**3GPP TSG RAN WG1 #100bis R1-200xxxx**

**e-Meeting, April 20th – 30th, 2020**

**Agenda Item: 7.2.11.7**

**Source: Moderator (AT&T)**

**Title: Summary of Email Approval [100b-e-NR-UEFeatures-PowSav-04]**

**Document for:** **Discussion/Decision**

# Introduction

This document presents the summary of email approval [100b-e-NR-UEFeatures-PowSav-04] during RAN1 #100bis-e. According to the Chairman’s Notes:

|  |
| --- |
| [100b-e-NR-UEFeatures-PowSav-04] Email discussion/approval on the medium priority item as in proposal 3 as in R1-2001869 by (4/24-4/28)– Ralf (ATT) |

The following was discussed and agreed during RAN1 #100bis-e within the scope of [100b-e-NR-UEFeatures-PowSav-04] “Email discussion/approval on the medium priority item as in proposal 3 as in R1-2001869” [1].

The following will be removed from the final document, however, in the meantime, please take note of this guidance of the RAN1 MCC technical officer:

|  |
| --- |
| W.r.t the naming convention, the following suggestion […] may be helpful to keep the previous company’s name (only the most recent one) in the filename, so that we can easily tell which previous version this is based on, and may solve the issue when there are crossing emails.e.g. something like the following:5\_Incoming\_Liaison\_Statements/Summary-1\_v1-LG5\_Incoming\_Liaison\_Statements/Summary-1\_v2-LG-CATT5\_Incoming\_Liaison\_Statements/Summary-1\_v2-LG-vivo5\_Incoming\_Liaison\_Statements/Summary-1\_v3-CATT-HWHiSi |

# Summary of Email Approval [100b-e-NR-UEFeatures-PowSav-04]

The following is the proposal in [1] for approval in this email discussion:

**FL Proposal 3 (19-3):**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Need for the gNB to know if the feature is supported | Applicable to the capability signalling exchange between UEs (V2X WI only)”. | **Consequence if the feature is not supported by the UE** | **Type****(the ‘type’ definition from UE features should be based on the granularity of 1) Per UE or 2) Per Band or 3) Per BC or 4) Per FS or 5) Per FSPC)** | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Capability interpretation for mixture of FDD/TDD and/or FR1/FR2 | Note | Mandatory/Optional |
|  | 19-3 | Maximum MIMO Layer Adaptation | 1. Support of maximum number of MIMO layer configuration per DL BWP
 |  |  | N/A |  | ~~[~~Per BC~~]~~ or Per UE or Per Band | No or Yes | No or Yes |  | This capability is indicated only if UE supports the network configuration of maxMIMO-Layers according to maxLayersMIMO-Indication | Optional with capability signalling |

* Medium priority
	+ Agree on type, xDD/FRx differentiation

Companies are asked to provide their views and comments in the following table.

**Type**

|  |  |
| --- | --- |
| Company | Comments/Questions/Suggestions |
| vivo | We prefer to be per-band. UE power saving can be achieved by reducing RF path and other implementation oriented approach and thus per band report is preferred. Furthermore, it is noted that maximum MIMO layer configuration is band-specific configuration. Therefore, considering potential different RF implementations across different bands, we proposes to confirm 19-3 is based on the granularity of per-band. |
| Huawei, HiSilicon | Per UE, but with FR1/FR2 differentiation. |
| MediaTek | We think ‘per UE’ is sufficient.As the comments provided in our contribution, the feature can save UE power by reducing the maximum MIMO layer number through BWP framework when there is no data for the UE. There is no impact to the supported maximum number of MIMO layer on a band combination by introducing this feature. As a result, we don’t see the need to have ‘per BC’/’per-band’ capability report, ‘per UE’ is sufficient. |
| ZTE | Per UEThis feature group indicates UE whether or not supports per DL BWP maximum number of MIMO layer configuration. It is enough to have the type of this feature group Per UE |
| Nokia, NSB | Per UE |
| CATT | Per BC. UE might not need to support the maximum layer adaptation to some bands due to the adaptation to spatial multiplexing gain might not be much. Moreover, the RF design for different band combination might be different for each UE. It does not need to be only different only between FR1 and FR2, It could be different between two bands in FR1 or two bands in FR2.  |
| Intel | In our view, per UE may not be suitable for this RF related issue. We think per Band provides reasonable granularity. |
| Apple | Per UE.  |
| Ericsson | Per UE |
| Qualcomm | Per UE |

**xDD differentiation**

|  |  |
| --- | --- |
| Company | Comments/Questions/Suggestions |
| Vivo | No |
| Huawei, HiSilicon | No |
| MediaTek | No |
| ZTE | NO |
| Nokia, NSB | No  |
| CATT | No |
| Intel | No |
| Apple | No |
| Ericsson | No |
| Qualcomm | No |

**FRx differentiation**

|  |  |
| --- | --- |
| Company | Comments/Questions/Suggestions |
| Vivo | YesFR1 and FR2 has different realization and it can be caused by different RF paths to different FR. |
| Huawei, HiSilicon | Yes. FR1 and FR2 should be differential. But no need to be per band. |
| MediaTek | YesSince the UE implementations on RF modules and the UE power consumptions are very different in FR1 and FR2, it is beneficial that the capability report can be different in FR1/FR2. |
| ZTE | NO |
| Nokia, NSB | Yes |
| CATT | No |
| Intel | No. If reporting type is per band, FR1/FR2 differentiation is not needed. |
| Apple | Yes |
| Ericsson | Yes |
| Qualcomm | Yes |

There are other fields empty that we may want to try to agree on to conclude the entire row. You are invited to provide your views below.

**Prerequisite feature groups**

|  |  |
| --- | --- |
| Company | Comments/Questions/Suggestions |
| Huawei, HiSilicon | This capability is indicated only if UE supports the network configuration of maxMIMO-Layers according to maxLayersMIMO-Indication |
| Intel | FG from Rel-15 of max MIMO layers per cell should be pre-requisite |
| Ericsson | As the note says - this capability is indicated only if UE supports the network configuration of maxMIMO-Layers according to maxLayersMIMO-Indication |

**Need for the gNB to know if the feature is supported**

|  |  |
| --- | --- |
| Company | Comments/Questions/Suggestions |
|  |  |

**Consequence if the feature is not supported by the UE**

|  |  |
| --- | --- |
| Company | Comments/Questions/Suggestions |
|  |  |

**Capability interpretation for mixture of FDD/TDD and/or FR1/FR2**

|  |  |
| --- | --- |
| Company | Comments/Questions/Suggestions |
|  |  |

**…**

# Conclusions

…

# References

1. R1-2001869, Summary on UE features for UE power savings, Moderator (AT&T)