**3GPP TSG-RAN WG2 Meeting #115 Tdoc R2-2108861**

**Electronic Meeting, 16th-27th, Aug, 2021**

**Title:** [DRAFT] LS on gap handling for MUSIM

**Release:** Rel-17

**Work Item:** LTE\_NR\_MUSIM-Core

**Source:** vivo [To be RAN2]

**To:** RAN4

**Cc:** RAN

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**1. Overall Description:**

RAN2 has discussed the mechanism for a UE to notify Network A of its switch from Network A to Network B for MUSIM purpose. Network A is NR and Network B can either be LTE or NR. During the switching from the Network A, the UE can still be RRC connected state in Network A.

The following scenarios and gap mechanism were agreed by RAN2.

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| **Scenarios and supported gap types*** **RAN2 aims to support at least the below scenarios 1/2/3 in Rel-17 for cases when the UE is allowed to switch to network B without leaving connected state at network A.**

**Scenarios 1: Periodic switching, including SSB detection/paging reception, serving cell measurement, neighbouring cell measurement including intra-frequency, inter-frequency and inter-RAT measurement;** **Scenarios 2: SI receiving at network B;****Scenarios 3: Aperiodic (one-shot) switching with both transmission and reception at network B but will not enter RRC-connected state in NW B (e.g. no RRC connection Resume/Setup) at network B, including On-demand SI request;*** **Only per UE level scheduling gap is supported in Rel-17 for non-DC. FFS if we support MR-DC.**
* **Do not support autonomous gaps for MUSIM in Rel-17.**

**Gap configuration and activation*** **The network is allowed to configure at most 3 gap patterns (for any MUSIM purpose).**
* **Only a single aperiodic gap (for MUSIM) is supported in Rel-17. At most two periodic “gaps” (for MUSIM) and a single aperiodic gap (for MUSIM) is supported in Rel-17. FFS if signalling supports more.**
* **The SFN and subframe of the PCell of the network A is used in the gap configuration to calculate the gap**

**Periodic/Aperiodic/autonomous Gap configuration and activation*** **The switching gap configuration will explicitly provide the gap starting position (e.g. offset value or start SFN and subframe explicitly), gap length and gap repetition period.**
* **Switching Gaps (of any type) are configured or released by RRC signalling (e.g. RRCReconfiguration message) in Rel-17. FFS if gap can be released autonomously by UE after N repetitions.**

**Gap configuration assistance information*** **UE is allowed to include assistance information for setup or release of gaps for both 1) periodic gaps and 2) aperiodic gap in one UEAssistanceInformation Msg.**
* **To report the assistance information, the UE maps the timing info of the Gap on the network B to the network A and reports the mapped timing info to the network A.**
* **For the gap assistance information, the Gap start time, Duration of the gap and gap repetition period (for periodic) may be included. FFS is other information is included (e.g. gap purpose).**
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For the above Scenario 1 and Scenario 2:

* In Network B, System Information is needed for paging reception, serving cell measurement, neighbouring cell measurements including intra-frequency, inter-frequency and inter-RAT measurements. SIBs other than SIB1 are carried in System Information (SI) messages, which are periodically scheduled in SI window. The period of SI scheduling (si-Periodicity) can be {rf8, rf16, rf32, rf64, rf128, rf256, rf512} radio frames. For NR, the SI window Length (si-WindowLength) range can be {s5, s10, s20, s40, s80, s160, s320, s640, s1280} slots, for LTE the SI window Length (si-WindowLength) range can be {ms1, ms2, ms5, ms10, ms15, ms20, ms40} ms.

Note: SSB detection is only needed for NR network.

For the above Scenario 3:

* Only applied when network B belongs to NR, UE can request the on-demand SIs based on RACH procedure. For MSG1 based on-demand SI procedure, only MSG1 and MSG2 transmission and reception are needed. For MSG3 based on-demand SI procedure, all MSG1-MSG4 transmission and reception are needed.

RAN2 assumes that at most three MUSIM gap patterns can be configured at the same time to receive and transmit in Network B.

RAN2 will continue to discuss the detailed MUSIM gap handling, e.g., gap pattern (exact value for offset, gap cycle and duration), in part based on the RAN4 feedback requested below, and continue to inform RAN4 on these.

**2. Actions:**

**To RAN4:**

**ACTION:** RAN2 kindly asks RAN4 to answer the questions below.

**Question 1: Are the existing measurement gap cycle and duration value(s) sufficient to support the above any of Scenarios 1, 2, and 3?**

**Question 2: If the answer to Question 1 is negative, RAN2 would like to request feedback on the gap cycle and duration value(s) for the above scenarios and in particular:**

1. **For Scenario 1, could RAN4 provide feedback on the range of value(s) for gap cycle and duration needed to meet the Idle/Inactive mode RRM requirements in Network B?**
2. **For Scenario 2, could RAN4 provide feedback on the range of value(s) for gap cycle and duration required to acquire the necessary system information in Network B?**
3. **What would be the feasible range of value(s) for gap cycle and duration that can allow the UE stay in Connected mode in Network A for all 3 scenarios?**

**Question 3: What are the impacts of multiple activated MUSIM gaps (at most two periodic gaps and a single aperiodic gap) from RAN4 perspective?**

**3. Date of Next TSG WG RAN2 Meetings:**

RAN2#116-e 01 Nov - 12 Nov 2021

RAN2#116 bis-e 17 Jan - 26 Jan 2022