**3GPP TSG-RAN WG4 Meeting #111 R4-2410590**

**Fukuoka, Japan, May 20 – May 24, 2024**

**Title:** WF on requirements for 6Rx

**Agenda Item:** 10.1.2

**Source:** AT&T

**Document for:** Approval

# Topic 1: REFSENS (delta RIB,6R)

## Sub-topic 1-1: General considerations for specifying ΔRIB,6R value

**Issue 1-1-1: Whether band n104 should be included in the high band (n77, n78 and n79) category for 6Rx case**

**Agreement**: For ΔRIB,6R, include n77, n78, n79 and [n104] into the same group.

**Issue 1-1-2: Whether to use same ΔRIB,6R value for handheld UE and FWA**

**Way Forward**: Further discuss the following options.

- Option 1: RAN4 needs to determine whether to define different ΔRIB,6R value for handheld UE and FWA separately

- Option 2: Same value for handheld UE and FWA

- Option 3: Different value for handheld UE and FWA

**Issue 1-1-3: Release independence of ΔRIB,6R value**

**Way Forward**: Follow RAN4 Chair guidance and defer the release independence discussions until the requirements are stable.

## Sub-topic 1-2: ΔRIB,6R values for handheld UE and FWA

**Issue 1-2-1: Proposed ΔRIB,6R values for handheld UE and FWA**

**Way Forward**: Further discuss the following options for the ΔRIB,6R values. Ultimately, the decision to specify separate or same requirements for handheld UE and FWA will be dependent on outcome of Issue 1-1-2.

- Option 1: Consider range of ΔRIB,6R in brackets for each case below for further discussion.

|  |  |  |
| --- | --- | --- |
| Operating bands | ΔRIB,6R for FWA | ΔRIB,6R for Handheld |
| n77, n78, n79, [n104] | [-3.0 ~ -4.0] dB | [-3.0 ~ -4.0] dB |
| n41 | [-3.0 ~ -4.0] dB | [-3.0 ~ -4.0] dB |

- Option 2: Consider average value of ΔRIB,6R from company proposals for further discussion.

- Option 3: ΔRIB,6R can be defined considering following range.

- ΔRIB,6R = -4.77 (ideal ΔRIB,6R) + Relaxation6Rx

- [0.3 ~0.8] dB < Relaxation6Rx < [1.5~2] dB.

- Option 4: Other options are not precluded.

# Topic 2: SRS antenna switching and ΔTRxSRS

## Sub-topic 2-1: General considerations for SRS antenna switching and ΔTRxSRS

**Issue 2-1-1: SRS antenna switching configurations**

**Way forward**: RAN4 to focus on discussing ∆TRxSRS for 1tr6 and t2r6 until RAN1 concludes work on 3t6r and 4t6r. Pending RAN1 feedback, RAN4 can consider any necessary updates to the work scope in a Revised WID for the SRS antenna configurations subject to RAN Plenary approval.

**Issue 2-1-2: Whether to use different ∆TRxSRS based on operating frequency**

**Way forward**: RAN4 defines different ∆TRxSRS values based on operating frequency. Further discuss whether to introduce an additional breakpoint for bands whose FUL\_high is higher than the FUL\_low of n104.

## Sub-topic 2-2: ΔTRxSRS values

**Issue 2-2-1: Proposed ∆TRxSRS values**

**Way forward**: Further discuss the following options for the ∆TRxSRS requirements.

- Option 1: Consider average value of ∆TRxSRS for further discussion.

|  |  |  |  |
| --- | --- | --- | --- |
| Operating bands | ΔTRxSRS requirement for t1r6 | ΔTRxSRS requirement for t2r6 | ΔTRxSRS requirement for t1r6-t2r6 |
| Band n41, n77, n78 | 4.0 dB | 3.4 dB | 4.4 dB |
| Band n79, [n104] | 5.3 dB | 4.5 dB  | 5.7 dB |

- Option 2: Consider range of ∆TRxSRS in brackets for each case below for further discussion. (With inputs from OPPO)

|  |  |  |  |
| --- | --- | --- | --- |
| Operating bands | ΔTRxSRS requirement for t1r6 | ΔTRxSRS requirement for t2r6 | ΔTRxSRS requirement for t1r6-t2r6 |
| Band n41, n77, n78 | [2.8 ~ 6.0] dB | [2.3 ~ 4.0] dB | [3.3 ~ 5.5] dB |
| Band n79, [n104] | [3.6 ~ 7.5] dB | [3.0 ~ 5.5] dB  | [4.2 ~ 6.5] dB |

- Option 3: Other options are not precluded.

# Topic 3: MIMO layer evaluation for 6Rx UE

## Sub-topic 3-1: General considerations for MIMO layer evaluation for 6Rx UE

**Issue 3-1-1: Tightening BS EVM requirement**

**Way Forward**: RAN4 to further discuss if the BS EVM requirement needs to be tightened when discussing the feasibility of 6‑Layer MIMO for 6Rx UEs.

**Issue 3-1-2: 6-Layer Performance Evaluation Assumptions**

**Way Forward**: RAN4 to further discuss the 6-Layer MIMO performance evaluation assumptions considering realistic antenna correlation assumptions and deployment scenarios.

**Issue 3-1-3: Whether to use same requirement for handheld UE and FWA**

**Way Forward**: RAN4 to defer decision after evaluation of 6 MIMO layer performance for handheld and FWA devices.

## Sub-topic 3-2: 6-layer Support

**Issue 3-2-1: 6-layer Support**

**Agreement**:

- Decision on support of 6 MIMO layers for handheld is deferred until performance level differences in comparison with 4 MIMO layers are known based on evaluations considering realistic antenna correlation assumptions and deployment scenarios

**Issue 3-2-2: 6-layer Support as optional feature**

**Way Forward**: RAN4 to further discuss if 6-Layer support should be considered an optional feature.

**Issue 3-2-3: Release independence of 6-layer Support**

**Way Forward**: Follow RAN4 Chair guidance and defer any release independence discussions until the requirements are stable.

# Topic 4: SRS IL imbalance issue

## Sub-topic 4-1: General considerations for SRS IL imbalance issue

**Issue 4-1-1: Whether to solve SRS IL imbalance issue in Rel-19**

**Way forward**: RAN4 to further discuss if the SRS IL imbalance issue should be solved in Rel-19. Any decision to not solve the SRS IL imbalance issue in Rel-19 will need to be confirmed at RAN Plenary in a Revised WID.

**Issue 4-1-2: Initial Considerations for SRS IL imbalance issue**

**Way forward**: Given the different views amongst companies, RAN4 to further discuss the set of initial considerations which will allow companies to have a common understanding for the study including existing UE behavior for SRS transmissions in case of SRS IL.

* Companies are encouraged to bring analysis on the existing UE behavior and achievable power imbalance for SRS transmissions based on current specification and UE implementations in case of SRS IL,
* analyse the impact of SRS IL imbalance on NW performance degradation

## Sub-topic 4-2: 4.2.2 SRS IL imbalance issue solutions

**Issue 4-2-1: Candidate solutions for the SRS IL imbalance issue**

**Way forward**: After determining the set of initial considerations for the study, discuss candidate solutions considering the UE behaviour in terms of the IL imbalance compensation and whether the UE can compensate the IL imbalance for AS-SRS for all power levels and whether NW and UE have consistent understanding for the possible compensation.