**3GPP TSG RAN WG1 #112bis-e R1-23xxxxx**

**e-Meeting, April 17th – April 26th, 2023**

**Agenda item:** 9.17.16

**Source:** Moderator (NTT DOCOMO, INC.)

**Title:** [draft] Summary #1 on UE features for TEIs

**Document for:** Discussion and Decision

# **Introduction**

This document summarizes contributions submitted to AI 9.17.16 regarding other UE features and captures the following email discussion.

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| [112bis-e-R18-UE\_features-05] Email discussion on UE features for TEIs by April 26 – Shinya (DOCOMO)* Check points: April 21, April 26
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According to the initial UE features list from endorsed TEI proponents [1, 2], there are following feature groups for TEI18.

* FGs for SR periodicity
	+ 55-1 additionalSR-Periodicities-r18
* FGs for 1-symbol PRS
	+ 55-2 1-symbol PRS

# **FGs for SR periodicity**

In [1], FGs for SR periodicity are captured 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 (Sidelink 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 |
| 55. TEI18 | 55-1 | *additionalSR-Periodicities-r18* | Indicates whether the UE supports the following SR periodicities in the *periodicityAndOffset* parameter as specified in TS 38.331 [9]:-5sl for 30 kHz SCS-5sl and 10sl for 120 kHz SCS | N/A | Yes | N/A | If the network implements the TS 38.331 CR on new SR periodicities and the UE does not according to the capability indication, the network will not assign the new SR periodicities.Legacy behaviour applies.  | Per UE | No | No | N/A |  | Optional |

Following inputs are provided in contributions for the RAN1#112bis-e meeting.

|  |  |  |
| --- | --- | --- |
| [1] | Ericsson | We note that there is no prerequisite feature group for the SR periodicities, hence the periodic SR feature is in legacy de facto supported “Per UE”. Hence, it is natural if this extension of that feature is also supported “Per UE”. |
| [3] | Nokia, NSB | 1. FG on support of extra slot periodicities to the periodicityAndOffset in SchedulingRequestResourceConfig for 120 kHz
	1. Candidate values {5, 10}
2. FG on support of extra slot periodicity to the periodicityAndOffset in SchedulingRequestResourceConfig for 30 kHz
	1. Candidate value {5}
 |

## **Discussion**

**Question 2-1:**

* **Companies are encouraged to provide views on whether/how to introduce FG 55-1, e.g., separate FG for 30kHz SCS and 120kHz SCS or report type as per UE with FR1/FR2 differentiation.**

|  |  |
| --- | --- |
| Company | Comment |
| ZTE | Support the proposal in [1] above. In legacy, different SR periodicities are supported for different SCSs, while there is no FR1/FR2 differentiation. Similarly, we think a single UE feature with per UE reporting without FR1/FR2 differentiation is sufficient.  |
| Ericsson | Agree with ZTE but have not a strong view. |
| MediaTek | We think at least **FR1/FR2 differentiation is needed** to facilitate IODT process. FR2 may not be supported by some products and should not be mandated if UE wants to indicate the support for this new UE feature.  |
| Nokia, NSB | If the capability is per UE without any differentiation then it implies UE will need to support the capability for both FRs as long as it supports at least one frequency band in each FR, even if there is no deployment requiring both. This creates an unnecessary barrier for feature availability in the field. One possibility is to have it as a single capability with component values as {120 kHz SCS, 30 kHz SCS, both}, in which case the corresponding periodicities are supported if the SCS is indicated as supported. In any case, UE should be allowed to be configured with legacy periodicities as well, which implies the legacy capability should be a pre-requisite to this one, as this is about additional periodicities. |
| Huawei, HiSilicon | “Need of FR1/FR2 differentiation” should be yes in order to facilitate UE report differently for different FR. |
| QC | We don’t support the above proposal. The type for a UE feature should be at least per band (if not with finer granularity type), given the potential UE testing differentiation among licensed, unlicensed, and NTN band.  |
| Moderator | Summary of companies’ view* Reporting type
	+ Per UE without FR1/FR2 differentiation: ZTE. E///
		- With component values as {120 kHz SCS, 30 kHz SCS, both}: Nokia/NSB
	+ Per UE with FR1/FR2 differentiation: MTK, HW/HiSi
	+ Per band: QC
* Prerequisite FG
	+ Add FG4-1 (Basic UL control channel): Nokia/NSB?
		- *Moderator’s note: It seems not necessary to add FG4-1 since this FG is Mandatory without capability signalling*

Given more companies see the necessity for the reporting type finer than Per UE without FR1/FR2 differentiation, following proposal is made**Proposal 2-1:*** **Introduce FG 55-1 with one of the following reporting type**
	+ **Opt1: per UE with FR1/FR2 differentiation**
	+ **Opt2: per band**
 |
| MTK | We agree with QC and hence prefer Opt2 with “per band”.  |
|  |  |

# **FGs for 1-symbol PRS**

In [2], FGs for 1-symbol PRS are captured 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 (Sidelink 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 |
| 55. TEI18 | 55-2 | 1-symbol PRS | 1. Support of 1-symbol PRS | 13-1 | No | n/a | 1-symbol PRS is not supported | per UE | n/a | n/a | n/a | Need for location server to know if the feature is supported | Optional with capability signaling |

Following inputs are provided in contributions for the RAN1#112bis-e meeting.

|  |  |  |
| --- | --- | --- |
| [2] | ZTE | According to the above agreement, it is straightforward to introduce a new FG to let UE report this Rel-18 UE capability. The prerequisite should be the basic NR positioning FG, i.e. 13-1. Hence, this new FG will be common for all positioning methods and for both RRC\_INACTIVE and RRC\_CONNECTED states. |
| [3] | Nokia, NSB | 1. Support 1-symbol PRS with legacy comb sizes
 |

## **Discussion**

**Question 3-1:**

* **Companies are encouraged to provide views on whether/how to introduce FG 55-2, e.g., report type as per UE without FDD/TDD and FR1/FR2 differentiation**

|  |  |
| --- | --- |
| Company | Comment |
| Intel | We are fine with the proposed version for FG 55-2 with a small modification – As suggested by Nokia, it’d be good to mention that this is supported for legacy comb sizes. Thus, we suggest to modify the description as: Support of 1-symbol PRS with comb sizes from {2, 4, 6, 12} |
| ZTE | Support and confirm the yellow part.  |
| mtk | 1, No need to support 1-symbol DL-PRS for all comb sizes. Remember that for positioning SRS, 1 symbol is supported for comb-2. Then we prefer to support 1 symbol DL-PRS for comb size = 22, 1 symbol with larger comb size has the potential problem of performance. The IFFT size is limited to reduce the SNR boosting capability. The 1 symbol DL-PRS also has limited observation range if comb size increases. |
| MediaTek2 | We prefer to have FR1/FR2 differentiation to facilitate IODT process. One question: why gNB does not need to know whether this feature is supported.  |
| Ericsson | Support, we also agree with Intel to include the comb sizes for clarity. To MTK: the gNB is not aware that a particular UE is receiving PRS. This capability is for the location server.  |
| Nokia, NSB | OK to have FR1/FR2 differentiation as commented by Mediatek. |
| ZTE2 | @mtk 1-symbol PRS with all existing comb sizes is the agreement. @MediaTek2 We are fine to report this FG to gNB as well since PRS configuration also impacts TS 38.331 which is used for the feature of Propagation delay compensation for IIOT\_URLLC. We are fine with FR1/FR2 differentiation. |
| Huawei, HiSilicon | OK to take per-UE reporting. |
| QC | We don’t support the above proposal. The type for a UE feature should be at least per band (if not with finer granularity type), given the potential UE testing differentiation among licensed, unlicensed, and NTN band.  |
| Moderator | Summary of companies’ view* Need for the gNB to know if the feature is supported
	+ No: ZTE
	+ Yes: [ZTE]
* Component:
	+ 1. Support of 1-symbol PRS with comb sizes from {2, 4, 6, 12}: Intel, E///
	+ 1. Support of 1-symbol PRS with comb size = 2: MTK
* Reporting type
	+ per UE without FDD/TDD and FR1/FR2 differentiation: ZTE
	+ per UE with FR1/FR2 differentiation: MTK, Nokia/NSB, [ZTE]
	+ per band: QC

**Proposal 3-1:*** **Introduce FG 55-2 with one of the followings**
	+ **Component 1: Support of 1-symbol PRS with comb sizes from {2, 4, 6, 12}**
	+ **Need for the gNB to know if the feature is supported: Yes**
	+ **Reporting type**
		- **Opt1: per UE with FR1/FR2 differentiation**
		- **Opt2: per band**
 |
| MTK | 1. On Type, we agree with QC and hence prefer Opt2 with “per band”.
2. On Need for the gNB to know, thank Ericsson for explanation. We don’t have strong view on this and is OK with “No.”
 |
| ZTE | 1. If UE vendors have strong concern, we are fine with ‘per band’ granularity.
2. Regarding whether need gNB to know, we notice PRS can also be used for IIOT URLLC feature at gNB side. As shown in the Rel-17 FG 25-19a, PRS can be used for delay estimation. This feature is reported to gNB. If 1-symbol PRS is supported by the UE, it is better to let gNB know in our view. Then, gNB can configure 1-symbol PRS according to 38.331.

The existing 38.331:  |

# **Conclusions**

To be updated

# **References**

[1] R1-2302920 UE feature for agreed TEI-18 on SR periodicity Ericsson

[2] R1-2303283 UE feature on support of 1-symbol PRS ZTE

[3] R1-2302899 Initial views on UE features for TEI-18 Nokia, Nokia Shanghai Bell