**New Radio-5G Physical Uplink Shared Channel**

In this document we will explore the basics of NR-5G PUSCH. In NR-5G, PUSCH is very similar to what we have in LTE. A UL grant decoded on PDCCH, is required by the UE to be able to transmit PUSCH. This document does not explain aperiodic CSI grants and PUSCH repetitions. We will discuss these topics in detail in another document. This document assumes that the reader has basic knowledge on NR5G slot formats and frame pattern.

In NR-5G, there are 2 DCI formats available for the UE to decode on PDCCH to transmit PUSCH:

1. DCI format 0\_0
2. DCI format 0\_1

In usual practice, DCI 0\_1 is used for UE specific user data and 0\_0 is used for common search space signaling or grants.

**Time Domain Scheduling**

The delay between DCI 0\_0/ 0\_1 received by the UE on PDCCH in Downlink and PUSCH transmission is based on a “Time Domain Resource Allocation” bitfield in the DCI. This maps to an index of PUSCH-TimeDomain-Allocation table configured by higher layers or there are conditions to select default allocation tables. The row index will have parameters related to PUSCH such as K2 (delay between DCI and PUSCH), SLIV (PUSCH start and length indicator value) and PUSCH mapping type.

Below procedure is followed to determine the selection of time domain allocation table as per 3GPP 38.214:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| RNTI | PDCCH search space | *pusch-ConfigCommon* includes *pusch-AllocationList* | *pusch-Config* includes *pusch-AllocationList* | PUSCH time domain resource allocation to apply |
| PUSCH scheduled by MAC RAR | | No | - | Default A |
| Yes |  | *pusch-AllocationList* provided in *pusch-ConfigCommon* |
| C-RNTI, TC-RNTI | Any common search space associated with CORESET 0 | No | - | Default A |
| Yes |  | *pusch-AllocationList* provided in *pusch-ConfigCommon* |
| C-RNTI, CS-RNTI | Any common search space not associated with CORESET 0,  UE specific search space | No | No | Default A |
| Yes | No | *pusch-AllocationList* provided in *pusch-ConfigCommon* |
| No/Yes | Yes | *pusch-AllocationList* provided in *pusch-Config* |