**3GPP TSG-RAN WG4 Meeting # 112 R4-2413870**

**Maastricht, NL, August 19th – 23rd, 2024**

**Agenda item:** 5.15.3

**Source:** MediaTek inc.

**Title:** Ad-hoc minutes for [112][205] NR\_MG\_enh2

**Document for:** Information

# Introduction

This is the ad-hoc minutes for ad-hoc session for NR and MR-DC measurement gaps and measurements without gaps WI.

# [112][205] NR\_MG\_enh2

## Sub-topic 4-1: NFG - DRX related issue

**Topic #4: NeedForGap**

**Issue 4-1-2: Aligned DRX-on duration and SMTC for NFG measurements**

* Agreement
	+ Interruption ratio requirement not based on DRX-on duration
	+ Not define the interruption location
* Proposals
	+ Option 1: ZTE
		- The interruption is not allowed at least for the small DRX-on duration. For the large DRX-on duration, we can agree that interruption is allowed but except for the last DL slot containing PDCCH in the ON duration
	+ Option 2: QC
		- Interruption due to measurement without gap is allowed when UE is in DRX regardless of DRX cycle.
	+ Option 1e (from issue 4-1-1): HW
		- Interruption is not allowed during DRX ON duration, if there is no SMTC occasion within a time period starting [4ms] before the starting point of the DRX ON duration and ending [4ms] after the ending point of the DRX ON duration.
	+ Recommended WF
		- Interruptions are always allowed **outside DRX ON duration** and it is according to Tcycle,i.
			* Consider [4ms] aligning time margin:
				+ if there is no SMTC occasion within a time period starting [4ms] before the starting point of the DRX ON duration and ending [4ms] after the ending point of the DRX ON duration.

Discussion:

Tentative agreement:

**Issue 4-1-1: Misalignment between DRX-on duration and SMTC for NFG measurements**

* Background (agreement):
	+ - Interruption ratio requirement not based on DRX-on duration
		- Not define the interruption location
* Proposals
	+ Option 1:
		- Option 1a: vivo
			* + Interruptions are always allowed **outside DRX ON duration** and it is according to Tcycle,i.
		- Option 1b: Nokia, E///
			* + Interruptions are **not allowed during** DRX ON duration.
		- Option 1c: ZTE
			* + For the case of DRX cycle **larger than 320ms**, interruptions are not allowed when DRX cycle is larger than 320ms.
		- Option 1d: ZTE
			* + For the case of DRX cycle **not larger than 320ms**, interruptions are not allowed in the DRX ON duration, excluding the time extended due to drx-inactivityTimer.
		- Option 1e: HW
			* + Interruption is not allowed during DRX ON duration, if there is **no SMTC occasion within a time period** starting [4ms] before the starting point of the DRX ON duration and ending [4ms] after the ending point of the DRX ON duration.
	+ Option 2: QC
		- * Interruption due to measurement without gap is allowed when UE is in DRX regardless of DRX cycle.

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| **Session Chair:** Further discuss the two options:* + Option 1: Nokia, E///, HW, vivo, CMCC, ZTE, Xiaomi
		- Interruptions are not allowed during DRX ON duration.
		- Exclude the time extended due to drx-inactivityTimer
		- Consider [4ms] time margin as in option 1e.
	+ Option 1a: Xiaomi, CATT, ZTE, Nokia, E///, CMCC
		- Interruptions are not allowed during DRX ON duration.
	+ Option 2: QC, Apple
		- Interruption due to measurement without gap is allowed when UE is in DRX regardless of DRX cycle.
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* Recommended WF
	+ Option 1: Nokia, E///, HW, vivo, CMCC, ZTE, Xiaomi
		- Interruptions are not allowed during DRX ON duration.
			* Exclude the time extended due to drx-inactivityTimer
			* Consider [4ms] time margin as in option 1e.
	+ Option 1b:
		- Interruptions are not allowed during DRX ON duration with additional UE capability.
			* Exclude the time extended due to drx-inactivityTimer
			* Consider [4ms] time margin as in option 1e.

Discussion:

Tentative agreement:

**Issue 4-1-3: Interruption requirements for Tcycle,i when DRX cycle is configured and aligned with SMTC occasions**

* Proposals
	+ Option 1: vivo, E///, QC
		- * For DRX, the interruption ratio is defined based on
		- Tcycle,i = max (80ms, DRX cycle) x CSSFoutside\_gap,i, for DRX cycle > 320ms
		- Tcycle,i = max (80ms, SMTC period, DRX cycle) x 1.5 x CSSFoutside\_gap,i, for DRX cycle ≤ 320ms
	+ Recommended WF
	+ For DRX, the interruption ratio is defined based on
		- Tcycle,i = max (80ms, DRX cycle) x CSSFoutside\_gap,i, for DRX cycle > 320ms
		- Tcycle,i = max (80ms, SMTC period, DRX cycle) x 1.5 x CSSFoutside\_gap,i, for DRX cycle ≤ 320ms

Discussion:

Tentative agreement:

**Issue 4-2-1: Interruption requirements in 8.2.2.2.19 apply also for NR-DC, EN-DC, and NE-DC**

* Background:
	+ the NFG signalling is used in NR SA only, as shown below:

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| **From 38.331**:– *NeedForGapsInfoNR*The IE *NeedForGapsInfoNR* indicates whether measurement gap is required for the UE to perform SSB based measurements on an NR target band while NR-DC or NE-DC is not configured. |

* Proposals
	+ Option 1: CMCC
		- * Yes.
				+ ***except SA, it is proposed that interruption requirements in 8.2.2.2.19 apply also for EN-DC***.
				+ According to RAN2 spec, R16 signalling doesn’t support NR-DC or **NE-DC**, which means they are applied to SA and **EN-DC**.
	+ Option 2: Nokia, vivo, QC, MTK, HW
		- * No,
				+ NFG requirements are applicable for NR SA only.

CMCC: we can further check with RAN2 colleague.

Tentative agreement

* NFG requirements are applicable for NR SA only.

**Issue 4-3-2: NFG and NCSG capabilities**

* Previous Agreements
	+ No need to establish the mapping between UE’s indication for NeedForGaps and NCSG.
* Proposals
	+ Option 1: vivo, MTK, HW
		- * NeedForGaps and NCSG are not expected to be enabled/configured for the same UE at the same time.
			* Option 1a: Capture in RAN2 (Nokia, HW)
			* Option 1b: Capture in RAN4, i.e., no RAN4 requirement if both are configured (Apple, HW, vivo)
	+ Option 2: E///, ZTE
		- * From NW’s perspective, it’s possible to enable both NCSG and NFG reporting for the same UE at the same time.
	+ Recommended WF
		- NeedForGaps and NCSG are not expected to be enabled/configured for the same UE at the same time.
			* FFS whether there is a need to send an LS to RAN2 or capture this in RAN4 spec?



Discussion:

Tentative agreement:

## Sub-topic 4-3: Cross feature in NFG (HST)

**Issue 4-3-3: Cross feature support**

* Background (agreement)
	+ - Rel-18 requirements for UE supporting NFG and inter-RAT measurements without gap do not apply for FR2-2.
* Proposals
	+ Proposal 1: Whether to have Rel 18 measurements without gaps with interruptions apply for **HST**.
		- * Option 1: Yes [CMCC]
			* Option 2: No [Nokia]
* Recommended WF:
	+ - For FR1 related requirements:
			* FFS
		- For FR2 related requirements:
			* FFS

Discussion:

Moderator’s note:

* For FR1 related HST requirements, no-DRX requirements are the same as legacy ones while the enhancements with DRX requirements are restricted to SMTC periodicity <=40ms, hence companies to discuss the necessity to have such two features combination due to the limit benefits.
	+ - Moderator: Can we merge NFG with HST for the HST with no-DRX requirements only?
* For FR2 related HST requirements, the requirements are restricted to SMTC periodicity <=40ms, while NFG is 80ms, hence the mismatch in the requirements makes it infeasible to merge these two features for FR2.
	+ - Moderator: Do we still need to consider NFG with HST for FR2?

Tentative agreement:

## Sub-topic 5-2: Inter-RAT without gaps

**Topic #5: Inter-RAT without gaps**

**Issue 5-2-1: Overlap between Effective measurement window and SMTC/SSB**

* ***Background***
	+ Previous Agreements
		- For case b-2, when EMW is configured overlapped with SMTC/SSB/CSI-RS measurement with scheduling restrictions, inter-RAT LTE measurement will be dropped.
		- For case b-1 and b-2, when EMW is partially overlapped with MG (EMW periodicity < MGRP), the EMW occasion colliding physically with MG will be dropped.



* Proposals to: For case b-1 and b-2 inter-RAT LTE measurement causing scheduling restriction, when EMW periodicity is smaller than MGRP,
	+ Option 1: E///, QC
		- RAN4 to update the legacy agreements as: after considering EMW dropping rule if EMW is colliding with SMTC/SSB/CSI-RS, when the remaining EMW is fully overlapping with MG, the inter-RAT meas will be performed within MG.
	+ Option 1a: HW
		- RAN4 to update the legacy agreements as: after considering EMW dropping rule if EMW **outside MG** is colliding with SMTC/SSB/CSI-RS, when the remaining EMW is fully overlapping with MG, the inter-RAT meas will be performed within MG.
* Recommended WF
	+ Moderator note: CRS is available all the time to the UE and the NW can avoid such corner case scenario.

Discussion:

Tentative agreement:

**Issue 5-2-2: Overlap between Effective measurement window and MG**

* ***Background***
	+ Agreements
		- For case b-1 and b-2, when EMW is partially overlapped with MG (EMW periodicity < MGRP), the EMW occasion colliding physically with MG will be dropped.
		- Note: The proximity rule in Rel-17 does not apply in this case.
* Agreement for down-selection: For case b-1 and b-2 inter-RAT LTE measurement causing scheduling restriction, when EMW periodicity is larger than MGRP and all EMW are covered by measurement gaps,
	+ ~~Option 1: inter-RAT LTE measurement will be dropped.~~
	+ ~~Option 2: No UE behaviour is specified.~~
* Proposals to: For case b-1 and b-2 inter-RAT LTE measurement causing scheduling restriction, when EMW periodicity is larger than MGRP and all EMW are covered by measurement gaps,
	+ Option 3: E///, MTK
		- apply legacy gap-based measurement requirements, i.e. RAN4 requirements should NOT be defined based on EMW.
	+ Option 4: vivo, HW
		- UE measurement requirements are based on EMW-RP.
* Recommended WF
	+ Discuss the options.

Discussion:

Tentative agreement:

**Issue 5-2-5: Scaling factor for case a-1: Nfreq definition**

* ***Background***
	+ The principles are different between NR MO outside gap and LTE inter-frequency without MG, where all inter-frequency MOs, regardless if they are measured with or without MG, are counted in the same Nfreq.
* Proposals
	+ Option 1: E///, HW
		- total number of LTE and NR MOs that are measured outside MG (same principle as LTE SA).
			* Option 1a: MTK
				+ total number of inter-frequency LTE and NR MOs (same principle as LTE SA).
	+ Option 2: HW
		- number of NR MOs that are measured outside MG (same principle as NR SA).
* Recommended WF
	+ Discuss the options.

Discussion:

Tentative agreement: