

Agenda Item : 6.7.2.2.2 (NR_IIOT-Core)**Source : LG Electronics Inc., LG Uplus****Title : Confirmation MAC CE for multiple CG configurations****Document for: Discussion and Decision**

1. Introduction

In RAN1#98 and RAN1#97 meetings, it was agreed to support joint release for multiple SPS/CG configurations as follows:

Agreements in RAN1#97:

- Support joint release in a DCI for two or more configured grant Type 2 configurations for a given BWP of a serving cell if the bit-length for indication which configurations released is no more than 4 bits and DCI size is not impacted by adopting joint release.
 - FFS details.

Agreements in RAN1#98:

- $M \leq 4$ bits indication in the Release DCI is used for indicating which CG configuration(s) is/are released, where the association between each state indicated by the indication and the CG configuration(s) is
 - Up to 2^M states are higher layer configurable, where each of the state can be mapped to a single or multiple CG configurations to be released
 - In case of no higher layer configured state(s), separate release is used where the release corresponds to the CG configuration index indicated by the indication

Working assumption in RAN1#98:

- Support joint release in a DCI for two or more SPS configurations for a given BWP of a serving cell
 - Reusing the joint release mechanism as that defined for UL type 2 CG

Based on the above agreements, this contribution discusses the enhancement of confirmation MAC CE for efficient utilization of multiple CG configurations.

2. Discussion

In RAN1#97 and RAN1#98 meetings, it was agreed to support joint release in a DCI for multiple SPS/CG configurations. Based on the RAN1 progress, RAN2 should discuss the enhancement of the confirmation MAC CE for multiple CG configurations.

The previously agreed working assumption of RAN2 is that multiple CG configurations could be used for one TSN flow. In this case, the network is likely to send the activation or deactivation command(s) for multiple configurations at the same time, whether through a single DCI or multiple DCIs. In legacy NR, the CG confirmation MAC CE has a fixed size of zero bit, since there could be only one active CG configuration at a time on each serving cell. However, if the UE receives multiple activation/deactivation commands at once, the UE has to generate and transmit multiple confirmation MAC CEs as many as the number of the received commands. Considering that each MAC CE has a subheader including an 8 bit LCID field, even if it is a zero bit MAC CE, this is a huge waste of resources. If the CG

confirmation MAC CE can contain the status of multiple CG configurations, e.g. in the form of bitmap, it could not only save lots of resources and but also reduce the UE processing for CG confirmation.

Observation 1. Considering that each MAC CE has a subheader including an 8 bit LCID field, even if it is a zero bit MAC CE, this is a huge waste of resources. If the CG confirmation MAC CE can contain the status of multiple CG configurations, it could not only save lots of resources and but also reduce the UE processing for CG confirmation.

Another thing we should consider in the scenario of multiple active CG configurations is that there should be no misalignment between the UE and the network for the activation/deactivation status of each CG configuration. Given that the main motivation for introducing the multiple active CG configurations is a reliable service of delay critical traffic, e.g. URLLC or TSN traffic, activation/deactivation status of each CG configuration should be exactly aligned between the UE and the network. If the status of each CG configuration is not aligned between the UE and the network, the QoS requirement of the delay critical traffic may not be guaranteed. This problem may occur when the UE misses the command from the network.

Observation 2. It would be beneficial to report the activation/deactivation status of multiple CG configurations in a CG confirmation MAC CE to reliably support the TSN traffic.

In this regard, it would be beneficial to report the activation/deactivation status of multiple CG configurations in a CG confirmation MAC CE to reliably support the TSN traffic. Figure 1 shows an example of a new CG confirmation MAC CE format to support joint confirmation of multiple CG configurations (in this example, it is assumed that the maximum number of CG configurations per UE is n).

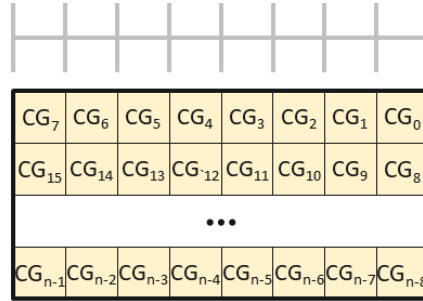


Figure 1. New CG confirmation MAC CE format

Proposal 1. A CG confirmation MAC CE including the activation/deactivation status of multiple CG configurations should be introduced.

Some companies proposed to introduce a group-based signalling or a configuration with a group index for multiple activated SPS or CG configurations in order to reduce the signalling overhead to configure or handle the multiple SPS/CG configurations [1]-[3]. However, considering the semi-static service property of the TSC traffic, the SPS/CG configurations to serve the TSC traffic is also semi-static and the signalling overhead to configure the SPS/CG configurations is not significant. Moreover, the confirmation MAC CE for the multiple CG configurations can be designed without introducing a group index by using a bitmap which indicates the activation/deactivation status of multiple CG configurations.

Proposal 2. RAN2 does not support a group-based signalling or a configuration with a group index to configure or handle the multiple SPS/CG configurations.

3. Conclusion

In this contribution, we discussed the enhancement of confirmation MAC CE for efficient utilization of multiple CG configurations.

Observation 1. Considering that each MAC CE has a subheader including an 8 bit LCID field, even if it is a zero bit MAC CE, this is a huge waste of resources. If the CG confirmation MAC CE can contain the status of multiple CG configurations, it could not only save lots of resources and but also reduce the UE processing for CG confirmation.

Observation 2. It would be beneficial to report the activation/deactivation status of multiple CG configurations in a CG confirmation MAC CE to reliably support the TSN traffic.

Proposal 1. A CG confirmation MAC CE including the activation/deactivation status of multiple CG configurations should be introduced.

Proposal 2. RAN2 does not support a group-based signalling or a configuration with a group index to configure or handle the multiple SPS/CG configurations.

4. References

- [1] R2-1909648 Support for multiple CG and SPS configurations NTT DOCOMO, INC. discussionRel-16 NR_IIoT-Core
- [2] R2-1908823 Further Discussion on Multiple Active SPS/CGs CATT discussionRel-16NR_IIoT-Core
- [3] R2-1909459 Analysis on the RAN1 Reply LS on multiple SPS-CG for IIoT CMCC discussionRel-16 NR_IIoT-Core