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

**Incheon, KR, May 22- May 26, 2023**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **37.340** | **CR** | **Draft CR** | **rev** | **-** | **Current version:** | **17.3.0** |  |
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| *For* [***HELP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **x** | Radio Access Network | **x** | Core Network |  |

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| ***Title:*** | 37.340 running CR for introduction of IDC | | | | | | | | | |
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| ***Source to WG:*** | ZTE Corporation | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_IDC\_enh-Core | | | | |  | ***Date:*** | | | 2023-3-20 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-18 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
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| ***Reason for change:*** | | This CR is for the support of Rel-18 IDC solutions. | | | | | | | | |
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| ***Summary of change:*** | | Introduction of Rel-18 IDC solutions. | | | | | | | | |
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| ***Consequences if not approved:*** | | Rel-18 IDC solutions are not supported in NR | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 7.10,13.1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **X** |  | Other core specifications | | | | TS 38.300 CR TBD  TS 38.331 CR TBD | | |
| ***affected:*** | |  | **x** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **x** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
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| ***This CR's revision history:*** | |  | | | | | | | | |

START OF CHANGES

7.10 UE assistance information

In MR-DC, the UE can be configured to report MCG specific UE assistance information if the MN is a gNB and/or SCG specific UE assistance information if the SN is a gNB, if it prefers an adjustment on the connected mode DRX parameters, the maximum aggregated bandwidth, the maximum number of secondary component carriers, the maximum number of MIMO layers, whether the UE prefers the SCG to be deactivated, the minimum scheduling offset for cross-slot scheduling cycle length, whether the UE is applying RLM/BFD measurements relaxation for power saving, and/or whether the UE is experiencing IDC problems. In these cases, it is up to the network whether to accommodate the preference or how to use the relaxation status indications or how to solve the IDC problems. SCG specific UE assistance information for power saving or IDC can be configured by the network via SRB1 or SRB3. SCG specific UE assistance information for power saving or IDC is directly transmitted to the SN via SRB3, if SRB3 is configured and the SCG is activated, otherwise UE transmits SCG specific UE assistance information for power saving or IDC in a transparent container to the MN. When network simultaneously configures the UE to perform radio link monitoring on the SCG and beam failure detection on the SCG while the SCG is deactivated, UE assistance information for the relaxation state report of RLM/BFD measurements for SCG is reported over MCG. UE can implicitly indicate a preference for NR SCG release by indicating zero number of carriers and zero aggregated maximum bandwidth in both FR1 and FR2.

NEXT CHANGE

## 13.1 Interference avoidance for in-device coexistence

In-Device Coexistence (IDC) solution as described in TS 36.300 [2] is extended to address EN-DC/NR-DC operation. For the FDM solution, the list of NR carriers, frequency ranges or frequency ranges combinations suffering from IDC problems is signalled in IDC indication. For the TDM solution, a periodic pattern can be signalled per-CG in IDC indication. In EN-DC, the MN can configure the UE to report FDM assistance information with affected carriers. In NR-DC, the MN can configure the UE to report FDM assistance information with affected frequency ranges and/or TDM assistance information. For both EN-DC and NR-DC, the SN can configure the UE to report FDM assistance information with affected frequency ranges and/or TDM assistance information to the SN via SRB1 or SRB3, if SRB3 is configured and the SCG is activated. The network can also configure autonomous denial per-CG for the UE to solve IDC problems. The requirement on RRM/RLM/CSI measurements in different phases of IDC interference defined in TS 36.300 [2] is applicable except that for NR serving cell, the requirements in TS 38.133 [8] and TS 38.101-1 [12], TS 38.101-2 [13], TS 38.101-3 [14] apply.

Editor’s Note: For the TDM, FFS whether any additional coordination is needed for network to resolve the problem when network receives an IDC report from UE.

ALTERNATIVE 13.1 CHANGES

## 13.1 Interference avoidance for in-device coexistence

In-Device Coexistence (IDC) solution as described in TS 36.300 [2] and in TS 38.300 [XX] is extended to address EN-DC operation. For FDM solution the list of NR carriers suffering from IDC problems is signalled in IDC indication. In addition, the IDC related information in UE assistance information as described in 7.10 is applicable for EN-DC. The requirement on RRM/RLM/CSI measurements in different phases of IDC interference defined in TS 36.300 [2] is applicable except that for NR serving cell, the requirements in TS 38.133 [8] and TS 38.101-1 [12], TS 38.101-2 [13], TS 38.101-3 [14] apply.

For NR-DC, the IDC related information in UE assistance information as described in 7.10 is applicable. In addition, the autonomous denial as described in TS 38.300 [XX] can be configured per-CG for the UE to solve IDC problem.

Editor’s Note: FFS whether any additional coordination is needed for network to resolve the problem when network receives an IDC report from UE.

END OF CHANGES

# Annex - RAN2 agreements

Green highlight – agreement captured in the specification

Blue highlight – agreement captured as editor’s notes

Yellow highlight- agreement that are MR-DC related but can be implicitly indicated or stage 3 related

No highlight – agreement with no direct impact on specifications

## RAN2#119-e

### FDM

* The Adjacent channel interference between NR Stand Alone (SA) or MN of NR-DC and non-3GPP should be considered for the FDM enhancement in Rel.18.
* The Adjacent channel interference between SN (NR) of MR-DC and non-3GPP should be considered for the FDM enhancement in Rel.18.
* NE-DC is not considered; We will work on NR freq as SA NR case.
* We will not consider the enhancements on E-UTRA freq for EN-DC scenario.
* FFS, on signalling details;
* The IMD interference from simultaneous Tx in EN-DC to non-3GPP should be considered for the FDM enhancement in Rel.18.
* The IMD interference from simultaneous Tx in NR-DC to non-3GPP should be considered for the FDM enhancement in Rel.18.
* Note: the solution (on freq granularity) for adjacent can be reused for IMD, we will not invent new solution on freq granularity for IMD. FFS on signalling details.
* Granular indications of the affected NR frequency reported for IDC issue needs to consider both serving and non-serving frequency as in the legacy FDM solution.

### TDM

* The use cases (e.g. BT voice, BT eSCO and WLAN beacon) as described in 3GPP TR 36.816 for LTE TDM solutions are considered for developing the Rel-18 IDC TDM solution in RAN2.
* Rel-18 IDC TDM solution(s) targets at resolving the adjacent channel interference issue and the intermodulation distortion interference issue, as LTE.
* As the baseline, the UE reports the TDM assistance information for IDC affected frequency list , as LTE.
* Note, this does not exclude MUSIM gap like solution.

### General

* RAN2 consider “hardware sharing indication” is out of scope. Company should bring this to RANP if want to support it.

## RAN2#120

### FDM

* Reconfirm, The Rel-18 IDC solution should allow for more granular IDC indications both on serving and on non-serving frequencies.
* Only one single new finer granularity report is introduced, that applies for both serving and non-serving frequencies.
* For LTE, problematic frequencies of E-UTRA are indicated by indicating measurement object IDs (same as existing LTE, no specification impact is foreseen.)
* RAN2 down select one of solution 1, 2 or 2a based on ASN.1 details. FFS on the signalling details, how to configure, how to report.
* MN can configure IDC, FFS whether SN can configure IDC for SN

### TDM

* Periodic pattern is supported; FFS on the values.
* Option 3 (i.e. UL and/or DL transmission occasion(s) solution) is not supported in Rel-18.
* The periodic pattern reported by the UE includes cycle, start offset and active duration. FFS, whether multiple patterns are supported. FFS on per CG pattern.
* RAN2 confirms the understanding that in Rel-17 NR RRC, the values from periodic pattern in MUSIM-gap is a subset of the DRX parameters.
* NR DRX values can be treated as a starting point for assistance information reported by UE. FFS, on exact values.
* RAN2 reconfirms the previous RAN2 agreement that the aperiodic traffics as described in 3GPP TR 36.816 are considered for developing the Rel-18 IDC TDM solution in RAN2.
* Autonomous denial solution is supported in Rel-18 IDC, RAN2 will not introduce other solution on aperiodic use case (i.e. no report from UE on this aperiodic issue).

## RAN2#121

### FDM

* Adopt Option 1 based frequency range reporting to the network i.e Center frequency + bandwidth in KHz/MHz for the actual affected frequencies is reported by the UE to the network for addressing IDC problem in R18.
* Take the ASN.1 framework for option 1 as a starting point in the Text proposal section and work on the following enhancements
  + 1. Add granular values for band width (including BW in KHz/Mhz) to cover all the scenarios involving Wi-Fi, GNSS, BT
  + 2. Add the other IEs such as direction of interference.
  + 3. Add combination of frequencies’ range for addressing IMD scenarios.
  + 4. Check whether to reuse maxFreqIDC-r16, or define maxFreqIDC-r18
* In MR-DC scenarios, SN can also configure the UE for IDC reporting in SN, including both FDM and TDM solution.
* no additional co-ordination is needed for IDC configuration, apart from the existing mechanism between MN and SN (i.e. candidateServingFreqListNR in CG-Config for EN-DC).
* The gNB configures the candidate frequency ranges using (centre frequency + bandwidth) for which the UE should report IDC issues. Network may indicate the whole bandwidth of the freq.
* The frequency range (centre frequency + bandwidth) reported by the UE shall at least overlap with the frequency range (centre frequency + bandwidth) configured by the network.
* The centre frequency reported by the UE is within the frequency range (centre frequency + bandwidth indicated by network in the configuration) configured by the network.
* If the UE detects interference in both directions for one candidate frequency range indicated by the gNB, the UE can report two affected frequency ranges with the respective interference direction, as legacy. No extra specification change is required.
* LTE MN does not configure the UE with R18 NR IDC configuration.

### TDM

* The NR values of long/short DRX cycle and start offset are used for periodic pattern. RAN2 will not introduce new DRX value for network configuration for IDC purpose.
* The slot offset with 1/32ms granularity is included in UEAssistanceInformation-v18xy-IEs for start offset.
* Multiple periodic patterns for IDC are not supported in R18.
* Per CG pattern is supported for MR-DC. SN can configure the UE to report the TDM assistance information directly to SN, either through SRB 1 (if SRB3 is not configured) or SRB 3.
* FFS whether any additional coordination is needed for network to resolve the problem when network receives the reporting from UE.
* Slot as time unit for autonomous denial
* Agree to send LS to RAN4, indicate the progress in RAN2
* For NR-DC, per CG idc-AssistanceConfigTDM-r18 is introduced to indicate whether TDM assistant information needs to be reported.
* For NR-DC, per CG idc-AssistanceConfigFDM-r18 is introduced to indicate whether FDM assistant information needs to be reported. FFS on dependency between FDM and TDM configuration.
* The values of drx-onDurationTimer in NR is used as the baseline for active Duration in UE assistant information. FFS on other values.
* The same values of validity period and number of denial slots as in LTE is reused. FFS on other values.
* The autonomous denial configuration is per CG.

### 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.