**3GPP TSG RAN WG1 #105-e R1-210xxxx**

**e-Meeting, May 10th – 27th, 2021**

**Source: Moderator (ZTE)**

**Title: Summary of Email Discussion [105-e-LTE-6.1CRs-01]**

**Agenda item: 6.1**

**Document for:** **Discussion/Decision**

# Introduction

Per Chairman’s guidance, the following email discussion is allocated to discuss LTE Rel-14 CR R1-2104575. This summary is generated to collect companies’ views.

 [105-e-LTE-6.1CRs-01] Email discussion/approval on R1-2104575 by May 24 - Xingguang (ZTE)

# Discussion

**SCS = 15 KHz**

In LTE spec, for the SCS=15 KHz, the following equations are applied.

|  |
| --- |
| where |

The $m^{'}$can be derived by



, where $N\_{SC}^{RB}=12$ represents the number of sub-carriers per RB for SCS=15 KHz. The “2” in $\frac{N\_{SC}^{RB}}{2}$ is derived by k=2m or k=2m+1 as shown above.

**SCS = 1.25 KHz**

The **existing** spec is as below.

|  |
| --- |
| where  |

While for the SCS = 1.25 KHz case, the $m^{'}$can be derived by



, where  represents the number of sub-carriers per RB for SCS=1.25 KHz. The “6” in $\frac{N\_{SC}^{RB}}{6}$ is derived by k=6m or k=6m+3 as shown above.

**Thus, our CR tries to correct the equation for** $m^{'}$ **for SCS= 1.25 KHz case. In summary we change  to  for SCS=1.25 KHz case.**

The **updated** spec in R1-2104575 is as below.

|  |
| --- |
| 6.10.2.2.2 Mapping to resource elements for 1.25 kHzThe reference-signal sequence  in OFDM symbol  shall be mapped to complex-valued modulation symbols  with  according to where  |

## Question#1

Question#1: Do you think the CR in R1-2104575 is needed or not? Any views on how to correct the equation for $m^{'}$ for SCS = 1.25 KHz case?

|  |  |
| --- | --- |
| **Company** | **View** |
| Qualcomm | Although we agree the number (following the same approach as legacy) should be 12 and not 3, we think the current equation works and prefer to not correct the spec.Note that what the equation does is it creates a 110RB long sequence, and then (for legacy) it picks the center N\_RB for the sequence. The equation as it is today would just introduce an offset on how this sequence is picked, but the spec still works. |
| ZTE | Thanks Qualcomm for the comments. For all the SCS=15KHz, 7.5KHz, 2.5KHz and 0.37KHz, the same approach is used for reference-signal sequence mapping, i.e., picking the center N\_RB. However, per the existing spec, it defines a different way to pick the N\_RB for reference-signal sequence mapping only for SCS=1.25KHz. Based on our understanding, the previous intention is to pick the center N\_RB. However, it somehow ends up with copy-paste mistake here. Besides, if we apply the existing equation in the spec, it requires different “offset” for different bandwidths, which unnecessary complicates the network and UE implementation/computations.Furthermore, if we apply the existing equation in the spec, it picks different ranges of sequences for different bandwidths. However, with our CR, the sequence picked for smaller bandwidth (e.g., 1.4M) is a subset of the sequence picked for larger bandwidth (e.g., 5M), which may potential reduce the memory for UE and network.Overall, although we understand Qualcomm’s comments that the spec still works, we believe it is worth it to correct this unintentional mistake in the spec to align reference-signal sequence mapping for SCS=1.25KHz with all other SCSs with potential gain of reducing the UE and network implementation complicity and reducing memory. It is better to correct this equation as early as possible to avoid potential NBC issue. |
|  |  |

# Conclusion

# Reference

1. R1-2104575, Correction for MBSFN reference signal mapping to resource elements for 1.25 kHz, ZTE, RAN1#105-e meeting.