**3GPP TSG-RAN WG4 Meeting # 104b-e R4-22xxxxx**

**Electronic Meeting, 10th-19th, Oct., 2022**

**Title:** WF on FeMIMO RRM impact for unified TCI state

**Agenda item:** 4.5.1

**Source:** Intel

**Document for:** Approval

# Way Forward on Unified TCI state

### Sub-topic 1-1 Active UL TCI state

**Issue1-1-1a If source RS in UL TCI state is in the DL active TCI list:**

* Agreements:
  + No time/frequency tracking is needed.

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| **Company** | **Comments** |
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**Issue1-1-1b If source RS in UL TCI state is not in the DL active TCI list:**

* Proposals:
  + Proposal 1: No time/frequency tracking is needed
  + Proposal 2: Time/frequency tracking is needed
  + Proposal 3: No requirement for the case. Adding applicability rules for current UL TCI switching when source RS in active UL TCI state is a subset of source RS in DL active TCI list
  + Proposal 4: other option

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| **Company** | **Comments** |
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### Sub-topic 1-2 MAC CE based TCI state Switching delay requirements

**Issue 1-2-1 Joint TCI switching delay requirement for DL TCI state switch**

* Proposals:
  + Proposal 1(Intel, MTK, vivo, Ericsson, Apple, Samsung,vivo, Qualcomm):
    - Remove the square bracket:

- In case of joint TCI state switch, UE is not expected to receive on DL before UE completes the DL and UL TCI state switch.

* + Proposal 2(Nokia):
    - For joint TCI state switch, if the UL TCI state switch delay exceeds the DL TCI state switch delay, the UE is required to receive in DL up to THARQ before it completes UL TCI state switch.
  + Proposal 3(ZTE):
    - No matter whether UL TCI state switching completed or not, UE can receive DL by the target DL TCI state given that DL TCI state switching has been finished. So we suggest the bullet in square brackets can be ignored.

*Moderator note: As majority company support Proposal 1, suggest proponent of other proposals to check whether proposal 1 is agreeable.*

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**Issue 1-2-2 MAC-CE based UL TCI state switching delay when SSB is indicated as PL-RS in UL TCI state for FR2**

* Proposals
  + Proposal 1(Apple, Samsung, Huawei):
    - When PL-RS in UL TCI state switch is SSB in FR2, longer delay is expected.
  + Proposal 2(Huawei, Apple, Samsung):
    - If no consensus can be achieved in RAN4, we suggest that there is no requirements when SSB is indicated as PL-RS in UL TCI state in FR2.
  + Proposal 3(Intel):
    - When SSB is indicated as PL-RS in UL TCI state for FR2, the total delay is:

- n+THARQ + 3ms + NM*\** (Tfirst\_target-PL-RS + 7\*Ttarget\_PL-RS + 2ms)

* + Proposal 4(MTK, vivo, Ericsson, ZTE, Qualcomm):
    - Reuse the existing delay requirement of MAC CE based UL TCI state switch.
  + Proposal 5(Nokia):
    - known conditions:
    - The UE shall be able to transmit uplink signal with the target TCI state in the slot n+THARQ + + NM*\** (1\*Ttarget\_PL-RS + Tprocessingms) / *NR slot length*.

where:

- NM = 1, if the target PL-RS is not maintained by the UE, 0 otherwise.

- PL-RS is considered maintained if the DL RS associated with the UL TCI state is in the active TCI state list.

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### Sub-topic 1-3 Common TCI state switching in CA case

**Issue 1-3-1 Common TCI state switching delay requirement**

* Agreements:
  + No further spec change is needed

### Sub-topic 1-4 TCI state list update delay

**Issue 1-4-1 Whether to consider unknown TCI state in the TCI state list**

* Proposals
  + Proposal 1(Samsung, Apple, MTK, Huawei):
    - Longer delay applies if any TCI state is unknown in TCI state list update. Active TCI state list can contain known and unknown TCI states.
  + Proposal 2(Ericsson, Nokia, ZTE,vivo):
    - Define the detailed delay requirement

*Moderate note: The wording of proposal 1 is from the GTW agreement with removed bracket in RAN4 #104 meeting.*

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