huawei, HiSilicon

# Appendix: