**3GPP TSG-RAN WG2 Meeting #121bis-e *R2-230xxxx***

**Electronic meeting, 17 – 26 April 2023**

**Agenda item: 7.10**

**Source: Intel Corporation**

**Title: [Post121][654][IDC] Capability CRs on IDC (Intel)**

**Document for: Discussion and Decision**

# Introduction

This is the report of the following post meeting email discussion:

* [Post121][654][IDC] Capability CRs on IDC (Intel)

 Scope: Capture decisions up to this meeting and to be endorsed as the baseline CRs

 Intended outcome: Endorsable baseline CR

 Deadline: Long

Two phases below are considered for this email discussion:

Phase 1: Discussion on the pre-requisite of the capabilities; Deadline: 28th March;

Phase 2: Review of proposals and draft CRs; Deadline: March 31st 12:00 UTC.

# Contact information

Respondents to the email discussion are kindly asked to fill in the following table.

|  |  |
| --- | --- |
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# Discussion

## Phase 1

In RAN2#121 meeting, following was agreed regarding IDC UE capabilities:

* Rel-18 IDC UE capability(ies) defined in NR side is/are per UE, not FDD-TDD DIFF, not FR1-FR2 DIFF.
* In NR side, 3 capability bit is introduced for FDM, periodic pattern and autonomous denial separately.
* The pre-requisite of autonomous denial is FDM solution (R16 or R18) or periodic pattern.

The main open issues are the pre-requisite of the capabilities.

Pre-requisite of Rel-18 IDC FDM solution

In [1], it is proposed that the pre-requisite of Rel-18 IDC FDM solution is Rel-16 NR IDC (*inDeviceCoexInd-r16*). An alternative is that no pre-requisite is defined for Rel-18 IDC FDM solution.

**Question 1:** Which option do you prefer for the pre-requisite of Rel-18 IDC FDM solution?

Option a: Rel-16 NR IDC (*inDeviceCoexInd-r16*);

Option b: Rel-18 IDC FDM solution does not have pre-requisite.

|  |  |  |
| --- | --- | --- |
| **Company** | **Option a/b** | **Comments** |
| Intel | Option a | Rel-18 IDC FDM solution provides finer granularity on top of Rel-16 reporting. |
| Qualcomm | Option a |  |
| vivo | Option a | If Rel-18 IDC FDM solution contains finer granularity based on Rel-16 NR IDC solution, the pre-requisite is needed. |
| Ericsson | Option a |  |
| Huawei, HiSilicon | Option b | We don’t think there is a need to couple inDeviceCoexIndFDM-r18 with R16 capabilities inDeviceCoexInd-r16. It can be independent of it.  |
| Nokia | Option a | R18 FDM is extension of R16 FDM – It seems quite unlikely that UE could support R18 FDM but not R16 FDM.  |
| Samsung | Option a | Rel-18 IDC FDM is the enhancement to Rel-16 |
| Xiaomi | Option a | Agree with most companies that Rel-18 IDC FDM solution is an enhanced solution based on Rel-16 IDC FDM solution. |

**Summary**

Seven companies agree that the pre-requisite of Rel-18 IDC FDM solution is Rel-16 NR IDC (*inDeviceCoexInd-r16*), while one company prefers that Rel-18 IDC FDM solution does not have pre-requisite. It is proposed to follow majority view given that Rel-18 IDC FDM solution provides finer granularity on top of Rel-16 reporting.

**Proposal 1**: (7 vs 1) The pre-requisite of Rel-18 IDC FDM solution is Rel-16 NR IDC (*inDeviceCoexInd-r16*).

Pre-requisite of Rel-18 IDC periodic pattern

There are three options in contributions submitted to RAN2#121 meeting regarding the pre-requisite of Rel-18 IDC periodic pattern:

1) Rel-16 NR IDC (*inDeviceCoexInd-r16*), as from [1];

2) Rel-18 affected frequency indication in LTE for (NG)EN-DC operation or the Rel-18 IDC FDM solution in NR or *inDeviceCoexInd-ENDC-r15* or Rel-16 NR IDC *(inDeviceCoexInd-r16)*, as from [2];

3) Rel-18 IDC FDM solution in NR or Rel-16 NR IDC *(inDeviceCoexInd-r16)*, as from [3].

Given that RAN2 agreed that “*LTE MN does not configure the UE with R18 NR IDC configuration*”, it is rapporteur’s understanding that option 2) can be simplified to option 3). In addition, if Option a in Question 1 is agreed, then option 1) and 3) are also equivalent.

Therefore rapporteur proposes that the pre-requisite of Rel-18 IDC periodic pattern is Rel-18 IDC FDM solution or Rel-16 NR IDC(*inDeviceCoexInd-r16*), as in option 3 above. The pre-requisite can be further simplified to Rel-16 NR IDC(*inDeviceCoexInd-r16*) if Option a in Question 1 is agreed.

**Question 2:** Do you agree with the following? If not, please indicate preferred pre-requisite of Rel-18 IDC periodic pattern.

The pre-requisite of Rel-18 IDC periodic pattern is Rel-18 IDC FDM solution or Rel-16 NR IDC (*inDeviceCoexInd-r16*).

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree / Disagree** | **Comments** |
| Intel | Agree |   |
| Qualcomm | Disagree | This is unneeded now that TDM has its own RRC configuration and the agreement that “3 capability bit is introduced for FDM, periodic pattern and autonomous denial separately.” . There is no need to include a frequency reporting pre-requisite. Recall that TDM can be used when FDM does not solve the problem, e.g., in NTN where the UE only operates in band n255. In this case, the UE does not need to support FDM capability (especially the high granularity FDM problem) as the problem can only be solved with TDM.  |
| vivo | Disagree | Since we have agreed “3 capability bit is introduced for FDM, periodic pattern and autonomous denial separately.” the pre-requisite is unnecessary. |
| Ericsson | Agree | We agree with Intel. We can further discuss if it is simpler to just refer to the Rel-16 field |
| Huawei, HiSilicon | Agree | We agree with Intel. |
| Nokia | Agree | We are not sure why technically FDM solution is prerequisite for TDM solution but we are fine to do so. It seems anyway likely that FDM solution is more widely used so UE only supporting TDM seems unlikely.  |
| Samsung | Agree |  |
| Xiaomi | Agree |  |

**Summary**

Six companies agree that the pre-requisite of Rel-18 IDC periodic pattern is Rel-18 IDC FDM solution or Rel-16 NR IDC (*inDeviceCoexInd-r16*). Two companies don’t think Rel-18 IDC periodic pattern should have pre-requisite considering that: 1) Separate capability bits are defined; 2) TDM can be configured independent from FDM; 3) TDM can be used to solve problem which FDM cannot solve. It is rapporteur’s understanding that separate capability bits do not imply that pre-requisite is not needed (otherwise there is no need to discuss pre-requisite at all). It is beneficial for the network to know the affected frequency / range when receiving TDM assistance information.

It is proposed to follow majority view. With proposal 1, the pre-requisite of Rel-18 IDC periodic pattern can be further simplified to Rel-16 NR IDC (*inDeviceCoexInd-r16*).

**Proposal 2**: (6 vs 2) The pre-requisite of Rel-18 IDC periodic pattern is Rel-16 NR IDC (*inDeviceCoexInd-r16*).

In RAN2#121 meeting, RAN2 agreed that “*The pre-requisite of autonomous denial is FDM solution (R16 or R18) or periodic pattern*”. With Proposal 1 and 2, the pre-requisite of Rel-18 IDC autonomous denial can be further simplified to Rel-16 NR IDC (*inDeviceCoexInd-r16*).

**Proposal 3**: The pre-requisite of Rel-18 IDC autonomous denial is Rel-16 NR IDC (*inDeviceCoexInd-r16*).

# Conclusion

Based on the input from companies, we have the following proposals:

**Proposal 1**: (7 vs 1) The pre-requisite of Rel-18 IDC FDM solution is Rel-16 NR IDC (*inDeviceCoexInd-r16*).

**Proposal 2**: (6 vs 2) The pre-requisite of Rel-18 IDC periodic pattern is Rel-16 NR IDC (*inDeviceCoexInd-r16*).

**Proposal 3**: The pre-requisite of Rel-18 IDC autonomous denial is Rel-16 NR IDC (*inDeviceCoexInd-r16*).

# References

[1] R2-2300833, Intel, “UE capabilities for IDC”

[2] R2-2301110, Xiaomi, “UE capability bits for IDC”

[3] R2-2301489, Huawei, HiSilicon, “Discussion on UE capability for IDC enhancement”