**3GPP TSG RAN WG1 #100bis-e R1-2002882**

e-Meeting, April 20th – 30th, 2020

Source: NTT DOCOMO, INC.

Title: Summary on Email discussion [100b-e-NR-UEFeatures-Positioning-05]

Agenda Item: 7.2.11.8

**Document for:** **Discussion and Decision**

# **Introduction**

This contribution summarizes the following email discussion in AI 7.2.11.8 regarding UE features for NR Positioning.

[100b-e-NR-UEFeatures-Positioning-05] Email discussion/approval on issues with capability signaling impacts for NR positioning based on ECID and for multi-RTT (27th – 29th April) – Hiroki (DCM)

* Discuss on component(s) of each FG that need to be reported and candidate values for the component(s)
* Discuss on reporting type of each FG
* Discuss on the need of xDD and/or FRx differentiation for each FG of per-UE type
* Note that discussed FGs in this email discussion are derived by outcome of high priority email discussions (e.g., FG13-1/2/12/13 in FL proposal 1)

In the email discussion [100b-e-NR-UEFeatures-Positioning-01], following agreements were made.

**Agreements:**

* Following FGs are included in UE features list for positioning.
* [NR E-CID DL SSB RRM measurements with LPP support for NR Positioning]
* [NR E-CID DL CSI-RS RRM measurements with LPP support for NR Positioning]
* Common DL PRS Processing Capability
* DL PRS Resources for DL AoD
* DL PRS Resources for DL-TDOA
* DL PRS Resources for Multi-RTT
* SRS Resources for Positioning
* [Support of SSB from neighbor cell as QCL source of a DL PRS]
	+ This does not imply UE is required to perform SSB measurement for Positioning purpose
* [Support of DL PRS from serving/neighbor cell as QCL source of a DL PRS]
* DL PRS Measurement Report for DL-AoD
* Inter-frequency measurements for [DL-AoD]
* [DL PRS RSTD/[RSRP] Measurement Report for DL-TDOA]
* Inter-frequency measurements for [DL-TDOA]
* Support of Aperiodic SRS Resources for positioning
* Support of Semi-persistent SRS Resources for positioning
* [Support of OLPC for SRS for positioning from neighbor cell]
* [Support of Spatial relation for SRS for positioning from serving cell]
* [Support of Spatial relation for SRS for positioning from neighbor cell]
* [UE Rx-Tx Measurement Report for Multi-RTT]
* Inter-frequency measurement for [Multi-RTT]

# **13-11a: Inter-frequency measurement for [Multi-RTT]**

Based on agreements and [1], FG13-11a can be defined as below.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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****( 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 |
| 13. NR Positioning | 13-11a | Inter-frequency measurement for [Multi-RTT] | 1. Inter-frequency measurement for [Multi-RTT]
 | TBD | Yes | N/A |  | [Per Band] | [N/A] | [N/A] | [N/A] | Need for location server to know if the feature is supported. | Optional with capability signaling |

**Companies are encouraged to provide feedbacks focusing on signaling design aspects (e.g., components with candidate values for reporting, Type, Need of xDD/FRx differentiation).**

|  |  |
| --- | --- |
| Company | Comment |
| Huawei/HiSilicon | 1. Per UE
 |
| Qualcomm | Support (remove brackets)Per band  |
| MTK | Per band combination |
| CATT | Per UE or per FR. It may be too many combinations if per band combination. |
| vivo | Support to remove bracketsPer band combination |

# **[13-11: UE Rx-Tx Measurement Report for Multi-RTT]**

Based on [1], FG13-11 can be defined as below although it is under discussion in email discussion [100b-e-NR-UEFeature-Positioning-01].

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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****( 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 |
| 13. NR Positioning | 13-11 | UE Rx-Tx Measurement Report for Multi-RTT | 1. UE Rx-Tx Measurement Report for Multi-RTT
 | TBD | No | N/A |  | [Per band] | [N/A] | [N/A] | [N/A] | Need for location server to know if the feature is supported. | Optional with capability signaling |

**Companies are encouraged to provide feedbacks focusing on signaling design aspects (e.g., components with candidate values for reporting, Type, Need of xDD/FRx differentiation).**

|  |  |
| --- | --- |
| Company | Comment |
| Huawei/HiSilicon | 1. Suggest to rewrite the components to
	1. Max number of DL PRS measurements on different PRS resources from the same TRP supported by the UE Values = {1, 2, 3, 4}
2. Per UE
3. {1,2,3,4}
4. For the FR where the supported number of PRS resources within a resource set to be less than 4, the number of measurement that UE can measure and report is bounded by the supported number of PRS resources in a resource set.
 |
| Qualcomm | Split into 2 FGs: * Max number of UE Rx-Tx measurements per TRP supported by the UE. Values = {1, 2, 3, 4}
* Max number of DL PRS RSRP measurements on different PRS resources from the same TRP supported by the UE. Values = {1, 2, 3, 4}

Per band  |
| MTK | Per band |
| CATT | Similar view with QC to split into 2 FGs. Our preference is per UE. |
| vivo | Support Qualcomm’s view to split into 2 FGs with each per band. |

# **[13-12: NR E-CID DL SSB RRM measurements with LPP support for NR Positioning]**

Based on [1], FG13-12 can be defined as below although it is under discussion in email discussion [100b-e-NR-UEFeature-Positioning-01].

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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****( 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 |
| 13. NR Positioning | 13-12 | NR E-CID DL SSB RRM measurements with LPP support for NR Positioning | 1. NR E-CID DL SSB RRM measurements with LPP support for NR Positioning
 | TBD | No | N/A |  | [Per band] | [N/A] | [N/A] | [N/A] | Need for location server to know if the feature is supported. | TBD |

**Companies are encouraged to provide feedbacks focusing on signaling design aspects (e.g., components with candidate values for reporting, Type, Need of xDD/FRx differentiation).**

|  |  |
| --- | --- |
| Company | Comment |
| Huawei/HiSilicon | 1. Per UE
 |
| Qualcomm | Remove brackets. Per band |
| MTK | Per band |
| CATT | Per UE, Mandatory |
| vivo | OK to have this FG. Per band. |

# **[13-12a: NR E-CID DL CSI-RS RRM measurements with LPP support for NR Positioning]**

Based on [1], FG13-12a can be defined as below although it is under discussion in email discussion [100b-e-NR-UEFeature-Positioning-01].

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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****( 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 |
| 13. NR Positioning | 13-12a | NR E-CID DL CSI-RS RRM measurements with LPP support for NR Positioning | 1. NR E-CID DL CSI-RS RRM measurements with LPP support for NR Positioning
 | TBD | No | N/A |  | [Per band] | [N/A] | [N/A] | [N/A] | Need for location server to know if the feature is supported. | TBD |

**Companies are encouraged to provide feedbacks focusing on signaling design aspects (e.g., components with candidate values for reporting, Type, Need of xDD/FRx differentiation).**

|  |  |
| --- | --- |
| Company | Comment |
| Huawei/HiSilicon | 1. Per UE
 |
| Qualcomm | Remove brackets. Per band |
| MTK | Per band |
| CATT | Per UE |
| vivo | OK to have this FG. Per band. |

# **Conclusion**

TBD

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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****( 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 |
| 13. NR Positioning | 13-11a | Inter-frequency measurement for Multi-RTT | 1. Inter-frequency measurement for Multi-RTT
 | TBD | Yes | N/A |  | FFS: [Per Band or Per BC or Per UE] | [N/A or No] | [N/A or No or Yes] | N/A | Need for location server to know if the feature is supported. | Optional with capability signaling |
| 13. NR Positioning | [13-11] | [UE Rx-Tx Measurement Report for Multi-RTT] | 1. [UE Rx-Tx Measurement Report for Multi-RTT]
 | TBD | No | N/A |  | [Per band] | [N/A] | [N/A] | [N/A] | Need for location server to know if the feature is supported. | Optional with capability signaling |
| 13. NR Positioning | [13-12] | [NR E-CID DL SSB RRM measurements with LPP support for NR Positioning] | 1. [NR E-CID DL SSB RRM measurements with LPP support for NR Positioning]
 | TBD | No | N/A |  | [Per band] | [N/A] | [N/A] | [N/A] | Need for location server to know if the feature is supported. | TBD |
| 13. NR Positioning | [13-12a] | [NR E-CID DL CSI-RS RRM measurements with LPP support for NR Positioning] | 1. [NR E-CID DL CSI-RS RRM measurements with LPP support for NR Positioning]
 | TBD | No | N/A |  | [Per band] | [N/A] | [N/A] | [N/A] | Need for location server to know if the feature is supported. | TBD |

# **References**

[1] R1-2001484 RAN1 UE features list for Rel-16 NR after RAN1#100-E Moderator (AT&T, NTT DOCOMO, INC.)

[2] R1-2001605 NR positioning UE features ZTE

[3] R1-2001723 Discussion on UE features for Rel-16 NR positioning vivo

[4] R1-2001739 Discussion on UE features for NR Positioning OPPO

[5] R1-2001831 Views on Rel-16 UE features for NR positioning MediaTek Inc.

[6] R1-2001956 Discussion on UE features for NR positioning LG Electronics

[7] R1-2002022 Input to discussion on UE features for NR Positioning Intel Corporation

[8] R1-2002073 Discussion of UE features for NR positioning CATT

[9] R1-2002156 UE features for NR positioning Samsung

[10] R1-2002479 On UE features for NR Positioning Nokia, Nokia Shanghai Bell

[11] R1-2002569 Discussion on NR Positionign UE features Qualcomm Incorporated

[12] R1-2002712 Rel-16 UE features for NR positioning Huawei, HiSilicon

[13] R1-2002624 View on UE feature description for NR positioning Ericsson

[14] R1-2002878 Summary on Email discussion [100b-e-NR-UEFeatures-Positioning-01] Moderator (NTT DOCOMO, INC.)