**3GPP TSG-RAN WG4 Meeting #94-e R4-20xxxxx**

**Electronic Meeting, Feb.24th – Mar.6th 2020**

**Agenda item:** 9.15

**Source:** Moderator (China Unicom)

**Title:** Email discussion summary for RAN4#94e\_#28\_ENDC\_UE\_PC2\_FDD\_TDD

**Document for:** Information

# Introduction

In RAN #86 meeting, a new WID was approved to standardize Power Class 2 high power UE for EN-DC (1 LTE FDD band + 1 NR TDD band). Two cases were included in the WI, i.e. case 1 for 23dBm LTE + 23dBm NR and case 2 for 23dBm LTE + 26dBm NR. The scope of the email discussion is to confirm the LTE reference configuration, UE-Network interaction mechanism as well as MSD values.

*List of candidate target of email discussion for 1st round and 2nd round*

* 1st round: TBA
* 2nd round: TBA

# Topic #1: High power UE (power class 2) for EN-DC (1 LTE FDD band + 1 NR TDD band)

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2000121 | vivo | Proposal 1: considering characteristics of ENDC traffic, typical NR UL/DL Configuration and LTE TDD UL/DL Configuration, it is proposed that two LTE configurations are DutyLTE1=70% and DutyLTE2=40%.  Proposal2: corresponding to the LTE fixed dutycycle in proposal 1, the reported UE NR ul dutycycle capabilities (maxNRDuty1, maxNRDuty2) are proposed as   * Corresponding to DutyLTE1=70%, maxNRDuty1 ∈ {30%, 40%, 50%, 60%, 70%, 80%, 90%, 100%, *Full\_duty\_supported*}, default value in case no reporting case1=30%, case2=15% * Corresponding to DutyLTE2=40%, maxNRDuty2 ∈ {30%, 40%, 50%, 60%, 70%, 80%, 90%, 100%, *Full\_duty\_supported*}, default value in case no reporting case1=60%, case2=30% |
| R4-2000122 | vivo | Draft LS on UE capability for PC2 inter-band EN-DC (LTE FDD+NR TDD) |
| R4-2000447 | Xiaomi | Observation 1: the only Rx requirement which shall be re-evaluated for DC\_3\_n78 is intermodulation interference due to dual uplink operation for both case 1 and case 2.  Observation 2: IMD2 and IMD4 falling into Band 3 shall be re-evaluated for DC\_3\_n78 both case 1 and case 2.  Proposal 1: the MSD value as shown in table 4 is proposed for high power UE for DC\_3\_n78 for both case 1 and case 2. |
| R4-2000878 | CHTTL | Proposal 1: For each fixed LTE reference configuration of the PC2 FDD-TDD EN-DC, consider a conditional statement for 100% UL percentage with an upper limit of the UL power setting on the LTE side. If the network configuration PLTE is not larger than the upper limit, then 100% UL percentage needs to be supported, and the UE don’t need to check the percentage of the LTE uplink symbols.  - The upper limit of the PLTE corresponding to fixed LTE reference configuration (70%, 40%) can be ([21], [19]) dBm respectively. |
| R4-2000908 | CMCC | CR to TS38.101-3 - CR for adding power class 2 output power requirement for DC\_3A\_n41A |
| R4-2000968 | ZTE | Proposal 1: reuse TDD-Patternconfiguration IE specified for the single uplink transmission EN-DC. |
| R4-2001037 | China Unicom | Proposal 1: To complete the WI base on the SAR compliance scheme 2 from TR37.815 as specified in its summary part. |
| R4-2001188 | LG Electronics | Proposal 1: For PC2 DC\_3A\_n78A UE, the proposed MSD levels in Table4 shall be considered in TS38.101-3. |
| R4-2001326 | Ericsson | Proposal 1: SAR compliance is the liability of the UE; for UEs providing a duty cycle capability, the fallback behaviour is ensured by the UE by its estimates of the actual UL duty cycle on both cell groups.  Proposal 2: support for EN-DC power class 2 for FDD-TDD band combination is specified by combining the methods of NR duty-cycle reporting and reduced FDD power. |
| R4-2002097 | Qualcomm | Proposal 1: The “scheme 2” feedback-based method is preferred to enable the potential for higher performance for PC2 FDD-TDD EN-DC networks.  Proposal 2: The “scheme 2” feedback-based scheme shall be used if the UE signals a capability. If no capability is signaled, then a blind scheme can be used. The scheme to modify based on network configured parameters is one such blind scheme that can be considered. Another blind scheme based on actual transmitted symbols similar to SA and TDD-TDD EN-DC can also be considered. |
| R4-2002101 | Ericsson | CR to TS38.101-3 - Introduction of EN-DC power class 2 for FDD-TDD band combinations |

## Open issues summary

Main open issues identified from the contributions are the LTE reference configuration, UE-Network interaction mechanisms as well as MSD values.

### Sub-topic 1-1

Sub-topic description: LTE reference configuration

*Open issues and candidate options before e-meeting:*

**Issue 1-1: LTE reference configuration**

* Proposals
  + Option 1: DutyLTE1=70% , DutyLTE2=40%
* Recommended WF
  + TBA

### Sub-topic 1-2

*Open issues and candidate options before e-meeting:*

**Issue 1-2-1: UE-Network interaction**

* Proposals
  + Option 1: The “scheme 2” feedback-based scheme shall be used if the UE signals a capability. If no capability is signaled, then a blind scheme can be used. (Qualcomm)
    - Option 1-a: To consider a conditional statement for 100% LTE FDD UL percentage if the network configuration PLTE is not larger than the upper limit. (CHTTL)
  + Option 2: support for EN-DC power class 2 for FDD-TDD band combination is specified by combining the methods of NR duty-cycle reporting and reduced FDD power. (Ericsson)
* Recommended WF
  + TBA

**Issue 1-2-2: Capability signalling**

* Proposals
  + Option1:

Corresponding to DutyLTE1=70%, maxNRDuty1 ∈ {30%, 40%, 50%, 60%, 70%, 80%, 90%, 100%, *Full\_duty\_supported*}, default value in case no reporting case1=30%, case2=15%

Corresponding to DutyLTE2=40%, maxNRDuty2 ∈ {30%, 40%, 50%, 60%, 70%, 80%, 90%, 100%, *Full\_duty\_supported*}, default value in case no reporting case1=60%, case2=30%

* Recommended WF
  + TBA

### Sub-topic 1-3

Sub-topic description: MSD values.

*Open issues and candidate options before e-meeting:*

**Issue 1-3: MSD value for high power UE for EN-DC**

* Proposals
  + Option 1: IMD2: 31.8dB ;IMD4: 19.4dB
  + Option 2: IMD2: 32.0dB ;IMD4: 17.5dB
* Recommended WF
  + TBA

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Xiaomi | Sub topic 1-1: we support option 1  Sub topic 1-2:  Sub topic 1-3: If MSD need to be defined in this meeting, we can compromise to accept the average approach like RAN4 usually do considering the difference is not so much. |
| LG Electronics | Sub-topic 1-1: In case of LTE (FDD) + NR(TDD), we prefer option1: Report UE NR UL duty cycles based on corresponding to the LTE fixed duty cycles.  Sub topic 1-3: When RAN4 define the required MSD levels, we can merged all MSD levels as average manner like RAN4 usually considered for LTE-A CA and EN-DC basket WI.  So the proposed MSD level for DC\_3A\_n78A power class 2 UE as follow  - IMD2: 31.9 dB ; IMD4: 18.5dB |
| vivo | Issue 1-1: we support option1.  Issue 1-2-1: we support option1. We are also fine with option1a as comprise for option2.  Issue 1-2-2: we support option1 as in R4-2000121. |
| OPPO | Issue 1-2-1: The solutions introduced actually are optional solutions, UEs which do not need support from NW side to do restriction no matter power or UL duty cycle shall be allowed. Therefore, we have concern on mandating UE to choose between reporting UL duty cycle and reduce power. When no capability is signalled BS shall not restrict UE scheduling. |
| CMCC | Issue 1-2-1: Considering that the UE behaviour of EN-DC PC2 FDD+TDD and TDD+TDD could be as consistent as possible. We prefer option1. |
| Huawei | Issue 1-1: support option1  Issue 1-2-1: support option 1  Issue 1-3: MSD should be further studied with more inputs from companies |
| XXX | Sub topic 1-1:  Sub topic 1-2:  ….  Others: |

### CRs/TPs comments collection

*Major close-to-finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| XXX | Company A |
| Company B |
|  |
| YYY | Company A |
| Company B |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic#1** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |

*Recommendations on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 |  |  |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provides recommendation on CRs/TPs Status update*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

# Topic #2: Title

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-20xxxxx | Company A | Proposal 1:  Observation 1: |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 2-1

*Sub-topic description:*

*Open issues and candidate options before e-meeting:*

**Issue 2-1: TBA**

* Proposals
  + Option 1: TBA
  + Option 2: TBA
* Recommended WF
  + TBA

### Sub-topic 2-2

*Sub-topic description*

*Open issues and candidate options before e-meeting:*

**Issue 2-2: TBA**

* Proposals
  + Option 1: TBA
  + Option 2: TBA
* Recommended WF
  + TBA

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 2-1:  Sub topic 2-2:  ….  Others: |

### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| XXX | Company A |
| Company B |
|  |
| YYY | Company A |
| Company B |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic#1** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |

*Suggestion on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 |  |  |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provided recommendation on CRs/TPs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |