**3GPP TSG-RAN WG2 Meeting #127** **R2-240xxxx**

Maastricht, Netherlands, 19th – 23th Aug, 2024

**Agenda item: 7.4.2**

**Source: MediaTek, ZTE**

**Title: Discussion summary on [AT127][104][MOB]**

**Document for: Discussion and Decision**

# 1. Introduction

# 2. Discussion

## 2.1 Clarification on R4 39-6

The capability ltm-FastProcessingConfig-r18 (R4 39-6) that has UE granularity with FR differentiation. This capability is implemented as per band granularity with the description stating that the capability value remains consistent across all FDD-FR1 bands, all TDD-FR1 bands, all TDD-FR2-1 bands and all TDD-FR2-2 bands.

However, this capability also includes parameters for the maximum number of some functionality. Given the per-band granularity, there is a potential for misunderstanding that these values are for the current band but not cross-band, even the value is consistent for all bands.

Therefore, the following propose is made for clarification:

**Proposal 1: Clarify that the capability value of *ltm-FastProcessingConfig-r18* indicates the maximum number across all the supported bands, rather than the current band.** **Adopt the TP 1 in the following.**

|  |
| --- |
| [Discussion]* Majority think it is acceptable.
* [Huawei]: We should also clarify this in each component. (This has been updated in the following TP, as well as some editorial modifications.)

[Outcome]**The proposal 1 and the following TP 1 is agreeable.** |

A TP can be found as below:

### TP 1

---- Begin TP ----

| ***ltm-FastProcessingConfig-r18***Indicates whether the UE supports fast processing of LTM candidate cell RRC configuration. This capability signalling comprises the following parameters:- *maxNumberStoredConfigCells-r18* indicates the maximum number of serving cell(s) and candidate cell(s), including serving SpCell(s), serving SCell(s) in MCG and SCG, SpCell in *LTM-CandidateConfig*(s) and Scell(s) in *LTM-CandidateConfig*(s) for MCG and SCG, that UE can storeacross all the supported bands.- *maxNumberConfigs-r18* indicates the maximum number of *LTMCandidateConfigs* that UE can support fast processing across all the supported bands.A UE supporting this capability shall also indicate support of *ltm-MAC-CE-JointTCI-r18* or *ltm-MAC-CE-SeparateTCI-r18*. UE shall set the capability value consistently for all FDD-FR1 bands, all TDD-FR1 bands, all TDD-FR2-1 bands and all TDD-FR2-2 bands respectively. The capability value represents the maximum number across all the supported bands.NOTE: The conditions for fast processing of an LTM candidate cell RRC configuration is defined in section 6.3 in TS 38.133 [5]. | Band | No | N/A | No |
| --- | --- | --- | --- | --- |

---- End TP ----

## 2.2 Correction on R4 39-7

R4 39-7 is defined as "Faster UE processing time during LTM cell switch," which includes components for the reduced time values in FR1 to FR1, FR2 to FR2, and FR1/FR1 to FR2/FR1. This is designated as an optional feature group with capability signalling.

However, in the latest TS 38.331, this capability is implemented with a unified optional marker for these three components, which means that the feature in all three cases must be either supported or not supported.

**Observation: R4 39-7 is implemented with only one unified optional marker for three components, which is not aligned with the intention of this feature**.

Therefore, we propose:

**Proposal 2: Add separate optional markers for the three components of the feature R4 39-7 (*ltm-FastUE-Processing*). Adopt the TP 2 in the following.**

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| --- |
| [Discussion]* Rapporteur highlight that this is an NBC change, but it is important. Think NBC change at this stage should be acceptable.
* Majority think it is acceptable.

[Outcome]**The proposal 2 and the following TP 2 is agreeable.** |

A TP can be found as below:

### TP 2

---- Begin TP ----

MeasAndMobParametersCommon ::= SEQUENCE {

 …

-- R4 39-7: Faster UE processing time during cell switch

 ltm-FastUE-Processing-r18 SEQUENCE {

 fr1-r18 ENUMERATED {ms10, ms15} OPTIONAL,

 fr2-r18 ENUMERATED {ms10, ms15} OPTIONAL,

 fr1-AndFR2-r18 ENUMERATED {ms20, ms30} OPTIONAL

 } OPTIONAL,

---- End TP ----

## 2.3 Per band pair per band combination granularity

Regarding the LTM UE capabilities with per band pair per band combination:

* R1 45-5a RACH-based early TA acquisition with simultaneous transmission
* R4 39-4 Interruption on DL slot(s) due to PDCCH- ordered RACH transmission
* R4 39-4a Interruption due to RF retuning for PDCCH- ordered RACH
* R4 39-5 RF/BB preparation time for PDCCH-order RACHR

Rapporteur suggest a optimization to current signalling structure that directly indicate the target band of the band pair (as option2 below), instead of the current bitmap structure (as option1 below) from the appliedFreqBandListFilter indicate by the network.

Option1(bitmap-like, current structure), take R1 45-5a as example:

FeatureSetUplink-v1800 ::= SEQUENCE {

 …

 -- R1 45-5a: RACH-based early TA acquisition with simultaneous transmission

 rach-EarlyTA-BandList-r18 SEQUENCE (SIZE (1..maxBandsMRDC)) OF BOOLEAN OPTIONAL,

Note: The sequence should be equal and listed in the same order as the *applied**FreqBandListFilter*, which is a mirror to FreqBandListFilter indicated by the network.

Option2 (Indicate target band list directly. Rapporteur’s suggestion), take R1 45-5a as example:

FeatureSetUplink-v18xx ::= SEQUENCE {

 …

 -- R1 45-5a: RACH-based early TA acquisition with simultaneous transmission

 rach-EarlyTA-BandList-r18 SEQUENCE (SIZE (1.. maxBands)) OF RACH-EarlyTA-TargetBand OPTIONAL,

…

RACH-EarlyTA-TargetBand ::= SEQUENCE {

 TargetbandNR FreqBandIndicatorNR

}

|  |
| --- |
| [Discussion]* Rapporteur think the current structure need network to always send *FreqBandListFilter* into Capability enquiry, which is an extra request to network and we cannot ensure. Nokia think it should not be a problem.
* Not too much view was collected from the offline discussion. After further discuss with UE capability Rapporteur (Intel). The current structure is preferred.
* Note: Capability enquiry without frequencyBandListFilter is not supported.

[Outcome]**The signalling structure in option2 is not pursued. Keep the current signalling structure for the capabilities with per band pair per band combination granularity** |

The current structure is kept, then some corrections is further needed:

Issue1: For R4 39-4, 39-4a and 39-5, as per RAN4 FL, these three capabilities are mutually independent. (Not pre-requisite to each other). However, there is only one “notsupported” for these three capabilities. This implies UE need to report both supported or not supported to these three capabilities.

FeatureSetDownlink-v1800 ::= SEQUENCE {

 …

 pdcch-RACH-DL-InfoList-r18 SEQUENCE (SIZE (1..maxBandsMRDC)) OF PDCCH-RACH-DL-Info-r18

 OPTIONAL,

…

PDCCH-RACH-DL-Info-r18 ::= CHOICE {

 notSupported NULL,

 supported SEQUENCE {

 -- R4 39-4: Interruption on DL slot(s) due to PDCCH- ordered RACH transmission

 pdcch-RACH-AffectedBands-r18 ENUMERATED {noIntrruption, interruption},

 -- R4 39-4a: Interruption on DL slot(s) due to PDCCH- ordered RACH transmission

  pdcch-RACH-SwitchingTimeList-r18 ENUMERATED {ms0, ms0dot25, ms0dot5 , ms1, ms2} OPTIONAL,

 -- R4 39-5: the RF/BB preparation time for PDCCH ordered RACH of which the resources are not fully contained

 -- in any of UE's configured UL BWP(s) of active serving cells

 pdcch-RACH-PrepTime-r18  ENUMERATED {ms1, ms3, ms5, ms10} OPTIONAL

 }

}

|  |
| --- |
| [Discussion]* [Nokia]: These three IEs should be the components of one capability, so they should be some dependencies and should be indicated together or not.
* Rapporteur think we should follow RAN4’s FL and should not change the dependencies.
* Companies have different views on whether these three capabilities can be decoupled or not. This can be further confirmed with RAN4 internally and comeback on Thursday.

[Outcome]**RAN2 people ask internally to RAN4 to see whether the capabilities R4 39-4, 39-4a and 39-5 can be indicated independently, and come back on Thursday:*** **If** **these capabilities can be indicated independently, adopt the TP 3 in the following.**
* **If these capabilities are always coupled, no correction is needed.**
 |

### TP 3

---- Begin TP ----

FeatureSetDownlink-v1800 ::= SEQUENCE {

 …

 pdcch-RACH-DL-InfoList-r18 SEQUENCE (SIZE (1..maxBandsMRDC)) OF PDCCH-RACH-DL-Info-r18

 OPTIONAL,

…

PDCCH-RACH-DL-Info-r18 ::= CHOICE {

 -- R4 39-4: Interruption on DL slot(s) due to PDCCH- ordered RACH transmission

 pdcch-RACH-AffectedBands-r18 ENUMERATED {noIntrruption, interruption},

 -- R4 39-4a: Interruption on DL slot(s) due to PDCCH- ordered RACH transmission

 pdcch-RACH-SwitchingTimeList-r18 ENUMERATED {ms0, ms0dot25, ms0dot5 , ms1, ms2, notSupported} OPTIONAL,

 -- R4 39-5: the RF/BB preparation time for PDCCH ordered RACH of which the resources are not fully contained

 -- in any of UE's configured UL BWP(s) of active serving cells

 pdcch-RACH-PrepTime-r18 ENUMERATED {ms1, ms3, ms5, ms10, notSupported} OPTIONAL

 }

}

# 3. Conclusion

**Proposal 1: Clarify that the capability value of *ltm-FastProcessingConfig-r18* indicates the maximum number across all the supported bands, rather than the current band. Adopt the TP 1****in this paper.**

**Proposal 2: Add separate optional markers for the three components of the feature R4 39-7 (*ltm-FastUE-Processing*). Adopt the TP 2 in this paper.**

**Proposal 3: The signalling structure in option2 is not pursued. Keep the current signalling structure for the capabilities with per band pair per band combination granularity.**

**Proposal 4:** **RAN2 people ask internally to RAN4 to see whether the capabilities R4 39-4, 39-4a and 39-5 can be indicated independently, and come back on Thursday:**

* **If these capabilities can be indicated independently, adopt the TP 3 in this paper.**
* **If these capabilities are always coupled, no correction is needed.**

# 4. Reference

[1]. 3GPP TS 38.331 V18.2.0

[2]. R1-2403703 Updated RAN1 UE features list for Rel-18 NR after RAN1\_116bis

[3]. R4-2406680 Rel-18 RAN4 UE feature list for NR (version 4)