**3GPP TSG-RAN WG2 Meeting #117-e *R2-220xxxx***

**Electronic meeting, 21 February – 3 March 2022**

**Agenda item: 8.5.1**

**Source: Intel Corporation**

**Title: Report of email discussion [AT117-e][508][IIoT] UE Capabilities (Intel)**

**Document for: Discussion and Decision**

# Introduction

The contribution is the report of following email discussion:

* [AT117-e][508][IIoT] UE Capabilities (Intel)

UE capabilities CR (38.306/308.331)

Deadline: final approval by March 2nd

# Contact Information

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# Discussion

## UE capability for RTT based PDC

In email discussion “[POST116bis-e][513][IIoT] CP open issues (Ericsson)” R2-2203302 [1], UE capability regarding UE-side and gNB-side PDC was discussed. Following is the summary and proposal by the rapporteur. In RAN2#117-e online session, the issue was not handled due to lack of time and will be discussed in current email discussion.

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| **Summary:**  A UE supporting FG 25-19/25-19a shall also support:   * 3 companies support UE-side PDC * 8 companies support both UE-side and gNB-side PDC (if agreed) * 4 companies support at least UE-side or gNB-side PDC (if agreed)   There seems to have some misunderstandings. Rapporteur intends to sort-out the capability dependency, in light of the RAN1 introduced FG 25-19/25-19a. Some more clarification below (assuming the gNB-side PDC is agreed):   * If UE supporting of FG 25-19/25-19a also supports UE-side PDC, then there is a need for a separate optional UE capability for gNB-side PDC; * If UE supporting of FG 25-19/25-19a supports both UE-side and gNB-side PDC, then there is no need for any more optional UE capabilities in RAN2; * If UE supporting of FG 25-19/25-19a also at least supports UE-side PDC or gNB-side PDC, then there is a need for two separate optional UE capabilities, one for gNB-side PDC and another for UE-side PDC.   The proposal below is a majority view  Proposal 8 UE supporting of FG 25-19/25-19a also supports both UE-side and gNB-side PDC (if agreed). (8/15) |

In current email discussion, we will focus on UE capability aspect. RAN1 has defined two separate RTT based PDC capabilities in feature list R1-2200780 [2]:

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| 25-19 | RTT-based Propagation delay compensation based on CSI-RS for tracking and SRS | Support RTT-based Propagation delay compensation for time synchronization of the Uu interface based on CSI-RS for tracking and SRS | 2-51, 2-53 |
| 25-19a | RTT-based Propagation delay compensation based on DL PRS and SRS | Support RTT-based Propagation delay compensation for time synchronization of the Uu interface based on DL PRS and SRS | 25-19, 13-1, 2-53 |

As highlighted by rapporteur of “[POST116bis-e][513][IIoT] CP open issues (Ericsson)”, if RAN2 agreed that UE supporting of FG 25-19/25-19a shall support both UE-side and gNB-side PDC, then there is no need for any additional UE capabilities in RAN2. Otherwise, additional UE capabilities should be defined.

**Question 1:** Please provide your preferred option on UE capability regarding UE-side and gNB-side RTT based PDC.

* Option a: A UE supporting FG 25-19/25-19a shall support both UE-side and gNB-side PDC (if agreed). In this option, there is no need for any additional optional UE capabilities in RAN2.
* Option b: A UE supporting FG 25-19/25-19a shall support UE-side PDC. The UE supports gNB-side PDC (if agreed) optionally. In this option, separate UE capability for gNB side PDC should be introduced.
* Option c: A UE supporting FG 25-19/25-19a shall support either UE-side or gNB-side PDC (if agreed). In this option, two separate UE capabilities for UE-side and gNB side PDC should be introduced.

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| **Company** | **Preferred option (a/b/c)** | **Comments** |
| Intel | a | Our understanding is that if UE supports one of the UE-side or gNB-side RTT PDC method, the additional efforts to support the other is marginal. Therefore it is reasonable to go with option a to avoid market segmentation as well as to minimize the introduction of additional UE capabilities due to option b/c. |
| Ericsson | a | Agree with Intel |
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If RAN2 agrees on option b in Q1, separate UE capability for gNB side PDC should be introduced, and the dependency, capability type, and FRx/xDD differentiation of the capability need to be discussed. Since RAN1 has separate UE capabilities FG 25-19/25-19a, there could be various options regarding the dependency between UE capability for gNB side PDC and FG 25-19/25-19a. Currently the dependency between FG 25-19 and 25-19a is still not finalized (highlighted in yellow above) in R1-2200780 [2]. For simplicity, it is proposed that if option b in Q1 is supported, a UE supporting gNB side RTT based PDC shall support either 25-19 or 25-19a. If RAN1 confirms that 25-19 is one of the prerequisite FGs of 25-19a, then RAN2 dependency can be updated so that a UE supporting gNB side RTT based PDC shall support 25-19. In addition, given that gNB side RTT based PDC is mainly a RAN2 feature related to RAN1 features, it is proposed that the capability is per UE, not FDD-TDD DIFF, not FR1-FR2 DIFF.

**Question 2:** If Option b in Q1 is agreed, do you agree with the following:

An optional UE capability signalling is introduced for gNB side RTT based PDC (if agreed). A UE supporting this feature shall also support FG 25-19 or 25-19a (the dependency can be further updated based on RAN1 progress). The capability is per UE, not FDD-TDD DIFF, not FR1-FR2 DIFF.

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| **Company** | **Agree / Disagree** | **Comments** |
| Intel | Agree |  |
| Ericsson | Agree | If, in any chance, FG25-19/FG25-19a is FDD-TDD DIFF or FR1-FR2 DIFF, this is still per UE but interpreted as that it is restricted by the underlying support of FG25-19/FG25-19a on TDD or FDD, on which frequency range, and etc. |
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Similar reasoning regarding option b can be applicable to option c.

**Question 3:** If Option c in Q1 is agreed, do you agree with the following:

An optional UE capability signalling is introduced for gNB side RTT based PDC (if agreed). A UE supporting this feature shall also support FG 25-19 or 25-19a (the dependency can be further updated based on RAN1 progress). The capability is per UE, not FDD-TDD DIFF, not FR1-FR2 DIFF.

An optional UE capability signalling is introduced for UE side RTT based PDC. A UE supporting this feature shall also support FG 25-19 or 25-19a (the dependency can be further updated based on RAN1 progress). The capability is per UE, not FDD-TDD DIFF, not FR1-FR2 DIFF.

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| **Company** | **Agree / Disagree** | **Comments** |
| Intel | Agree |  |
| Ericsson | Agree |  |
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## Other disucssion for UE capability CRs

Draft UE capabilities CRs based on [3][4] are provided for review. In addition to use comments for the draft CRs, additional comments can be provided below.

**Question 4:** Additional comments for draft UE capabilities CRs can be provided below.

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| **Company** | **Comments** |
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# Conclusion

To be updated.

# References

[1] R2-2203302, Ericsson, "Summary of [POST116bis-e][513][IIoT] CP open issues (Ericsson)"

[2] R1-2200780, Moderators (AT&T, NTT DOCOMO, INC.), "Updated RAN1 UE features list for Rel-17 NR after RAN1 #107bis-e"

[3] R2-2202464, Intel, "Draft 38.306 CR for Rel-17 NR IIoT URLLC UE capabilities"

[4] R2-2202465, Intel, "Draft 38.331 CR for Rel-17 NR IIoT URLLC UE capabilities "