[95e-31-R17-RedCap-WI] - Version 0.0.6
RAN

3GPP TSG-RAN Meeting #95e RP-220891

e-Meeting, March 17-23, 2022

Agenda Item: 9.5.1.7

Source: Moderator (RAN1 VC, CMCC)

Title: Summary of email discussion [95e-31-R17-RedCap-WI]

Document for: Discussion and Decision

1 Introduction

In RAN#95-e, contributions [1-17] are submitted for seeking guidance or confirmation from RAN on how to proceed with the ongoing issues in RAN1/2/4. This document is created to summarize the issues, collect company views, and reach conclusions on the issues raised relating to the Rel-17 RedCap WI.

2 Issues for discussion

2.1 Issue 1: WI status

The rapporteur has submitted:

- RP-220135 [1], SR, reporting 90% core part completion, 25% performance part completion, and requesting additional core and performance part TUs.
- RP-220292 [2], exception sheet, proposing what core part open issues shall be worked on during 2022-Q3 in RAN1 and RAN4.
- RP-220293 [3], Revised WID, updating the specification target completion dates to match the SR and exception sheet.

RP-220403 [7] expresses support of Rapporteur's action, while RP-220784 [16] thinks that no exception sheet is foreseen necessary at this stage, including RAN4. Specially, to be pointed out from moderator's review, No TU is requested for RAN1 in RP-220135 [1] though exception sheet is submitted.

2.1.1 RAN1 related

The SR RP-220135 [1] and exception sheet RP-220292 [2] suggest RAN1 open issues are:

- Clarification of UE behaviour when separate initial DL BWP is not configured

- Presence of SSB transmission in separate initial DL BWP in connected mode for BWP#0 configuration option 1
- Collision handling between SSB and Msg3 or PUCCH in response to Msg4/MsgB for HD-FDD UE

The moderator observes RAN#94e took the approach that the RAN1 parts of the WI were of sufficient completion to move the WI into its maintenance phase, and further progress on that basis is reported in the latest SR. The company paper RP-220784 [16] which discusses these issues in detail provides analysis on why the issues can be left to RAN1 to handle, if handling is needed.

To be mentioned for the maintenance phase, there is clear guidance from MCC that we should distinguish two phases,

A. an ongoing WI/SI: % complete is <100%:

Here you should bring cat.B CRs to complete the work.

(Or a cat.F CR if you correct something that is already in the 3GPP specifications.)

B. ”maintenance phase”: starts after a WI/SI is 100% complete

Here cat.B CRs are strictly forbidden.

Only essential corrections (cat.F) to broken functionality are possible.

Based on this knowledge, it means if above RAN1 open issues [1] are confirmed to be addressed to guarantee the complete functionality rather new functionality, they can be treated with cat.F CR in maintenance phase, and exception sheet seems not necessary at least for RAN1 part in this meeting. moderator thinks the key point is whether we can confirm above RAN 1 open issues are essential to be fixed.

Thus, moderator would like to check views on Proposal 1a and 1b.

Proposal 1a: No exception sheet is necessary for RAN1 in this meeting. If not agreeable, what to be captured into the exception sheet?

Proposal 1b: The SR includes the RAN1 open issues as it did in RAN#94-e.

Feedback Form 1: Is proprosal 1a agreeable?

1 – vivo Communication Technology Yes. The RedCap WI has been declared as 100% complete from RAN1 perspective in RAN#94e and after which the WI was only treated in Feb. meeting but not the Jan. meeting and 20 more conclusions/agreements were made. The mentioned remaining issues are minor issues, although there are desire to continue discussing on those, but in our view system works even without additional conclusion on those issues.
2 – TELECOM ITALIA S.p.A. Open issues are not corrections. therefore they should be either removed or an exception sheet approved. See the comment from Vivo:

The mentioned remaining issues are minor issues, although there are desire to continue discussing on those

3 – Apple Poland Sp. z.o.o.

Yes.

In details, the issue 1 is sort of optimization to reduce signaling overhead and system works even without any conclusion on it. Regarding issue 2, without any conclusion, the separate initial DL BWP without NCD-SSB would not be used for RAR for RRC_CONNECTED UE, which still does not result in broken function and system works well for Redcap. On issue 3, a working assumption has been made in RAN1 108 meeting and it was addressed in our view. Long in short, we think it is reasonable to claim the WI completion and continue the discussion in RAN1 for the issue 1/2 as usual business.

4 – New H3C Technologies Co.

The RedCap WI should be 100% completed. The remaining issues are desire to be treated during the maintenance phase

5 – CATT

Yes.

For the first two issues, they are kind of optimization problems, and the system still work even without any further RAN1 agreements. The third issue almost addressed (a WA was reached) and the WA is to be confirmed very soon.

Do not see strong need to pursue an exception sheet.

6 – China Mobile Com. Corporation

Proposal 1a is agreeable. The WI was already claimed 100% completion for RAN1 part in RAN#94e meeting. The remaining issues can be resolved in maintenance phase and cat F CRs are sufficient

7 – Intel Corporation (UK) Ltd

It is not normal practice but we can accept that the SR still lists the open issues for RAN1 without having exception request for RAN1. We can also accept not listing them in the SR as long as this does not imply that the open issues are pushed under the rug.

8 – Intel Corporation (UK) Ltd

(please ignore previous comment - that was for Proposal 1b)

Yes, it would be reasonable to not include RAN1 in the exception sheet. As explained by the Moderator, these are essential items necessary to have complete functionality of the feature, and thus, can be addressed with Cat F. CRs as part of maintenance.

9 – Samsung Electronics Co.

Agree with the proposal. We share similar views with other companies that from RAN 1 perspective, this WI is complete. The function design for Redcap is complete and system can work without update.

10 – ZTE Corporation

Yes.

For the first issue: Clarification of UE behaviour when separate initial DL BWP is not configured, according to the RAN2 CR 5.2.2.4.2 In R2-2203558, actually a separate initial DL BWP should be configured when the initial DL BWP of non-RedCap UE is larger than the maximum RedCap UE bandwidth. Therefore, option 2a and option2b are kind of optimization which is not aligned with current RAN2 spec and should not be pursued.

For the second issue: Presence of SSB transmission in separate initial DL BWP in connected mode for BWP#0 configuration option 1. If legacy behavior and current agreement is followed and assume 6-1a is not supported, then the separate initial DL BWP should contains the SSB in connected mode, which means NCD-SSB/CD-SSB should be contained for transmission, else, separate initial DL BWP should not be used in connected mode.

For the third issue, I think it has been agreed as the WA. So, it is not a critical issue.

So, we support no exception sheet is necessary for RAN1 in this meeting.

11 – Spreadtrum Communications

Basically agree with vivo. The issues can be solved in maintenance stage.

For issue of "clarification of UE behavior", how to avoid the RF retuning should be discussed in RAN1. No RF retuning is common understanding in my memory, but selection of "center frequency alignment b/w CORESET#0 and initial UL BWP" and "the total frequency span is not greater than RedCap UE BW" should be decided by RAN1. On the other hand, which IE should be optional (genericParameters or its parent IE) should be decided by RAN2 to really save the signaling overhead.

12 – Panasonic Corporation

We agree no exception sheet is necessary for RAN1 in this meeting.

13 – NEC Corporation

Yes. We share similar view with other companies. RAN1 part of work has been completed.

14 – Ericsson LM

We are fine with or without RAN1 issues in the exception sheet, but the bar for different WIs should be the same. If other WIs with a similar situation do not have an exception sheet, then this WI should not have it either.

15 – Nokia Corporation

Nokia: The listed open issues in the SR are accurate from our point of view, and listing them improves transparency and focus in completing the remaining work by June. The RedCap RAN1 specifications are not fully functional until the listed open items are completed. Hence, in our view it is important to request exception sheet for the remaining open items including RAN1 open items and we strongly support the exception sheet.

16 – Huawei Tech.(UK) Co.. Ltd

Agree on no exception sheet. It would be strange for RAN to revert its own decision from December that the WI is now handled under maintenance, and back-out the WI to being functionally ***in***complete despite the WGs having made further agreements on the identified issues. It is not clear what purpose this would serve since the RAN1 planning and handling seem to present no problem in handling the WI in its current maintenance status.

Further, the rapporteur's submission of an exception sheet with (oddly) no TU request is essentially saying that the WI is in the maintenance stage, since an exception sheet requires a TU allocation to allow the WI to continue from an incomplete status.

17 – LG Electronics Inc.

Yes, we can declare the WI is complete. The remaining issues can be managed in the maintenance phase.

18 – Xiaomi Communications

Yes. We support proposal 1a. The remaining issues are not essential and these are kind of optimization. And we are open to further discuss these remaining issues in the maintenance phase.

19 – Qualcomm Incorporated

Agreeing with Proposal 1a. The RAN1 part can be maintained as complete and no exception sheet is necessary.

20 – VODAFONE Group Plc

It seems there is a majority view that the listed item can be handled in the maintenance phase so no exception may be required (at least the collision handling can fallback to legacy procedure although there is a WA already). Nonetheless we prefer to list them in the SR as in the previous meeting.

21 – Guangdong OPPO Mobile Telecom.

Agree the proposal 1a, RedCap is 100% done

We don't prefer to list the open issues in the SR. Bassically we think those FFS and WA in RedCap only have very minor issued can be solved by TS editor.

Feedback Form 2: Is Proposal 1b agreeable?

1 – vivo Communication Technology

No.

As commented in Proposal 1a, the WI should be considered as 100% complete from RAN1 perspective and any remaining discussion should be handled as usual maintanence as most of the other Rel-17 WIs. Therefore, no RAN1 open issues should be explicitly listed in the SR.

2 – Apple Poland Sp. z.o.o.

No.

As elaborated earlier, the open issues is sort of optimization although they can be further discussed in RAN1

during maintenance phase. There is no need to listed them in the SR report.

3 – New H3C Technologies Co.

No. See our comment in proposal 1a

4 – CATT

Prefer not to agree on Proposal 1b. Let's go to 1a.

5 – China Mobile Com. Corporation

NO.

6 – Intel Corporation (UK) Ltd

It is not normal practice but we can accept that the SR can still list the open issues for RAN1 without having exception request for RAN1. We can also accept not listing them in the SR as long as this does not imply that the open issues are pushed under the rug.

7 – Samsung Electronics Co.

Don't agree with the proposal. We think there is no need to list the issues based on the endorsed CR in RAN 1 and RAN 2. If some clarifications are needed, we can some discussion in the maintenance phase.

8 – Samsung Electronics Co.

(just to elaborate our comment)

For #1: Clarification of UE behavior when separate initial DL BWP is not configured.

No need to list this as open issue, and it can be discussed during ASN.1 review of the presence on separate initial DL BWP. Perhaps to always provide separate initial DL BWP in such case would be cleaner (considering TDD scenario).

For #2: Presence of SSB transmission in separate initial DL BWP in connected mode for BWP#0 configuration option

We think this is clarification for some certain configuration, while the system can work with proper configurations. If needed, the issue can be clarified in the maintenance phase.

For #3: Collision handling between SSB and Msg3 or PUCCH in response to Msg4/MsgB for HD-FDD

Current endorsed TS 38.213 already covered the working assumption for this issue. There is no need for further discussion.

9 – ZTE Corporation

No, as mentioned in proposal1a, these issues are not critical.

10 – Spreadtrum Communications

No

11 – Panasonic Corporation Our preference is no need to list them but also ok to capture them.
12 – NEC Corporation No.
13 – Ericsson LM We are fine with or without RAN1 issues in the exception sheet, but if the exception sheet does not list RAN1 issues, then the SR should not list RAN1 issues either.
14 – Nokia Corporation See answer for Proposal 1a above. Given that we support an exception sheet for this item, such open items should be listed in the SR as well, as usual. But it is not sufficient to only have the open item listed in the SR since RedCap RAN1 specifications are not yet fully functional.
15 – Huawei Tech.(UK) Co.. Ltd No. SRs should not be used to float open issues up to RAN repeatedly, once a WI is completed. Either the WI is in maintenance, in which case there are not open core part issues, or it is incomplete, and the open issues are used (at this end of Release timepoint) to decide whether to remove the feature from Rel-17. Since no-one is proposing to delete RedCap from Rel-17, and the functional freeze is now here, the open issues list in the SR should be empty. RAN1 has its preparation phase and FL summaries as the proper way of adequately capturing and prioritizing the issues companies think are essential to correct.
16 – LG Electronics Inc. No strong preference. We think they will be discussed anyway.
17 – Qualcomm Incorporated No strong view. Ok with listing items in the SR, also ok with not having it.
18 – VODAFONE Group Plc We support to have the listing items in the SR even if no exception sheet is agreed.
19 – Guangdong OPPO Mobile Telecom. Not supportive

2.1.2 core part

RF part:

RF requirements for FR1 and FR2 were agreed in RAN4#102e according to the SR [1].

RRM part:

- RRM requirements for the following aspects are not finished yet according to the SR [1]
- Measurement requirements in RRC_IDLE/INACTIVE states
- Requirements for RRC_CONNECTED state mobility
- Timing requirements
- Signalling characteristics
- Measurement requirements in RRC_CONNECTED state

2.1.3 performance part

The SR R1-220135 [1] reports 25% performance part WI completion, and requests extension with target completion date of December 2022, and additional TUs:

Table 1:

	RAN4#103	RAN#96	RAN4#104	RAN#97	RAN4#104bis	RAN4#105	RAN#98
R4RD	0.5	Jun. 2022	1	Sept. 2022	0.75	0.5	Dec. 2022

The moderator observes that, there are a few open issues till this RAN meeting, and if the RAN4 core part is extended to June 2022, the performance part would customarily be extended to December 2022 (RAN#98), though [15] proposes not to extend in this meeting.

Proposal 2a: Confirm whether the open issues for RAN4 part in the exception sheet [2] are agreeable.

Proposal 2b: The performance part Rel-17 RedCap WI target completion date is extended to 6 months after the core part target completion date, and is allocated the relevant meetings of the TU allocation requested in the SR (see Table 1).

Feedback Form 3: Could we confirm the open issues for RAN4 part in the exception sheet?

1 – China Mobile Com. Corporation There are open issues for RAN4 RedCap core part, especially RRM part. Exception sheet is required. We are OK with the open issues for RAN4 part in exception sheet.
2 – Intel Corporation (UK) Ltd Yes, we agree.
3 – Huawei Technologies France We think the RAN4 RF part “Agree RedCap operating band list in FR1 and add the operating band clause” in the exception sheet is not needed, which is also related to the discussion in Issue 5 for the CR of operating bands.

4 – MediaTek Inc.

On RF core part, this issue is the same as Issue 5. We suggest to discuss this in Issue 5, rather than having parallel discussions in Issues 1 and 5.

On RRM core part, we would like to add some scope limitation to the RRM part in current exception sheet to guarantee all works can be done in the next quarter. The problem is that there are too many different network configurations regarding

- whether NCD-SSB is configured
- whether the CD/NCD-SSB is within UE's active BWP
- whether the measurement gap is configured for UE to measure CD-SSB which is not in the active BWP part

The more different network configurations to be considered implies the more scenarios to define the RAN4 requirements, which will consume a huge amount of RAN4 time and effort. Due to the very limited time for discussion in next quarter, we would like RAN4 RRM session to only focus on the essential/typical scenarios. Therefore, we suggest to add the note that all the CONNECTED mode RRM requirements are limited to the following 2 scenarios

- 1) CD-SSB is configured in UE's DL active BWP
- 2) CD-SSB is outside of UE's DL active BWP, but one NCD-SSB is within UE's DL active BWP

5 – Ericsson LM

Yes

6 – Nokia Corporation

Support the proposals 2a and 2b.

7 – DENSO CORPORATION

Agree

8 – Apple Poland Sp. z.o.o.

Yes, we are fine with both Proposal 2a and Proposal 2b.

9 – Guangdong OPPO Mobile Telecom.

We are ok for the propsal

Feedback Form 4: Is Proposal 2b agreeable?

1 – China Mobile Com. Corporation Support. Considering there are one WG meeting in each following two quarters, we agree to extend the performance part accordingly.
2 – Intel Corporation (UK) Ltd Yes, the proposal is agreeable.
3 – MediaTek Inc. Yes
4 – Ericsson LM Yes
5 – vivo Mobile Communication Co. Yes
6 – Nokia Corporation Support the proposal
7 – DENSO CORPORATION Yes
8 – Beijing Xiaomi Mobile Software Yes, support the proposal 2b
9 – Apple Poland Sp. z.o.o. Yes

2.2 Issue 2: RedCap UE features

Contribution [4-6,9,11,13,15,16] provide respective views on the reporting type/granularity of FG 28-1 and FG 28-3, the following table epitomizes the main content of the RAN1 UE feature list for RedCap [5].

Table 2:

Features	Index	Feature Group		**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)**

NR_redcap	28-1	RedCap UE	1. Maximum FR1 RedCap UE bandwidth is 20 MHz. 2. Maximum FR2 RedCap UE bandwidth is 100 MHz. 3. Early indication of RedCap UE in Msg.1 for 4-step RACH 4. Separate initial UL BWP for RedCap UEs - It includes the configuration(s) needed for RedCap UE to perform random access - Enabling/disabling of frequency hopping for common PUCCH resources 5. Separate initial DL BWP for RedCap UEs - It includes CSS/-CORESET for random access - FFS: For separate initial DL BWP used for paging, CD-SSB is included - For separate initial DL BWP only used for RACH, SSB may or may not be included FFS whether to add any other basic features for RedCap UE	[Per UE]
NR_redcap	28-3	Half-duplex FDD operation type A for RedCap UE	1. Half-duplex FDD operation (instead of full-duplex FDD operation) type A for RedCap UE	[Per band]

2.2.1 Issue 2-1: FG 28-1 (RedCap UE)

A bit more specific, contribution [4-6,13,16] defend **reporting "Per UE" of FG 28-1** by referring to "***Specify definition of one RedCap UE type including capabilities for RedCap UE identification and for constraining the use of those RedCap capabilities only for RedCap UEs, and preventing RedCap UEs from using capabilities not intended for RedCap UEs including at least carrier aggregation, dual connectivity and wider bandwidths***" formulated in the WID, as well as the potential operation obstacles. Contribution [9] defends reporting "Per UE" of FG 28-1 by obviating defining special handling rules in RAN2 as well as prevent UE from pretending to be non-RedCap to the network. Contribution [15] specifically points out "***One argument in favor of such per band indication is that in some bands a UE supporting optional features for RedCap UEs such as 2RX and 256QAM, and fulfilling all requirements for regular UEs, would be indistinguishable from a regular UE. However, this is not necessarily correct, as there are also RAN2 capabilities to be considered, as well as higher layer aspects, such as charging, cell barring, etc. RAN4 requirements are not available yet either, hence it is not really possible to judge yet what it would mean in practice if some UEs are satisfying RedCap requirements in some bands.***"

Contribution [11] proposes that reporting type/granularity of FG 28-1 should be "Per band" instead of "Per UE". To defend its proposal, [11] claims:

- **In FR1 below 2.5 GHz, there are FDD and TDD bandswith CBW no more than 20 MHz and requiring a R15/16 eMBB UE to have a minimum of 2 RX branches**
- **On these bands, a "high-end" Rel-17 RedCap device supporting the envelope of radio and upper layer capabilities (2 RX, FD-FDD, 256 QAM, and etc.) will behave the same way as a Rel-15/16 eMBB UE, without using capabilities not intended for RedCap UE**
    - Such high- - end p RedCap UEs can access the legacy cells supporting R15/16 eMBB UE without requesting NW to upgrade its HW/SW
- **Benefits of "Per Band" Reporting for FG 28-1**
    - Improve deployment flexibility of Rel-15/16/17 NR UEs
    - Reduce cost/latency to roll-out Rel-17 RedCap UEs
    - Better co-existence with legacy NR UEs without causing market fragmentation
    - Simplify IODT testing and avoid negative interaction with UE testing on NTN and unlicensed spectrum
    - No need for xDD and FR differentiation
    - Compliant with WID requirements and previous agreements in Plenary/WGs
- **"Per band" reporting will NOT violate the restrictions on R17 p RedCap UE, including CA, DC, wider CBW, more than 2 Rx branches, and etc.**
- **The mandatory restrictions imposed on p RedCap UEs will prevent a non-RedCap UE (supporting CA/DC/wider CBW/more than 2 Rx branches/advanced upper layer functionalities) to declare itself as "RedCap UE"**

The moderator assumes that the technical points summarized above have been considered during WG discussions before formulating company views submitted to RAN, and observes that there are explicit preference and reasoning for companies to bring this to RAN for a resolution, e.g. RAN2 WA is pending confirmation, operator's business plan is beyond WG discussion, WID requirement is differently interpreted, therefore RAN intervention seems to be needed for WG progress. Given that a substantial majority of those submitted views prefer 'per UE' reporting, and the claimed benefit of "Per band" for the network seems not agreeable to some operators [15], the moderator suggests

Proposal 3a: FG 28-1 is reported per UE.

Feedback Form 5: Is Proposal 3a agreeable?

1 – Nordic Semiconductor ASA We support the proposal.
2 – KT Corp. KT supports the proposal to keep FG 28-1 is reported per UE.
3 – Classon Consulting [for FUTUREWEI] We support the proposal, which should also be viewed as the result if there is no consensus to adopt the "per band" + handling rules extension.
4 – Deutsche Telekom AG Support (this was always the intention)
5 – TELECOM ITALIA S.p.A. Support the rapporteur proposal (see comment from DT), and object to the proposal "per band"
6 – New H3C Technologies Co. We support this proposal.
7 – CATT We support FG 28-1 to be 'per UE'.
8 – NTT DOCOMO INC. We support the proposal. Even if "high-end" Rel-17 RedCap UE supporting the envelope of radio and upper layer capabilities (2 RX, FD-FDD, 256 QAM, and etc.) reports FG 28-1, it is completely up to NW whether to handle the UE as "RedCap" or "Non-RedCap" since those capabilities are reported separately from FG 28-1. We don't see any necessity to report per band yet. Maybe only the benefit to report per band is to simplify IODT testing on RedCap-specific UE behavior in FG 28-1 (e.g., separate BWP, early indication) for UE supporting the envelope of radio and upper layer capabilities, but it is band-agnostic, in our understanding.

9 – China Mobile Com. Corporation

We support proposal 3a. Originally, we think that "Per band" has its merit for the gNB which will offer its service to RedCap UE without any upgrading, even no need to recognize the capability signalling from Redcap UE, however, if take the operation issues or policies into account, it is really justifiable for requiring RedCap UE to give the information to network for distinguishing it from normal UE.

10 – Intel Corporation (UK) Ltd

Yes, we support the proposal.

With per-band reporting, effectively a new type of RedCap UEs are going to be defined resulting in at least two types of RedCap UEs – (1) UEs that are RedCap UEs in all bands that the UE supports; and (2) UEs that are RedCap UEs in some while are non-RedCap UEs in some other bands. This goes against the WI objective of defining a single type of RedCap UEs as it was never the intention to define a "single type of RedCap UE *per band*".

In our understanding, all the discussions so far have been on the assumption that RedCap will be a per UE capability, and CRs have been created under this assumption. For example, looking at the 38.331 CR, there are many references to "a RedCap UE". If we were to now change to a 'per band' assumption then all these occurrences will need to be reviewed and updated to make it clear if and how the band needs to be considered. This could be done but it may not be totally trivial and will consume time and effort.

Also, even with per-band reporting type, the gNB/NW may need to be updated anyway if the associated proposal "*If a R17 UE indicates FG 28-1 for at least one band, it will NOT be allowed in any band to support features restricted for RedCap UEs, including CA, DC, wider CBW and more than 2 Rx branches*" is to be enforced by the network.

It is also not clear how the CN can know that a UE is RedCap UE or not if the RedCap UE accesses the network from non-RedCap band via legacy gNB. This may impact CT1/SA.

11 – SoftBank Corp.

We support the rapporteur proposal. It is not clear to need this kind of hybrid-UE.

12 – CTSI

We support the proposal.

13 – vivo Communication Technology

No.

As discussed, in some low frequency bands with max CBW<=20MHz, there is no much room for UE cost reduction thus a device may support the full functionalities and requirments that are mandatory for non-RedCap UEs, and the same device may also support a higher TDD bands where cost reduction is necessary by reducing BW (100MHz->20MHz), reducing #Rx number (4->2), etc.

For such a device, per band indication allows it to indicate non-RedCap (by not indicating 28-1) in the low bands and RedCap (by indicating 28-1) in the higher bands. By per UE indication, UE will have to either

no indicating support of the low bands, or indicating as RedCap for the low bands even though it fullfills all the requirment mandatory for non-RedCap UEs.

The problems for the per UE indication on these low bands would be

1) UE may be barred by the cell in the low band unnecesarily -> degrades the user experience.

2) UE may be specially treated by the cell in the low band during initial access -> degrades the user experience.

3) IODT issues due to unavaiability of some components of 28-1 (e.g. early indication, NCD-SSB etc) on these low bands, as observed in RP-220305 -> either: force the device to indicate not support of these low bands, or delay the time-to-market of such device.

To respond the concern from companies against per band signaling

1) On those low bands with CBW<=20MHz, the above mentioned device can perform exactly the same as non-RedCap UEs, therefore no performance degradation from the NW perspective. Thefore NW does not need to differentiate these devices on these low bands. There is no RedCap UE that can ”camouflage” as a non-RedCap UE by this proposal.

2) The current proposl of per-band includes strong restrictions, in order to address the concern that low-end smartphones may be allowed by per-band indication, as proposed in P5 of RP-220613

- If a R17 UE indicates FG 28-1 for at least one band, it will NOT be allowed in any band to support features restricted for RedCap UEs, including CA, DC, wider CBW and more than 2 Rx branches

14 – Samsung Electronics Co.

Yes

15 – ZTE Corporation

We support it as ‘per UE’ reporting. If we introduce per band reporting, it will essentially introduce a new UE type i.e a hybrid UE type with complexity somewhere between RedCap and non-RedCap UEs. Even with some of the RedCap restrictions applicable to all bands as proposed in RP-220613, there are potential issues in the bands the UE declared itself as non-RedCap UEs even these bands has <=20MHz bandwidth. It is not clear whether the proponents of RP-220613 want to support all the mandatory UE features supposed for normal UEs. To make the UEs compatible with the existing network, the UEs have to support all the Rel-15/16 normal UE mandatory features (including 256QAM and higher layer mandatory capabilities, etc). Otherwise, this will require network upgrade to identify whether the UE supports these legacy mandatory features. If the UEs support these mandatory features for these bands, this is inconsistent with the principle of Redcap UEs with reduced complexity.

This certainly will have risk of market fragmentation. It also increase the network complexity to manage different types of UEs.

16 – Spreadtrum Communications

Yes

What we really care about is the smooth deployment of Re.17 RedCap. Some operators show their great concerns to deploy RedCap UEs as normal UEs in legacy cells especially from commercial point of view,

per band indication will leave the door open for that. This may lead to operators uncertainly or reluctantly deploy RedCap in their R17 network, and jeopardize the real RedCap deployment and its ecosystem. Thus, at this stage, per UE indication is more suitable .

17 – Panasonic Corporation

We support the proposal. For the argument of per band, ”without requesting NW to upgrade its HW/SW” requires not to report ”this is RedCap UE”. Our understanding is ”in FR1 below 2.5 GHz, CBW no more than 20 MHz, the UE behave the same way as a Rel-15/16 eMBB UE” can declare ” Rel-15/16 eMBB UE” by supporting only these bands.

18 – NEC Corporation

We support the proposal.

19 – Ericsson LM

Yes (see motivation in our contribution RP-220315)

20 – MediaTek Inc.

We support the proposal, i.e. ’per UE’ reporting.

RAN2 discussed and discarded another flavour of this proposal in the form of ’fallback operation’. It’s odd that the same proposal is now coming up with a different name. One of the issues (identified in RAN2) was connected mode mobility. If the UE connects as a legacy UE to a legacy gNB, what happens in case the gNB triggers this BW-limited UE to handover to a different legacy gNB that operates in a band >20MHz? The legacy gNB is unaware of the BW limitations of the UE in any band.

Furthermore, we have a similar understanding as Intel. All discussions so far have assumed that RedCap will be a per UE capability (based on the WID description). Changing this fundamental assumption has ramifications across WGs, introducing more delays to completing this WI (contrary to the proponents’ argument that this will enable fast time-to-market). It is also unclear how the CN would know if a UE is a RedCap UE or not, when the UE connects to a legacy gNB.

21 – Nokia Corporation

Support the proposal, as this is aligned with the WID and with the work done in the WGs.

22 – DENSO CORPORATION

Support per UE signalling. For lower bands less than or equal to 20 MHz, the legacy UE can be used i.e. w/o RedCap functionalities.

23 – Huawei Tech.(UK) Co.. Ltd

Agree. We see at least the following issues with reporting FG 28-1 “per band”:

- It is not expected that a Rel-17 RedCap UE could masquerade as a smartphone in some other band. This was ruled out for Rel-17.

- If such capability is per band then it allows a RedCap UE to slip past the current access control for deprioritizing RedCap UEs, beyond the operator's control.
- Companies supporting per-band report of RedCap UE type may want to avoid implementing some of the RedCap Rel-17 features on bands that are not larger than 20 MHz, by signaling a normal UE capability type for such band. This could lead to unwanted performance degradation. It is hard or impossible to predict that this will not happen in the future.
- Mixing support of RedCap/non-RedCap in different bands for the same UE complicates charging policies, and CN-related issues. It is likely to need a merry-go-round of LSs between RAN1/2 - SA2/CT1.
- Allowing RedCap UEs to mimic non-RedCap UEs will fragment the market of both eMBB (by different minimum performance requirements) and RedCap (by different device implementation of mandatory RedCap features)

24 – LG Electronics Inc.

We support the moderator's proposal.

25 – VODAFONE Group Plc

We support "per UE".

We understand the very significant benefit of global roaming but:

- if an NR network has not been upgraded to support RedCap, then there is a significant risk that the NR cell will hand the UE over to an NR cell with > 20 MHz bandwidth, leading to repeated handover failures; and

- (using pre-RACS concepts) the RedCap device can achieve global roaming by changing its NR UE Radio Access Capability (to indicate that it only supports bands with < 20 MHz bandwidth) based on the broadcast PLMN ID.

26 – Qualcomm Incorporated

Unfortunately, we will have to object to this proposal. If per-UE capability signaling is adopted, then quite obviously, what will happen is exactly what Panasonic describes in their comment (for the record, we agree with the description in the Panasonic comment but not with its conclusion).

If the RedCap UE is in an area where the only available <=20 MHz cell doesn't support RedCap, the UE will attach as a non RedCap UE. Seems a bit naive to assume this is not exactly what would happen. And when it does, it completely negates all the companies' arguments on why per-UE signaling is the right approach, including, for example, the Huawei arguments above.

If this is what the UE have to do, the network will never know the actual UE capabilities, leading to more problems and an obvious lack of available solutions.

We'd like to clarify that we are not proposing mobility support between 'RedCap' and 'non-RedCap' compatible networks.

Additionally, we'd like to clarify once again that a UE declaring non RedCap capability in a band will obviously need to meet all the relevant Rel-15/16/17 non-RedCap requirements in those bands, so it is quite puzzling what the previous commenters mean by "unwanted performance degradation".

27 – Deutsche Telekom AG

(mainly to Qualcomm/Peter:) As in the discussion yesterday: You claimed that for those bands a REDCAP UE would actually not be a REDCAP UE, but just a NO"RMAL (eMBB) UE FULFILLING ALL THE REQUIREMENTS of a "normal UE".

If this statement is true, please explain why we have this discussion at all ?! ... this is a bit strange as then the UE would just act "normally". So no specific handling is needed and we can close the discussion.

28 – TELECOM ITALIA S.p.A.

Second DT on the question on why we have to discuss this issue at all

29 – vivo Communication Technology

Respond to DT: As we commented in our early feedback above, per UE signaling force a multi-band device (with 2Rx and 20MHz BW capabiity) to indicate itself as RedCap (even thought it performs the same as non-RedCap UE) on band A (e.g. low band with CBW<=20MHz), due to the reason that the same device is reduced capability on another band B (e.g. higher TDD band with CBW>20MHz)

30 – BT plc

Support the proposal.

After being extensively discussed in RAN2, RedCap UEs are only allowed to access to RedCap cells. Non-RedCap cells are barred for RedCap UE therefore, per band signalling will add extra complexity without any benefit.

31 – Sequans Communications

Yes, we agree with "per UE" reporting.

32 – Qualcomm Incorporated

Responding to Deutsche Telecom and Telecom Italia.

- For many RedCap applications and use cases it is essential for a RedCap device to be able to operate in any NR network across the globe.
- The cheapest possible implementation that is able to fullfill this particular requirement has the following attributes:
    - Multi-band support with potentially large number of bands
    - No CA or DC support (not an NR smartphone)
    - Capability envelope, peak data rate comparable to LTE Cat3 (not an NR smartphone)
    - Support of many applicable FDD bands (whether the network got the RedCap upgrade or not)
    - Support of many applicable TDD bands (for the case it is the only one available)

Reducing the capability envelope to be less than that comparable with LTE Cat3 is making the viability of these devices questionable. Therefore not meeting NR 20MHz 2Rx eMBB requirements is also pointless, that's why we are discussing these devices.

==> Not enabling these devices to operate in every NR band will lead to likely opting for using LTE instead of NR.

==> This will result in the transitioning to NR from LTE and refarming spectum less viable even in the longer term, especially if there is a large number of such devices in the future.

33 – Xiaomi Communications

Firstly, we think RP-220613 contribution elaborates the benefits of indication per band well.

Secondly, regarding the concern raised by some companies on the indication per band, we have different understanding. The first concern is whether the UE only with bandwidth reduction could achieve the same performance requirement compared with regular UE. Currently, the mandatory capabilities supported by regular UEs are also supported by RedCap optionally. So, that's to say, same requirement is achievable. The second concern is the indication per band would block the different charging policy or some CN handling. In our understanding different charging or different CN handling can also be supported between UEs fulfilling the performance requirement of regular NR UE and the UEs which can't satisfy these requirements. Indication per band does not contradict applying different charging or different CN policy. The third concern is handover, as discussed in RP-220613, it can be solved by existing methods.

34 – THALES

Yes, we support the proposal.

35 – Sierra Wireless

Sierra Wireless does not support the proposal. There is only a minor complexity increase to report per band and the advantages of per band reporting are clear - most notably to reduce the roll-out time for Redcap UEs.

36 – Guangdong OPPO Mobile Telecom.

We would like to consider if the concern of "per UE" can be resolved by Operator if some 20MHz band cell can be allow and not bar RedCap UE. If that can be solved then there is not issue.

2.2.2 Issue 2-2 FG 28-3 (HD-FDD)

For FG 28-3, in contributions discussing FGs, [5,11,15] provides explicit proposals for FG 28-3, in which [5,15] clearly indicate that reporting type/granularity of FG 28-3 should be "Per UE" while [11] proposes "Per band" based on the understanding of the implementation of Duplexer in FDD band(s), e.g., ***"According to TR of Rel-17 RedCap SI, RF cost saving of HD-FDD is accumulative across FDD bands supporting RedCap UE" and "Duplexer is NOT shared among FDD bands that allow RedCap UE to access"***

Given the input documents, the moderator considers it makes sense to consider band-specific implement of Duplexer, and would like to propose

Proposal 3b: FG 28-3 is reported per band.

Feedback Form 6: Is proposal 3b agreeable?

1 – Nordic Semiconductor ASA

We support the proposal.

2 – KT Corp.

Initial motivation of REDCAP was to introduce 5G UE which does not necessarily needs to support full NR features. Having REDCAP UE per-band does not help introducing low-cost device where device needs to support full NR feature in other bands. KT suggests that FG 28-3 also should be reported 'per-UE'.

3 – vivo Communication Technology

Support. Maybe be good to note that LTE support HD-FDD feature and the capability indication is per band

4 – TELECOM ITALIA S.p.A.

Same view as KT

5 – CATT

Our first preference on FG 28-3 is still 'per UE'. However, we can live with 'per band' for FG 28-3, if FG 28-1 is confirmed to be 'per UE'.

6 – NTT DOCOMO INC.

We are fine with the proposal, but think it can be discussed in RAN1, since the discussion point is technical aspect only.

7 – China Mobile Com. Corporation

We can agree with proposal 3b since we see the point of QC's clarification on Duplexer.

8 – Intel Corporation (UK) Ltd

We think **per-UE** is sufficient in view of the original motivation of enabling low complexity UEs.

At the time when the objective of HD-FDD was debated for inclusion as a complexity reduction scheme, the main argument was that the RF cost/complexity savings from HD-FDD, although rather limited when considering a single band, can be accumulative when a UE may support multiple bands. Thus, the expectation was that HD-FDD support would, in practice, result in meaningful cost savings since typically a UE would be supporting multiple bands across which the RF cost savings would accumulate.

Now, it seems the same argument of "accumulative gains" is used to motivate a scenario when a UE may support HD-FDD only on some bands and still have duplexers for some other bands. Having discarded more promising complexity reduction schemes at start of the WI, defining a finely granular complexity profile now with per-band support of HD-FDD runs counter to the original motivation.

9 – SoftBank Corp.

We prefer it to be per-UE, but we can accept per-band indication if there is little cost effective according to the implementation of FDD duplexer.

10 – vivo Communication Technology

To respond to KT and Intel: It is true that device vendor is willing to reduce the cost/complexity as much as possible, however, there could be practical reasons that a UE cannot remove duplexer on all the bands, since operators on some of the FDD bands may not accept HD-FDD at all due to their service requirements. A multi-band device has to take all these aspects into acccount in the implementation.

Per-band indication gives the UE vendors flexiblity to handle such cases.

11 – Samsung Electronics Co.

We prefer per UE for FG 28-3 as well, but can live with per band.

12 – ZTE Corporation

We prefer that FG 28-3 is reported per UE but we can live with it if this can be a compromise to agree both proposals 3a and 3b

13 – Spreadtrum Communications

Yes

The Radio front design (filter) is band-specific, per band indication can bring the flexibility in radio front design. In addition, it seems there are no critical issues were observed for per band indication.

So we prefer Per band indication.

14 – Panasonic Corporation

As RF design can be different among bands, this should be per band.

15 – Ericsson LM

No, we prefer ‘per UE’.

16 – MediaTek Inc.

We are ok with this proposal

17 – Nokia Corporation

Agree with KT and others above that per UE indication is sufficient.

18 – DENSO CORPORATION

Agree that RF design for UE can be different amongst supporting bands and so support the proposal.

19 – LG Electronics Inc.

We think it’s a trade-off b/w the device cost/complexity and the flexibility. Being more interested in the cost/complexity, we slightly prefer the FG 28-3 to be per UE.

20 – VODAFONE Group Plc

We are OK with going per band on this proposal

21 – Huawei Tech.(UK) Co.. Ltd

The question seems to be what is the practical likelihood. It is true that the cost would be accumulative if the UE chose to implement more and more bands, hence, it seems to be more consistent for a UE to remove the duplexer for all bands in order to maximize the cost saving gain. We don't see the target use case/services for a UE tends to save its cost on one band but not on another band. This seems to question the real-world worth of per-band reporting.

There could also be a problem that, since a chipset is typically designed well before operators' band deployment plans are ready, if the HD-FDD reporting is per-band, a chipset may need to implement both HD-FDD and FD-FDD in each band to accommodate these unknown plans. This may add hardware complexity and also development complexity. Whereas, if the reporting is per-UE, the FD-FDD is either removed completely, or not removed at all. This tends to reduce complexity of hardware and development.

So overall, we are still questioning if per-band for HD-FDD is the best way to go.

22 – Qualcomm Incorporated

We support this proposal.

HD has been considered thus far an RF related capability, it lacks justification to re-categorize it as a baseband capability now.

Per-band capability signaling would not prevent any UE from setting the same value in every band it supports, on the other hand, per-UE signaling will quite likely reduce the viability of RedCap as a whole, because assuming that all the FDD networks will start providing RedCap support with HD-FDD included at the exact same time is quite unrealistic.

In order to gain the required scale for RedCap devices, the necessity of multi-band support by the RedCap UEs is quite likely. With per-UE HD-FDD capability, the UE would be forced into the common denominator of FD support in every FDD band (again because HD-FDD will not be implemented in all networks in all target bands at the same time) which makes the RF complexity of the multi-band RedCap devices uncompetitive and unattractive.

23 – Classon Consulting

[for FUTUREWEI] Agree with Intel

24 – Sequans Communications

No strong view. We are not opposed with the proposal, but also wonder to which extent per-band granularity will be useful.

25 – THALES

RF design can be different for the supported bands and hence we support the proposal.

26 – Sierra Wireless

Support the proposal

27 – Guangdong OPPO Mobile Telecom. Our first preference on FG 28-3 is still 'per UE' as in RAN1. In general, 'per band' for this Feature Group does not have problem, maybe, to accomodat some companies implementation.

2.2.3 Issue 3: RRM relaxation for non-RedCap UE

RP-220602 [10] provides two observations,

Observation 1: There are different views in RAN2 on whether RRM relaxation could be applied for non-RedCap UEs.

Observation 2: RAN4 understands eDRX and RRM relaxation are applied for RedCap UEs only. There is no discussion in RAN4 on whether these two features could be applied for non-RedCap UEs.

But it continues to provide company's understanding of the follow-up issue, and proposes that RRM relaxation can be applied also to *non*-RedCap UEs, suggests there is a common understanding to do so in RAN4, and points out that the RAN2 vice-chair had suggested the point for RRM relaxation could be raised in RAN.

RP-220651 [12] takes the opposite view, observing that RRM relaxation targets a truly stationary UE as compared to a low-mobility UE or a normal NR UE with generally frequent mobility; and being concerned that there would be impacts to other WI/features if RRM relaxation is extended to non-RedCap UEs.

Given the statement in the RAN2 meeting minutes, company views are invited on RRM relaxation for non-RedCap UEs.

Feedback Form 7: Is it in-scope of Rel-17 to support RRM relaxation for non-RedCap UEs?

1 – Deutsche Telekom AG Clearly NOT.
2 – Classon Consulting [For FUTUREWEI] It is not in scope.
3 – TELECOM ITALIA S.p.A. Not acceptable
4 – China Mobile Com. Corporation NO. RRM relaxation for RedCap targets for stationary UE which is quite different from normal non-RedCap UE with low mobility. And during the discussion in RAN4 requirements, only RedCap UE is considered. It may have impact on network performance if non-RedCap UE is allowed to perform RedCap RRM relaxation.

5 – Intel Corporation (UK) Ltd

This is not strictly in scope of RedCap WI. However RAN2 has agreed that eDRX capability applies for non-RedCap UE which is not strictly in the scope of WI. Therefore we think RAN can discuss whether to make this functionality (originally introduced for RedCap UEs) available to all UEs. We are open to make it available to all UEs.

6 – SoftBank Corp.

We share the view of CMCC, it is not in the scope.

7 – vivo Mobile Communication Co.

1. I think the question designed is somehow mis-leading, as I assume all companies agree that **eDRX and RRM relaxation are not in the scope of RedCap WI strictly**. It is not fair to only ask whether it is in-scope of Rel-17 to support RRM relaxation for non-RedCap UEs? RRM relaxation and eDRX have the same situation on the aspects of:

a) It is beneficial for UE's power consumption.

b) There is no functional difference between RedCap UEs and non-RedCap UEs.

With this understanding, **eDRX and RRM relaxation should be handled consistently.**

Then, the issue we need to discuss is **whether eDRX and RRM relaxation should be applied to non-RedCap UEs**.

If companies think RRM relaxation would not be applied to non-RedCap UEs due to procedure reason, i.e. WID scope, eDRX should have the same treatment.

2. Based on the discussion in RAN2, I think companies have common understanding that there is no additional effort in WGs to apply eDRX and RRM relaxation to non-RedCap UEs. The only standard impact is to restrict eDRX and RRM relaxation in the capability description and feature description, e.g. "xxxx ~~for RedCap UEs~~".

3. It is true RRM relaxation targets stationary UEs. But there is still stationary scenario for non-RedCap UEs. In these scenarios, network may configure RRM relaxation. All the determination is configured/controlled by network.

4. As we know, RRM relaxation feature in idle/inactive mode was first introduced for all UEs in Rel-16 PowSav WI. Now, further enhancements for idle/inactive mode in Rel-17 here, are naturally reasonable to be applied to all UEs, including RedCap and non-RedCap UEs. For RRM relaxation in connected mode, it is controlled and configured by the network via dedicated signaling. Thus, network could decide whether to confirm RRM relaxation for any UE. Therefore, we don't see any motivation to excluded non-RedCap UEs to use RRM relaxation features defined in Rel-17 RedCap WI, similar as eDRX.

8 – Samsung Electronics Co.

We support to extend this feature to normal UEs in general. Even if it is not the scope of WI, the feature itself can be applied to normal UEs as well, as the characteristics of "stationary" exists not only for RedCap UEs but also for non-RedCap UEs.

9 – HuaWei Technologies Co.

This is not in the scope of the WI, but we understand in previous RAN2 discussion this is allowed to be discussed in RAN plenary. As long as the impact to RAN2 is only the addition of UE capability reporting, we are open to discuss this.

10 – Ericsson LM

We prefer to specify the RRM relaxation feature for RedCap UEs only.

11 – MediaTek Inc.

We prefer to have RRM relaxation as applicable to RedCap UEs only.

12 – Nokia Corporation

No, the current WID clearly does not include RRM relaxtions to non-RedCap UEs. Rel-17 RRM relaxations are clearly applicable only for RedCap UEs considering limited capabilities such as number of receivers etc.

Furthermore, in our view RAN4 requirements would need to be defined for non-RedCap UEs if Rel-17 RRM relaxations were allowed to non-RedCap UEs, which would also increase workload in addition to negative system performance implications. Otherwise, Rel-17 RRM relaxations are clearly applicable only for RedCap UEs considering limited capabilities such as number of receivers etc.

13 – DENSO CORPORATION

Agree with Intel that eDRX can be supported by non-RedCap UEs, even though it is not in the scope of the RedCap WI. So, support of RRM relaxation for RedCap UEs can be discussed, according to the outcome in the last RAN2 meeting.

14 – NEC Corporation

No. This is not in the scope.

15 – Beijing Xiaomi Mobile Software

We prefer to have RRM relaxation as applicable to RedCap UEs only.

As we mentioned that in RP-220651, if we extend the it the normal UE, there would be impacts to other WI/features if RRM relaxation is extended to non-RedCap UEs.

16 – LG Electronics Inc.

No. according to WID, it is clear that RRM relaxation developed in Rel-17 should be restricted to RedCap UEs.

17 – vivo Mobile Communication Co.

To Nokia: We would like to provide more clarifications. According to the discussion on the relaxed requirements for RRM measurement and requirements for eDRX in RAN4, there is no such assumption that it is only for the limited capabilities or not, e.g. number of receivers etc. If companies agreed that the requirements for RRM relaxation and eDRX are only applicable for RedCap UEs, we could further confirm with RAN4. But we still think eDRX and RRM relaxation should have the same treatment in RAN2 and RAN4.

18 – vivo Mobile Communication Co.

To Xiaomi: we would like to understand more about your mentioned ”impacts to other WI/Features”. As indicated in your contribution RP-220651, ”there is some impact on RLM/BFD relaxation in PowSav WI”. But the trueth is: we only defined RRM relaxation on **Neighboring Cell** in RedCap WI. There is no impact on serving cell measurement. What you mentioned in your contribution is the reason we excluded RRM relaxation on serving cell at the very begining of Rel-17 RedCap discussion.

19 – ZTE Corporation

We also think the question is not formulated in the best possible way: it’s already acknowledged that, according to the current WID, RRM relaxation is only foreseen for RedCap UEs. The question should be on whether it’s desireable/acceptable to extend this feature to non RedCap UEs as well.

We don’t have a strong view on this but would like to make the following technical observations:

- An additional UE capability indication for non-RedCap UEs would not be useful, as it would not work for idle/inactive UEs (and for non-RedCap UEs in connected mode, existing capability bit could be reused, indicating the support of the reporting criterion fulfillment status).

- on the other hand, if UE vendors have a preference to extend this functionality to non-RedCap UEs, while operators want to be sure this can be restricted to RedCap UEs only, a possible compromise solution is to introduce a separate indicator in system information, used to control whether non-RedCap UEs are allowed to perform R17 RRM relaxation when R17 criteria are configured in SIB. This could make both sides happy.

20 – BT plc

It is not in the scope

21 – THALES

We support to extend the considered RRM relaxations especially stationarity requirement for REDCAP also to normal UEs. The underlying ”stationarity” assumption exists also for non-RedCap UEs. In case such features are not available for normal devices being in long-term stationarity scenario, i.e. could benefit from said feature these devices could re-appear as momentary REDCAP type devices.

22 – Sierra Wireless

It is not in scope

23 – Guangdong OPPO Mobile Telecom.

We prefer the capability for RedCap UE.

2.2.4 Issue 4: NCD-SSB for non-RedCap UE

RP-220602 [10] proposes that NCD-SSB can be applied also to *non*-RedCap UEs.

The moderator observes that the submitted document reports the clear RAN2 conclusion as below, and this to the moderator is rather not a critical issue that breaks the system nor blocking the progress, thus it does not seem appropriate for RAN to override the conclusion from RAN2 ”*The discussion on whether a non-RedCap UE should be able to use NCD-SSB instead of CD-SSB is deprioritized in Rel-17*”, nor to re-run, the RAN2 discussion.

Feedback Form 8: Does RAN need to intervene the RAN2 conclusion on the applicability of NCD-SSB to non-RedCap UE ?

1 – Nordic Semiconductor ASA

In our opinion, non-RedCap UE should at least be able to comprehend NCD-SSB configuration and be able to rate-match PDSCH . Such extra PDCCH rate-match pattern would not need to be configured to R17+ non-RedCap UE.

2 – China Mobile Com. Corporation

No. RAN should respect RAN2 conclusion: ”The discussion on whether a non-RedCap UE should be able to use NCD-SSB instead of CD-SSB is deprioritized in Rel-17”. No RAN discussion is needed.

3 – Intel Corporation (UK) Ltd

Same view as the Moderator - no intervention from RAN to override the RAN2 conclusion is necessary.

4 – HuaWei Technologies Co.

Same view as the moderator, no RAN discussion seems needed here.

5 – Ericsson LM

No

6 – vivo Mobile Communication Co.

In addition to RAN1 discussion, this issue will also impact on RAN1 UE capability structure, i.e. whether NCD-SSB should be a component of feature 28-1 or a separate FG.

From UE perspective, there is no additional effort for non-RedCap UEs to support NCD-SSB as RedCap UEs in Rel-17. It is beneficial for non-RedCap UEs to support NCD-SSB as RedCap UEs, e.g. by avoiding some retuning in case the active BWP contains only NCD-SSB.

From network perspective, network anyway needs to provide NCD-SSB as long as it is configured for one connected RedCap UE. Thus, there is no additional overhead for non-RedCap UEs to use NCD-SSB.

Thus, we prefer to extend NCD-SSB to be applied for non-RedCap UEs.

7 – Nokia Corporation

This was already deprioritized in RAN2. No need to repeat the discussion.

8 – MediaTek Inc.

No. We see no need to reopen this discussion in RAN. RAN should respect RAN2’s conclusion.

9 – VODAFONE Group Plc

We see benefits on non-RedCap UEs supporting NCD-SSB thus we agree with RP-220602’s Proposal 2

10 – NEC Corporation

No need.

11 – DENSO CORPORATION

Agree with moderator's view that there is no need to rediscuss here in RAN.

12 – ZTE Corporation

[as RAN2 VC - RedCap session chair in RAN2] Well, I personally wouldn't mind RAN intervention here ;-)

RAN2 indeed agreed that "*The discussion on whether a non-RedCap UE should be able to use NCD-SSB instead of CD-SSB is deprioritized in Rel-17*".

However, this does not formally imply a decision that NCD-SSB shall not be supported for non-RedCap UEs in Rel-17. If, at the end of the NCD-SSB discussion in the next quarter, for some reason it will become clear that - from a pure technical point of view - NCD-SSB support can be extended to non-RedCap UEs without any changes (apart from capability reporting), I expect that the proponents might bring up this issue again an push for a final decision. And this might escalate back to plenary once again. So I wouldn't mind if this RAN plenary could take a principle decision whether the support of NCD-SSB can be extended to RedCap UEs or not, clearly under the assumption that no additional changes for non-RedCap UEs are needed, on top of capability signalling (meaning that if the need for additional changes will be acknowledged in RAN2, this feature will anyway not be supported for non-RedCap UEs in Rel-17).

13 – Apple Poland Sp. z.o.o.

RAN4 made a conclusion in last RAN4 #102e meeting that "New NCD-SSB capability for non-RedCap UE: No need to discuss whether new NCD-SSB capability is to be introduced for non-RedCap UE." Given the conclusion in RAN2 and RAN4, it seems clear that NCD-SSB for non-Redcap UE is deprioritized explicitly.

14 – Guangdong OPPO Mobile Telecom.

Agree with moderator.

2.3 Issue 5: CR for operating bands

RP-220462 [8], company CR to TS 38.101-1, proposes to implement a new operating band section with proper suffix per RAN#93 agreement. RAN needs to decide whether or not to approve the CR. Company views are invited.

Feedback Form 9: Approve the CR in RP-220462? Yes/No

1 – Deutsche Telekom AG

Do we really need this ?

In the end we will end up with listing (nearly) all bands 3GPP defined (as for other features like NB-IoT where we started with a reasonable set of low bands end ended up with ... (many), similar for the discussion on concurrent B47/n47 with Uu bands and CA/DC combinations with LAA and NR-U etc ...

2 – CATT

Same quesiton as DT, and we feel the answer is NO.

For operating bands (including V2X, unlisenced, SUL) of RedCap, RANP already had an agreement in

RAN#93-e that 'The specification will not contain any explicit restriction to prevent implementation of RedCap UEs with these features'. Now RP-220462 is deviating from the RANP guidance, by listing RedCap-specific bands and precluding V2X, unlisenced and SUL bands from RedCap.

3 – China Mobile Com. Corporation

NO. Agree with DT. We do not see the reason to create a new RedCap band list which is most likely copied from original band list table. The table itself does not contain any requirements anyway. We support to reuse the existing band table by excluding SDL bands considering that CA is not supported.

4 – Intel Corporation (UK) Ltd

We are fine with the proposed CR, but are also open to continue the discussion in RAN4 as well.

In addition, we would like to note that it may be premature to approve the CR, since no other RedCap RAN4 CRs were agreed and it is expected that a full CR pack will be submitted for June plenary.

5 – CTSI

We don't support this CR. The CRs on RedCap UE RF requirements agreed in February RAN4 meeting are enough to close the RAN4 RF work.

Adding a long list of bands will complicate the RAN4 specification, and also bring workload for future maintenance.

6 – Huawei Technologies France

We share similar view with DT and CATT. The CR does not obey the RAN#93e agreement "The specification will not contain any explicit restriction to prevent implementation of RedCap UEs with these features", while with a band list but w/o some specific bands, in our view, it prevents UE to support SUL explicitly. The RF requirements of RedCap have already been completed after the Rx and Tx CRs were agreed in RAN4. The band list table is not needed. In addition, for the agreed Tx and Rx requirements in RAN#102e, there is no place in the specification to refer to the band list proposed in this CR, and the band list here just copy part of the content of Table 5.2-1, then what's the use of the band list table for RedCap? As commented by DT, we don't need to maintain two tables in the spec, which only burdens the group with unnecessary workload not to say it violates the RAN decision. So we disagree with the CR and don't think that there is a remaining issue in RAN4 RF for the band list.

7 – Ericsson LM

Yes

8 – vivo Mobile Communication Co.

According to the conclusion made in RAN#93e, we should not introduce RedCap specific change on the specification. Thus, this additional band list for RedCap may not needed.

9 – Nokia Corporation

We see some benefits on approving the CR, given that it clarifies some of the ongoing discussions regarding applicability of RedCap UEs to some bands.

10 – MediaTek Inc.

We support the CR as we feel it is useful and consistent with how features are normally added to the RAN4 specs, and does align with the RP#93-e way forward in our view.

However, if the CR is not approved, we would not like to send this back to RAN4 to discuss further, as it will not help, and we just agree the existing Tx and Rx CRs.

@Intel: There is a CR pack sent from RAN4 to this plenary meeting on this FR1).

11 – TELECOM ITALIA S.p.A.

Even if it seems to be a redundant exercise, we see some gain in clearly listing the supported bands (it avoids further misinterpretations as a minimum).

And we second the comment from Mediatek: let's avoid re-opening the discussion in RAN4

12 – China Unicom

We are not supportive with this CR, the contents are not aligned with RAN agreement "The specification will not contain any explicit restriction to prevent implementation of RedCap UEs with these features". And it is not necessary to maintain two band tables in the spec. Otherwise we can remove the whole band table from this CR.

13 – QUALCOMM JAPAN LLC.

We support this CR. For such features RAN4 has explicitly added the bands for which requirements are defined, there is no good reason to set a new precedent and not have the set of bands. Without this CR, would we automatically assume all bands are supported?

2.4 Issue 6: RRC CR

RP-220836 [17], CR pack, contains two CRs to TS 38.331 for RedCap, being R2-2204267 (CR2950) and R2-2204268 (CR2970). The main reason for proposing two CRs from RAN2 is different understanding on the endorsed proposal in RP-212634 [18],

- **Moderator's proposal for discussion in Friday GTW:**
  - In Rel-17, there will be no work on any RedCap specific specification update for any of the following:
    - RedCap UEs also supporting V2X/PC5 on n47
    - RedCap UEs operating in unlicensed bands
    - RedCap UEs supporting SUL
  - The specification will not contain any explicit restriction to prevent implementation of RedCap UEs with these features.
  - Note: The consequence of this agreement would be:

- if any spec change/addition is found necessary in order to enable one of the options above then it will not happen in Rel-17.

RAN definitely needs to decide which one should be approved. Company views are invited.

Feedback Form 10: Approve which one of 38.331 CR2950 or CR2970?

1 – Nordic Semiconductor ASA

In our opinion only CR2950 complies with the RAN guidance.

2 – Deutsche Telekom AG

[as RAN VC:] There is no Friday GTW ... !

3 – CATT

R2-2204268 (CR2970) should be adopted.

The baseline is that initial UL BWP can be configured in NUL and SUL for NR UE. Meanwhile, R2-2204267 (CR2950) additionally precludes SUL for RedCap UE, which creates difference. This does not follow the spirit of 'The specification will not contain any explicit restriction to prevent implementation of RedCap UEs with these features'.

4 – CMDI

As moderator of this discussion

To DT, it's not referring to myself, please review the context of the reference contribution, it is excerpted from RP-212634 verbatim to align the conclusion in the chair notes for everyone's convenience.

5 – China Mobile Com. Corporation

CMCC comment: we support CR2970. In our view, CR2950 precludes SUL support for RedCap UE. For non-RedCap UE, both initial UL BWP of both NUL and SUL can be configured. The existing signaling structure should be baseline for RedCap. CR 2950 precludes initial UL BWP configuration of SUL explicitly. We share the view with CATT that CR 2950 is to prevent implementation of RedCap UEs with SUL.

6 – HuaWei Technologies Co.

As CATT also commented, we think CR 2970 is the right way to go. From Rel-15 the uplink and supplementary uplink are referring to the same IE, i.e. UplinkConfigCommon, the current extension for this IE is also common for the uplink and supplementary uplink, and there is no extra changes for SUL are made.

CR 2950 explicitly excluded SUL and is not compliant with RAN plenary decision that "The specification will not contain any explicit restriction to prevent implementation of RedCap UEs with these features."

7 – CTSI

We prefer CR 2970. We think common design for SUL and NUL continues to be applied in R17, which has no harm for RedCap UEs. From perspective of operators, the coverage and flexibility of NW can be improved.

8 – Ericsson LM

CR2950

9 – Nokia Corporation

The RAN plenary outcome (RP-212634, endorsed in RAN#93).

This outcome says "If any spec change/addition is found necessary in order to enable one of the options above then it will not happen in Rel-17." And SUL is listed. Therefore, we agree with Nordic Semiconductor that CR2950 without SUL is the only one complying with the RAN guidance.

10 – vivo Mobile Communication Co.

CR2950 is somehow aligned with the conclusion in RAN#93e meeting, "*If any spec change/addition is found necessary in order to enable one of the options above then it will not happen in Rel-17.*". While considering CR 2970 only adds an IE for SUL similar as NUL, there is no additional effort, we could consider CR 2970.

11 – DENSO CORPORATION

CR 2950. Our understanding of the RAN#93e decision is the same as Nordic Semiconductor and Nokia.

12 – LG Electronics Inc.

We prefer CR 2970 because 2970 allows for the common procedure to be applied for RedCap UE both in NUL and SUL. As commented by CATT, CR 2950 explicitly restricts the operation of RedCap UE in SUL, which causes an impact to UL carrier selection procedure for some cases (e.g., when legacy initial BWP in SUL > RedCap max BW).

13 – MediaTek Inc.

RAN's agreement from RP#93e (that was confirmed in RP#94e) is clear: *if any spec change/addition is found necessary in order to enable one of the options above then it will not happen in Rel-17.*

Only CR2950 can be approved as only CR2950 complies with RAN's agreement.

This will preclude the configuration of a RedCap-specific initial UL BWP for SUL, but does not prevent implementation of RedCap UEs with SUL completely as suggested by comments above.

14 – China Unicom

We support CR 2970. For the configuration design, Rel-17 should follow the Rel-15 that both NUL and SUL are referring to the same IE. And supporting SUL for RedCap UE can improve the perfoamance for the network.

CR 2950 is not including SUL, which is not compliant with RAN plenary decision. We are not supportive of this CR 2950.

15 – Qualcomm Incorporated

CR2950

16 – Apple Poland Sp. z.o.o.

CR2950 is preferred.

2.5 Issue 7: Preclude some features from the exception sheet?

Contribution [14] proposes not to capture the following features into the exception sheet,

- SSB-less active DL BWP
  - No SSB (CD or NCD) in UE's active BWP for both serving and neighboring cells (e.g., for measurement, handover, timing, RLM/BFD/CBD/L1-RSRP)
- More than one SSB in active DL BWP
- CSI-RS L3 measurement
- Inter-frequency measurement without gap (Rel-16)
- LTE and NR positioning

However, above features are not mentioned yet in the exception sheet [2], moderator suggests no separate discussion on this issue, but to focus on the discussion of Issue 1.

Feedback Form 11: Do we need this separate discussion (as Issue 7) on the contents of the exception sheet?

1 – Nordic Semiconductor ASA

We think these features could be deprioritized in R17 in order to complete the release on time.

2 – CATT

Agree with moderator. Let's focus on Issue 1.

3 – China Mobile Com. Corporation

These are working group level detailed discussion, should not be discussed in RAN.

4 – Intel Corporation (UK) Ltd

No separate discussion is needed. The current version of exception sheet does not include any of the above items.

5 – MediaTek Inc.

We have detected that RAN4 has wasted online time and efforts on some of these topics, which are not essential to the Redcap requirements. As the proponent, our intention is to avoid these discussions, bearing in mind that the exception sheet should be prepared with the assumption that all works should be done in the next quarter.

We understand that the current exception sheet already did not mention some of the items (e.g, CSI-RS, positioning). We are fine with this part. However, we still see some ambiguity in the configurations of

CD/NCD-SSB and UE's active DL BWP. We are fine to move this discussion to Issue 1. So that all related issues will be discussed together.
6 – Spreadtrum Communications Agree with moderator. no separate discussion on this issue, let's focus on Issue 1.
7 – Ericsson LM No
8 – Nokia Corporation Agree with moderator that there is no need for this discussion at the moment.
9 – vivo Mobile Communication Co. Agree with moderator there is no need to discuss these issues.
10 – NEC Corporation No. We don't think we need this separate discussion.
11 – LG Electronics Inc. Share the view with the moderator. Prefer to focus on the discussion on Issue 1.
12 – DENSO CORPORATION Agree on moderator's suggestion
13 – Apple Poland Sp. z.o.o. We understand the motivation behind the MTK's proposals to make RAN4 discussion more focus, which is extremely important to timely finalize the performance part for the Redcap. On the other hand, this discussion can be still down to working group level i.e., RAN4 to decide whether define requirement for these deprioritized features as usual business.
14 – Guangdong OPPO Mobile Telecom. Agree with moderator. Let's focus on Issue 1.

3 Intermediate round discussion

3.1 Summary of the discussion on Issue 1 after initial round

3.1.1 Summary of the discussion on Proposal 1a and 1b for Issue 1

For Proposal 1a, 20 companies provided their views, vast majority of the companies believe that RAN1 part of work has been completed, and they are fine with Proposal 1a, i.e., no exception sheet is needed. One company expresses strong support of the exception sheet, and one company is fine with Proposal 1a as long as the bar for different WIs should be the same.

For Proposal 1b, 17 companies provided their view, vast majority of the companies prefer no listing the open issues, which is quite aligned with their answer to Proposal 1a, naturally, one company suggests that the SR should include the RAN1 open issues as they believe the exception sheet is needed, and one company supports to have the listing items in the SR even if no exception sheet.

In summary, moderator would like to consolidate the proposals for exception sheet and SR for RAN1 and as below and suggest no further discussion in the intermediate round, with common understanding that those issues can still be handled in RAN1 under maintenance phase when needed.

Proposals for exception sheet and SR for RAN1

- **No exception sheet for RAN1 in this meeting**
- **The SR includes no RAN1 open issues**

3.1.2 Summary of the discussion on Proposal 2a and 2b for Issue I

For Proposal 2a, 5 of 7 involved companies are fine with the open issues for RAN4 in the exception sheet [RP-220292], 1 company think the RAN4 RF part "Agree RedCap operating band list in FR1 and add the operating band clause" in the exception sheet is not needed, which is also related to the discussion in Issue 5 for the CR of operating bands, and the left 1 company is trying to further limit the scenarios by adding note such as:

Note□All the CONNECTED mode RRM requirements are limited to the following 2 scenarios

- **CD-SSB is configured in UE's DL active BWP**
- **CD-SSB is outside of UE's DL active BWP, but one NCD-SSB is within UE's DL active BWP**

For Proposal 2b, 8 companies attend the discussion, all companies are fine to requests extension with target completion date of December 2022, and additional TUs as shown in Table 1 (In section 2.1.3)

In summary, moderator believes the **proposal 2b is to be agreed**, no further discussion in the intermediate round is needed. Moderator also believes the **proposal 2a is agreeable by removing** "**Agree RedCap operating band list in FR1 and add the operating band clause**" from the RAN4 tasks in RP-220292, especially when jointly considering the disucsion on Issue 5, but we need to further check if the note is agreeable to be captured in the exception sheet in the intermediate round.

Proposal for the tasks of RAN4 in the exception sheet

- **Confirm all the tasks of RAN4 except "Agree RedCap operating band list in FR1 and add the operating band clause" in RP-220292**.

Feedback Form 12: Any strong concerns on this proposal?(if no strong concerns, please skip it)

1 – QUALCOMM JAPAN LLC.

Operating band list is still needed, should not be removed from the exception sheet.

2 – Huawei Technologies France

We are fine with the moderator proposal.

As both Rx and Tx requirements were already finished in the CRs in last RAN4 meeting, we don't think there is a need to have a copy & paste of band list in the spec. No addtional new information provided by such list.

3 – Ericsson LM

Operating band list is still needed. It should not be removed from the exception sheet.

But if the company CR is approved at this RAN only then the this can be removed from the exception sheet.

4 – Nokia Corporation

Similarly to Qualcomm, we would like clarification on the exact proposal, as we still see such a CR as needed. Is the intention to approve the company CR at this RAN Plenary then?

Feedback Form 13: Can we agree to add above note for limiting the scenarios to the exception sheet?

1 – MediaTek Inc.

Support adding the limitation.

As the proponent, we would like to provide more information in previous RAN4 discussions. In the agreed WF R4-2206950, at least the following open issues are related to the limitations

- HO to a RedCap specific BWP with NCD-SSB (no CD-SSB)
- Requirements for handover to RedCap specific BWP with NCD-SSB (no CD-SSB)
- Handover to RedCap specific BWP with no SSB
- Whether SSB has to be in UE active BWP for meeting the UE transmit timing requirements
- Whether to introduce L1 measurement gaps for performing receiving SSB outside active BWP in Rel-17
- Reference SSB to decide measurement type (intra- or inter-frequency)
- Definition of SSB based intra-frequency measurement
- When both CD-SSB and NCD-SSB are configured for serving cell measurements
- When both CD-SSB and NCD-SSB are configured for serving cell measurements and both require MG
- When both CD-SSB and NCD-SSB are configured for neighbour cell measurements

With the limitation, some open issues are no longer needed to be discussed in the next RAN4 meeting or can be concluded straightforwardly. This clear Plenary guidance can effectively help RAN4 avoid unnecessary discussions and complete requirements in time.

2 – China Mobile Com. Corporation

We do not agree to have limitation. Previously, RAN1 agreed a RedCap UE can optionally support relevant operation based on CSI-RS and FG 6-1a by reporting optional capabilities. If the intention of such limitation is to reuse the existing requirements as much as possible and save RAN4 efforts, the details can be further discussed in RAN4. But if the intention is to preclude such case, we cannot agree.

3 – Huawei Technologies Sweden AB

We oppose to exclude the second bullet. It is agreed in RAN1 and RAN4 that UE with FG6-1a/CSI-RS can work in a BWP without NCD-SSB or CD SSB. Even there is no CD-SSB and NCD-SSB in active BWP, UE can still perform RRM measurements with retuning. The legacy L3 measurement requirements with gaps can be reused for this case.

4 – Ericsson LM

No. If scenarios are supported in RAN1/RAN2, then it is reasonable to develop corresponding RRM requirements.

5 – Nokia Corporation

We no not agree to this limitation. In fact, in RAN4 the only scenario that is still open for discussion is the one below, and even then it is already clear that supporting the scenario implies no new requirements, and hence the benefit of removing it is questionable:

- Case B-2: Some neighbour cells include NCD-SSB, and some neighbour cells without NCD-SSB on the same frequency location as serving cell NCD-SSB/CD-SSB
- Note: if the scenario is supported then **no new requirements or minimum changes** shall be introduced comparing to Case A and B-1 requirements

3.2 Summary of the discussion on Issue 2 after initial round

For Proposal 3a ”**FG 28-1 is reported per UE**”, 27 of the 30 involved companies agree with it, other 3 companies disagree with it. Since all arguments from proponents and opponents have already been expressed from RAN1 to RAN, and in this summary, moderator believes it will not help anything to continue the further discussion in the intermediate round.

For Proposal 3b ”**FG 28-3 is reported per band**”, 18 of the 24 involved companies can live with or support this proposal, one company’s comment is a bit equivocal, and other 5 companies think “Per UE” is sufficient. Since all arguments from proponents and opponents have already been expressed in this summary, moderator believes it will not help anything to continue the further discussion in the intermediate round. From moderator’s view, **package of Proposal 3a and Proposal 3b is a possible compromise** for moving us out of the gridlock**.**

Proposal for reporting type/granularity of FG 28-1 and FG 28-3

- **FG 28-1 is reported per UE, and FG 28-3 is reported per band**

3.3 Summary of the discussion on Issue 3 after initial round

For the RRM relaxation for non-RedCap UE, it is asked "Is it in-scope of Rel-17 to support RRM relaxation for non-RedCap UE?" 10 companies of the 18 involved companies answer "no", 3 companies answer that they prefer to specify the RRM relaxation feature for RedCap UE only, 3 companies are fine to extend this feature to non-RedCap UE, and 1 company comments that it should be supported for non-RedCap UE and eDRX and RRM relaxation for non-RedCap UE should be handled consistently. Based on this observation, moderator would like to propose

Proposal for Issue 3

- **It is not pursued to support RRM relaxation for non-RedCap UE in Rel-17.**

Feedback Form 14: Any new comments on this proposal? (if no new comments, or just repeat comments as initial round, please skip it)

1 – T-Mobile USA Inc.

T-Mobile agrees with the moderators proposal that RRM relaxation for non-RedCap UE in Rel-17.

2 – vivo Mobile Communication Co.

1. During the discussion in the initial round (including some late comments), except companies answering the question it is not in WID scope, it seems comparable supporting level between supporting RRM relaxation for all UEs and supporting it only for RedCap UEs, while several companies are open to discuss it.

2. We would like to provide more technique reasons:

a) During evaluation and discussion in RAN2 SI and WI, there is no special difference between RedCap and non-RedCap UEs on the benefit and system impacts for both eDRX and RRM relaxation. Meanwhile, during the discussion in RAN4, the relaxed requirement for RRM measurement and requirement for eDRX have not any limitation on UE capabilities. In this way, all defined mechanism and requirement could be used for both RedCap UEs and non-RedCap UEs.

b) Besides, there is no additional standard work or specification impact (except some capability/feature description, e.g. xxx ~~for RedCap UEs~~) in both RAN2 and RAN4 to support RRM relaxation and eDRX for non-RedCap UEs.

c) There is also requirement on power saving for non-RedCap UEs, which includes stationary/low mobility scenarios. There is no harm but much better for non-RedCap UEs to support eDRX and RRM relaxation.

3. From procedure point of view, we think the power saving features defined in RedCap WI should be treated consistently. Thus, could we suggest to discuss the following options:

a) Alt1: apply eDRX and RRM relaxation for all UEs

b) Alt2: apply eDRX and RRM relaxation for only RedCap UEs.

3 – TELECOM ITALIA S.p.A. Sorry for somehow repeating the comment, but we clearly cannot support Alt1 proposed by Vivo. On alt.2: if it is already agreed, why list it? if not yet agreed, it seems to add a new objective when the WI should be closed
4 – China Mobile Com. Corporation We agree with moderator proposal. For the RRM relaxation for RedCap UE, the agreed RAN4 requirements are more relaxed considering that the target device is RedCap. In our view, the relaxation and corresponding requirements are designed for RedCap UE only. We do not think same requirements can be applied to non-RedCap UE.
5 – CATT We are generally fine with moderator's proposal. Just want to hear one more clarification: does the proposal cover both 'RRM relaxation' and 'eDRX'?
6 – VODAFONE Group Plc We agree with the moderator's proposal
7 – HuaWei Technologies Co. We have some sympathy on Vivo's comment, it is true that currently eDRX and RRM relaxation are now handled differently, and we prefer to treat them in a consistent way. If this discussion continues, we are fine with Alt1 and can also accept Alt2.
8 – Deutsche Telekom AG We also agree with moderators proposal
9 – BT plc We support rapporteur's proposal

3.4 Summary of the discussion on Issue 4 after initial round

For Issue 4, it is clearly indicated by all companies that no intervene from RAN is needed since RAN2 has already concluded "*whether a non-RedCap UE should be able to use NCD-SSB instead of CD-SSB is deprioritized in Rel-17*", **so this issue will not be discussed in the intermediate round**.

3.5 Summary of the discussion on Issue 5 after initial round

In the 13 companies attending the discussion, 7 companies think this CR is not needed, 4 companies support this CR, 1 company is fine with the CR, but note that it is premature to approve the CR, 1 one company think it redundant but helpful, additionally, two of the proponent companies think this CR should not discussed anymore if it is not approved in RAN#95.

Based on this collection, moderator would like to propose

Proposal for Issue 5

- **It is not pursued to approve the CR in RP-220462.**

Feedback Form 15: Any new comments on this proposal? (if no new comments, or just repeat comments as initial round, please skip it)

1 – T-Mobile USA Inc.

Our understanding is that there are no RedCap requirements for unlicensed bands and SUL bands because they require significant more work including RRM. There are also no requirements for any V2X operation with any Uu link. So we support adding a list of bands. However, if the band list is approved we think it would be unnecessary to list the frequency ranges for the bands and the duplex modes. If the RedCap bands had different frequency ranges and duplex modes than the NR bands we would need to also list them also in 38.104. If the bands for RedCap are listed in a new section, it should be sufficient to list the band numbers, as in 5.2D operating bands for UL MIMO, rather than including the frequency ranges and duplex modes.

2 – QUALCOMM JAPAN LLC.

We would like clarification on what exactly ”not pursued” means in this case? in our understanding this means that this CR will go back to RAN4 for further discussion, is this correct?

We still believe such a CR is needed.

3 – Huawei Technologies France

We are fine with the moderator proposal. We didn’t see the necessity to have such band list captured in the RAN4 specification, otherwise, it violates the previous RAN decision.

4 – TELECOM ITALIA S.p.A.

We do not have a strong view on adding or not the bands (we have a slight preference to add them, in a ”simple” way, as suggested by T-Mobile USA).

What we do not want is to go back to RAN4 as suggested by Qualcomm. A clear decision should be taken at this plenary

5 – China Mobile Com. Corporation

We support the moderator proposal. We do not think the CR is needed. It does not matter whether the band list table includes frequency range or duplex mode or not. If new band table for RedCap is introduced, RAN4 anyway needs to maintain the tables in future work. Also, following RAN plenary guidance, there should be no explicit restriction in the spec for V2X/unlicensed/SUL bands.

6 – China Telecom Corporation Ltd.

We support the moderator proposal. Based on the discussion in the initial round, we don’t think we can agree the CR in this RAN plenary meeting and in future RAN4 meeting. Let us focus on other more essential issues for the WI.

7 – CATT

If we approves this CR, we afraid it shows a bad model: will similar arguing repeat again (and again) in Rel-18 eRedCap UE (or even later release)? So yes we support the proposal, which alleviates the future burden of RAN4.

8 – China Unicom

We support the moderator proposal. We also didn't see the necessity to have such band list captured in the RAN4 specification, as the proposed contents are not aligned with "The specification will not contain any explicit restriction to prevent implementation of RedCap UEs with these features".

9 – vivo Mobile Communication Co.

We are fine with the moderator proposal. This additional band list for RedCap is not needed.

10 – Ericsson LM

We support to list the RedCap bands in the specs because the list should contain bands for which all requirements exist in the spec.

For V2X, NR-U and SUL, more work is needed. But RAN4 is not allowed to work on these features as per RAN#93 agreements. So the Redcap bands for them cannot be added in R17. But implementation is still possible since lack of requirements does not prevent device to implement the feature.

The question is whether the CR is approved in RAN#95e or pushed back to RAN4. RAN#93e made the agreement so it is better that RAN also resolves the issue in this RAN. This will save RAN4 time.

11 – MediaTek Inc.

We would NOT like this to be pushed back to RAN4. Our understanding would be that if the CR is not agreed then it is the end of the discussion.

3.6 Summary of the discussion on Issue 6 after initial round

In the 13 companies attending the discussion,

Support 2950: Nordic, Ericsson, Nokia, DENSO, MTK, Qualcomm

Support 2970: CATT, CMCC, Huawei, CTSI, LG, China Unicom

Fine to both: vivo

From moderator's understanding, literally, 2950 alone looks compliant with RAN agreement in RP-212634, unfortunately, it may not be as simple as the discrepancy between 2950 and 2970 presents, which maybe the reason why companies still present different understanding on the agreement and both CRs win nearly equal support. In this sense, it seems more analyses and evaluations are needed in WG(s) or cross WGs, moderator would like to propose tasking WGs to continue the discussion.

Proposal for Issue 6,

- **Task RAN2 to continue the discussion on the NUL and SUL extension parts of the 2 CRs**

Feedback Form 16: Is the proposal acceptable? if not, any new proposal? e.g., remove the NUL and SUL extenstion parts from either of the 2 CRs for approving left parts in this RAN, etc.

1 – Intel Corporation (UK) Ltd

While we are open to approving either of the CRs, we think that returning this to the RAN2 is unlikely to be productive as the discussion was relating to the interpretation of previous RAN plenary decisions. Hence, we think it would be preferable if we could resolve this question in RAN plenary.

2 – T-Mobile USA Inc.

Given that this is the end of the release, T-Mobile supports removing NUL and SUL extensions from the CR's and approving the remaining parts.

3 – Samsung Electronics Co.

We also think that RAN should provide the guidance to WG on this, as it is about the scope of the WI.

We understand that the question here is whether "RedCap-specific initial BWP for SUL" can be part of the WI. But before going there, RAN first needs to (clearly) conclude whether support of "SUL" itself can be part of the WI. From the discussion last September, we think the conclusion was that it can be supported (only) if it does not require any specification update. Now we observe that the specification change is needed for the SUL due to the introduction of RedCap-specific initial BWP. Even if the specification change "looks" small for this, we cannot say the impact by having this one would also be small. In that sense, we would like to be conservative here, so propose to go with CR2950, and also possibly to conclude to not support SUL for the WI.

4 – HuaWei Technologies Co.

We could accept the way forward suggested by the moderator, although we don't see any technical arguments from companies who are not in favor of CR2970. Our view is that we either adopt CR2970 and close the discussion to move forward, or further work in RAN2 to formulate another CR without precluding SUL, which is possible.

To respect to the RAN plenary guidance, "The specification will not contain any explicit restriction to prevent implementation of RedCap UEs with these features." shall not be violated. Therefore SUL shall not be precluded even without explicit extension in any case. We completely disagree with excluding SUL from REDCAP WID.

5 – CATT

We are not objecting the moderater's assignment. But we hope to make it clear: what is the '*baseline*' and what is the '*RedCap-specific spec change*'.

It is simple to us that the '*baseline*' is normal UE behavior, i.e. '*initial UL BWP can be configured to NUL and SUL*'. The '*RedCap-specific change*' is '*precluding configuring initial UL BWP on SUL from RedCap*', which is 2950 trying to do. That's why 2970 is better.

6 – China Mobile Com. Corporation

We are OK with moderator proposal. If companies believe this should be discussed in RAN, we are also fine. In previous RAN2 discussion, the initial UL BWP for RedCap was added firstly for both NUL and SUL in the running CR. This is the ”baseline” design as commented by CATT. Due to the different understanding on RAN plenary decision, the SUL part was removed artifically based on some comments. In our view, this is explictly preclude SUL for RedCap. That is why we support CR 2970

7 – ZTE Corporation

[As RAN2 VC & session chair for RedCap in RAN2] I don’t think that sending this back to RAN2 would help at all. This is not a technical discussion, but related to the interpretation of an earlier RAN agreement and a possible clarification thereof. I fear that a decision can only be taken at RAN level.

8 – CTSI

[China Telecom comment]: We are fine with moderator’s proposal to further discuss this issue in RAN2. We agree with other companies that SUL shall not be precluded, and we can accept to formulate another CR without precluding SUL in RAN2.

9 – MediaTek Inc.

RAN2 Chair: I support Sergio (ZTE). Decision is not related to RAN2 technical domain. If RAN2 is to make a hard decision, maybe the only agreeable part is what is common between these two CRs (and this was subject to objections last RAN2 meeting). Please try to conclude here at TSG RAN.

10 – MediaTek Inc.

There is no point in sending this back to RAN2 (as highlighted by the session chair above) as this is not a technical discussion but a discussion on the scope of the WI. RAN has to conclude on this, as RAN2 can only follow RAN’s earlier agreement.

As indicated in our earlier response, CR2950 does not exclude SUL operation for RedCap UEs. It prevents one feature (RedCap-specific initial BWP) from being configured for SUL as that feature requires SUL-specific changes. This is consistent with our earlier RAN agreement, i.e. *if any spec change/addition is found necessary in order to enable one of the options above then it will not happen in Rel-17*.

It is quite clear that as only CR2950 complies with RAN’s agreement, CR2950 should be approved by RAN.

11 – vivo Mobile Communication Co.

We could accept the moderator proposal. Maybe another simple way forward is to approve the CR 2970 with SUL in RAN to make RAN2 work easier, as it is natural to have common change for NUL and SUL.

12 – China Unicom

We are fine with the moderator proposal. And we also agree with that the SUL should be supported for RedCap UE.

13 – Nokia Corporation

It is difficult to see the benefits of tasking RAN2 to continue the discussion on this issue, as it is clearly about understanding of earlier RAN Plenary guidance, and RAN Plenary is then the right place to clarify it. It also clear that RedCap UEs will support normal UL, hence those parts and corresponding extensions should be approved by RAN Plenary, regardless of how companies want to proceed on SUL aspects.

As for SUL itself, we agree with Samsung's assessment above. RAN Plenary decision was clear that SUL can be supported as long as no specification change is needed for it. We would like to remind companies that no change is really small in a system as complex as NR, even if they look small on a particular specification text.

14 – Ericsson LM

As stated earlier this was discussed in previous RAN plenary meetings and it is clear that introducing the SUL extension is not in the scope for Rel-17 since it was concluded that "*If any spec change/addition is found necessary in order to enable one of the options above then it will not happen in Rel-17.*" RAN2 has already discussed and presented how support for NUL and/or SUL can be implemented in CRs 2950 and 2970. We do not think it would be beneficial to continue the discussion in RAN2 considering that this is about interpretation of the RAN agreement and therefore, the discussion should better take place at RAN plenary level.

We would like to note that CR2950 does not contain "explicit restriction" which means an explicit statement that something is not supported or configured. There are no such statements in the CR.

3.7 Summary of the discussion on Issue 7 after initial round

It is clearly indicated by all companies that the discussion should focus on Issue 1. No further discussion on Issue 7 in the intermediate round.

4 Final round discussion

4.1 Summary of the discussion on Issue 1 after intermediate round

4.1.1 Summary of the discussion on Proposal 1a and 1b for Issue 1

No discussion in the intermediate round, the proposal from the initial round

Proposals for exception sheet and SR for RAN1 (for the final round)

- **No exception sheet for RAN1 in this meeting**
- **The SR includes no RAN1 open issue**

Feedback Form 17: Do you have strong concerns on Proposals for exception sheet and SR for RAN1 (for the final round)?

1 – Ericsson LM
No strong concerns

4.1.2 Summary of the discussion on Proposal 2a and 2b for Issue I

Following the discussion on Proposal 2a and 2b in the initial round,

to the question, whether company has strong concern on **"Confirm all the tasks of RAN4 except "Agree RedCap operating band list in FR1 and add the operating band clause" in RP-220292",** companies only comment on the keep or remove of "Agree RedCap operating band list in FR1 and add the operating band clause", and companies think it is relevant to discussion on Issue 5, and

to the question, Can company agree to add some notes for limiting the scenarios to the exception sheet, all companies except the proponent single company disagree with it.

so it means all other part argeeable, except the "**Operation band list**", the proposal will be refined to

Proposal for the tasks of RAN4 in the exception sheet (for the final round)

- **Confirm all the tasks of RAN4 except "Agree RedCap operating band list in FR1 and add the operating band clause" in RP-220292**
  - **Whether to keep "Agree RedCap operating band list in FR1 and add the operating band clause" in the final exception sheet is decided by the outcome of Issue 5.**

Feedback Form 18: Any views on Proposal for the tasks of RAN4 in the exception sheet (for the final round)

1 – Ericsson LM
Agree the inclusion of RedCap operating band list in FR1 on exception sheet depends on the outcome of issue 5.

4.2 Summary of the discussion on Issue 2 after intermediate round

No discussion in the intermediate round, the proposal from the initial round,

Proposal for reporting type/granularity of FG 28-1 and FG 28-3

- **FG 28-1 is reported per UE, and FG 28-3 is reported per band**

Feedback Form 19: Can you live with this package proposal?

1 – Panasonic Corporation

We are ok with the proposal. One of the WI described use case of Redcap UE is wearable. For wearable use case, to have the connectivity as much as possible is quite important as the wearable would appeal the function of ”connect everywhere”. In order to achieve this, we can discuss ”in FR1 below 2.5 GHz, CBW no more than 20 MHz, the UE behave the same way as a Rel-15/16 eMBB UE” as separate feature of Redcap while keeping FG 28-1 as per UE. Then to have the connectivity as much as possible can be achieved especially for wearable.

2 – CATT

We are fine with the proposal.

3 – NEC Corporation

Yes. We can live with the package proposal.

4 – NTT DOCOMO INC.

We support the proposal

5 – Intel Corporation (UK) Ltd

Yes, we can accept this proposal.

6 – China Mobile Com. Corporation

We support moderator proposal.

7 – ZTE Corporation

We are fine with it. The package proposal is kind of compromise.

8 – vivo Communication Technology

Bundling of the two FGs together is not necessary.

For FG 28-1, we believe our concern regarding low band FDD frequency with max CBW <=20MHz is a valid one and simply making FG28-1 as per UE does not address the concern. We suggest to keep FG28-1 open untill June.

For 28-3, there is no objection to make it per band, we suggest to make a agreement on that.

9 – Guangdong OPPO Mobile Telecom.

Although we prefer to let 28-3 per UE in RAN1, we actually are OK with the agreed per band. Don’t see the possibility to overturn it. For the 28-1 we see some flexibility for having it per band, but seems no much problem of per UE.

We can go with moderator’s proposal.

10 – Huawei Tech.(UK) Co.. Ltd

OK to take these two FGs together as proposed.

11 – TELECOM ITALIA S.p.A. We cannot accept the proposal from Vivo. similar to OPPO we would prefer to also have 28-3 per UE, but we can live with the current compromise
12 – Spreadtrum Communications We support this proposal.
13 – Nokia Corporation Similarly to Telecom Italia, Huawei and others, we think it is important to consider these two FGs together. The current proposal is not ideal but it is an acceptable compromise for us, assuming the current FG structure remains the same, i.e. 28-1 remains as pre-requisite for 28-3.
14 – VODAFONE Group Plc We support the moderator's proposal
15 – MediaTek Inc. We are ok with this proposal
16 – Deutsche Telekom AG These two are coupled by not optimal as Nokia points out. In light of the "package" we can accept this proposal.
17 – Samsung Electronics Co. We can live with the proposals.
18 – Ericsson LM Yes
19 – Classon Consulting [for FUTUREWEI] We prefer per UE for both, but can accept the compromise as a way to close the issue. 28-1 needs to be resolved in RAN.
20 – SoftBank Corp. We support this proposal.

4.3 Summary of the discussion on Issue 3 after intermediate round

For the RRM relaxation for non-RedCap UE, it is asked "Is it in-scope of Rel-17 to support RRM relaxation for non-RedCap UE?" 10 companies of the 18 involved companies answer "no", 3 companies answer that they prefer to specify the RRM relaxation feature for RedCap UE only, 3 companies are fine to extend this feature to non-RedCap UE, and 1 company comments that it should be supported for non-RedCap UE and eDRX and RRM relaxation for non-RedCap UE should be handled consistently. Based on this observation, there is proposal for Issue 3 for the intermediate round,

Proposal for Issue 3

- **It is not pursued to support RRM relaxation for non-RedCap UE in Rel-17.**

Since it was proposed that companies can skip it if they have not changed their minds from the initial round or have not identified new arguments, in the intermediate round, 9 companies expressed their position, 7 of them supported moderator's proposal, 1 company insisted that it should be consistent for both RRM and e-DRX, and 1 comany showed empathy of demand of consistent for both RRM and e-DRX. However, since e-DRX for non-RedCap UE is not raised for discussion but only for peer features, moreover, RAN2 has already agreed **"eDRX feature is optional for any UE (including RedCap and non-RedCap UEs)"** , in this sense, moderator would like to propose to focus on RRM relaxation in this meeting.

Proposal for Issue 3(for the final round)

- **It is not pursued to support RRM relaxation for non-RedCap UE in Rel-17.**
- **Note: eDRX for non-RedCap UEs in Rel-17 can be revisited in RAN#96 if necessary.**

Feedback Form 20: Can we agree with proposal for Issue 3 (for the final round)?

1 – vivo Mobile Communication Co.

Thanks Moderator for making constructive progress. Actually, eDRX was also indeed raised for discussion at least in Proposal 1 in RP-220602: **Proposal 1: RAN provides guidance that eDRX and RRM relaxation in Rel-17 RedCap WI could be applied for all UEs, including RedCap and non-RedCap UEs.**

Meanwhile, RedCap WI will declare 100% completion in this meeting, so it is better to conclude this critical issue in this meeting. We do not see motivation to determine one feature in this meeting, while postpone the discussion on the other peer feature.

It is true that RAN2 has already agreed "eDRX feature is optional for any UE (including RedCap and non-RedCap UEs)", that is why we also propose RRM relaxation should have the similar conclusion. But at the same time, as commented by some companies, the requirements defined in RAN4 for eDRX and RRM relaxation are only for RedCap UEs, while we actually have different understandings and think the requirements defined in RAN4 are for any UE. In this way, whether eDRX should be applied for non-RedCap UEs still needs decision here. By now, we didn't see technique reason to treat them differently.

Thus, we think the power saving features defined in RedCap WI should be treated consistently. We suggest a compromise: both eDRX and RRM relaxation could be applied for any UE, which is configured by network.

2 – Panasonic Corporation

We support the proposal.

3 – CMDI

[As moderator]

To vivo, just referring to your proposal, it proposes RAN to provide guidance that eDRX and RRM relaxation in Rel-17 RedCap WI would be applied for all UEs, including RedCap and non-RedCap UEs,

meanwhile, in your contribution, it was mentioned that RAN2 has already concluded on eDRX, which is what RAN2 is doing, there is no controversial, moderator believes vivo also think eDRX itself is not controversial, what vivo proposed in the contribution is to resolve the extension of RRM relaxation to non RedCap UE rather than to remove eDRX, at least from moderator's review, vivo's contribution did not raise any concern on the agreement for eDRX itself. Based on current observation, it is quite hard to enforce one to exactly follow another one at this stage. But companies please feel free to feedback on vivo's compromised proposal in this feedback form:

Both eDRX and RRM relaxation could be applied for any UE, which is configured by network.

4 – Apple Poland Sp. z.o.o.

We support the proposal.

5 – NEC Corporation

Yes. We can agree with moderator's proposal.

6 – CATT

We can support moderator's proposal.

7 – Intel Corporation (UK) Ltd

We are fine with the main bullet of the Moderator proposal.

However, we do not think the new Note is needed. There is no ambiguity based on earlier RAN2 decisions on eDRX and it would be prudent to avoid encouraging revisiting prior RAN2 discussions/decisions.

8 – China Mobile Com. Corporation

We support moderator's proposal. We still have concern on vivo's proposal. RAN4 define relaxed requirements for RedCap UE considering the low cost. If non-RedCap UE is considered, we need to discuss seperately.

9 – Guangdong OPPO Mobile Telecom.

We are supportive to the moderator's proposal.

10 – Beijing Xiaomi Mobile Software

We are supportive to the moderator's proposal. If vivo really has concerns, we can keep the note at present.

11 – TELECOM ITALIA S.p.A.

Same view as Intel. We support the first bullet, but would like to remove the note

12 – Nokia Corporation

Similarly to Intel and Telecom Italia above, we are fine with the first bullet, but we do not see a need for the note. Given the need to conclude Rel-17 in the coming quarter we should avoid leaving pending issues to RAN#96 or to WGs.

13 – Deutsche Telekom AG As INTEL, TIM, Nokia above: We support the first bullet, but the note is not needed.
14 – MediaTek Inc. We are ok with the main bullet. However, we agree with Intel that the Note is unnecessary. There is no need to encourage revisiting WG agreements in RAN. We also disagree with artificially conflating eDRX with RRM relaxation. eDRX is introduced for delay tolerant traffic (regardless of the mobility status of the UE). RRM relaxation is introduced to deal with stationary UEs (regardless of its traffic type). These are independent features that should be discussed independently.
15 – Samsung Electronics Co. We can live with the proposal, and prefer to remove the NOTE as many others said.
16 – Ericsson LM We support the moderator's proposal in the main bullet, however, like many other companies, we think the note is not needed as RAN2 has already earlier agreed to support eDRX for all UEs.
17 – Panasonic Corporation Seeing the replies, we also agree not to have "Note: eDRX for non-RedCap UEs in Rel-17 can be revisited in RAN#96 if necessary."
18 – ZTE Corporation Similarly to many others, we are fine with the moderator's proposal in the main bullet, but we prefer not to have the additional note (to unnecessarily reopen the discussion on something already agreed in RAN2)
19 – Classon Consulting [for FUTUREWEI] Support the main bullet.
20 – SoftBank Corp. We support the first bullet, but prefer to remove the note.

4.4 Summary of the discussion on Issue 4 after intermediate round

No discussion, not pursued.

4.5 Summary of the discussion on Issue 5 after intermediate round

In the 13 companies attending the discussion, 7 companies think this CR is not needed, 4 companies support this CR, 1 company is fine with the CR, but note that it is premature to approve the CR, 1 one company think it redundant but helpful, additionally, two of the proponent companies think this CR should not be discussed

anymore if it is not approved in RAN#95.

In the intermediate round, it was asked if we can agree that **It is not pursued to approve the CR in RP-220462.** To clarify the question from QC, the proposal for the intermediate is to stop the discussion even in RAN4 if it is not approved in RAN#95, since companies think RAN4 should not repeat the situation even they prefer approving it in RAN#95.

Jointly considering the comments on Issue 1, the status is almost the same. From the discussion, it is observed that some companies think it necessary for RedCap UE, some companies think otherwise, and some other companies think it is fine to without this band list even they prefer, at least from moderator's observation, approving this CR is not the only way to support RedCap, just try to confirm or deny the observation/understanding in the final round,

Can RedCap UE be supported without approving CR in RP-220462□

Feedback Form 21: Can RedCap UE be supported without approving CR in RP-220462□

1 – T-Mobile USA Inc. We think that RedCap UEs can be supported by in bands without approving the CR in RP-22046 or a revision thereof, but we have a follow-up question: In the previous round T-Mobile USA and Ericsson both commented that for RedCap more work is needed for V2X, NR-U and SUL. And Ericsson commented that RAN4 is not allowed to work on these features as per RAN#93 agreements. If there is no list of bands, how will it be documented that additional work is needed for RedCap for V2X, NR-U and SUL? Or do others believe the work is completed for RedCap for V2X, NR-U and SUL?
2 – China Telecom Corporation Ltd. Sure, the support of RedCap is up to UE reporting, but not decided by whether we have a table on the operation band in RAN4.
3 – Huawei Technologies France Yes, RedCap UE can be supported without approving the CR in RP-220462, and RAN4 requirements do not rely on the specific table added in the CR.
4 – vivo Mobile Communication Co. Our answer is Yes, as RAN4 already concluded the corresponding requirements for RedCap UEs.
5 – CATT Yes and, if RedCap could not work in these bands eventually, it is not the fault of ''missing a RedCap-specific band list'.
6 – China Mobile Com. Corporation Yes. RedCap features and requirements do not depend on the proposed band table and can be supported without approving CR RP-220462.

7 – China Unicom

We don't support the CR, as the SUL bands aren't included. The RedCap feature can still be introduced without the band list table, the compromise is not to have the band table at current stage.

8 – Ericsson LM

If Redcap bands are not explicitly listed then it is interpreted that all existing requirements for these bands/features (V2X, SUL and NR-U) also apply for RedCap. It is also interpreted that there is NO open issue for these bands wrt RedCap. But in reality there are many missing requirements and also there are requirements which are irrelevant for RedCap for these bands. Significant amount of work is needed to make these features work for RedCap.

Replying to T-Mobile USA questions: In our view there are 2 options:

- 1) Specify list of Redcap bands excluding V2X, SUL and NR-U, and do proper requirement work in R18. Release independence from R17 can be discussed as well.
- 2) Do not specify list of Redcap bands. This implies RedCap requirements are in place for all the bands including V2X, SUL and NR-U. Then obviously RAN4 cannot and should not be allowed to do any work otherwise it contradicts the agreements. However, in reality these features will remain broken in terms of RAN4 requirements. Unfortunately they may never be fixed; because proponents are not likely to accept that anything is missing or irrelevant. This approach will also set bad precedence for RAN4 spec work. Any band specified in RAN4 specs should have all associated requirements as well.

We strongly prefer Option 1).

9 – Intel Corporation (UK) Ltd

We think that CR is helpful to improve the clarity of RAN4 specifications. If the table is not introduced, then it may give an impression that for example RedCap is supported for NR-U bands from RAN4 spec perspective, although there is a common understanding that it is not (e.g. there are no RRM requirements). Overall we think it is ok to continue discussion in RAN4 and strive to find some acceptable format of the table (e.g. add a note to the table on applicability of V2X, NR-U and SUL bands in line with prior plenary decisions).

4.6 Summary of the discussion on Issue 6 after intermediate round

Final Round status

- **Support 2950(Change to NUL only):** Nordic, Ericsson, Nokia, DENSO, MTK, Qualcomm
- **Support 2970 (Commone change to NUL and SUL):** CATT, CMCC, Huawei, CTSI, LG, China Unicom
- **Fine to both:** vivo

Intermediate Round status

- **Support 2950 and RAN make decision:** Samsung, Ericsson, Nokia, MTK
- **Support 2970 or fine to back to RAN2 :** CATT, CMCC, Huawei, CTSI, China Unicom, vivo
- **RAN make decision:** RAN2 Chair, RAN2 VC
- **Fine to either of 2950 and 2970, and fine to back to RAN2 though preferable in RAN:** Intel
- **Removing NUL and SUL extensions from the CR's and approving the remaining parts:** T-Mobile

In the discussion, it seems companies don't feel optimistic to return it to RAN2. Then if RAN need make hard decision, literally interpretating the endorsed proposal in RP-212634 [18], RP-2202950 is agreeable, meanwhile proponent companies of 2950 claim that it is not intended to exclude SUL operation for RedCap UEs, moderator would like to propose

Proposal for Issue 6(for the final round)

- **Approve 2950 with the understanding that SUL operation for RedCap is not precluded by 2950**

Feedback Form 22: Any views on proposal for Issue 6(for the final round)?

1 – Nordic Semiconductor ASA We support the proposal. 2950 does not exclude SUL for RedCap, if legacy SUL initial BWP is configured to be less than 20MHz. At the same time adding separate initial UL BWP for SUL would be clearly against "if any spec change/addition is found necessary in order to enable one of the options above then it will not happen in Rel-17."
2 – Panasonic Corporation We support the proposal.
3 – Apple Poland Sp. z.o.o. We support the proposal
4 – Intel Corporation (UK) Ltd We are OK with the Moderator's proposal.
5 – MediaTek Inc. Thank you for your work on moderating this discussion. To avoid any future misunderstanding, we propose to reuse the text from our earlier agreement as below: **Approve CR2950 with the understanding that CR2950 does not contain any explicit restriction to prevent implementation of RedCap UEs with SUL.**
6 – Nokia Corporation We are OK with the moderator's proposal but we don't see a need for Mediatek's revised version.

7 – Samsung Electronics Co.

We can live with the moderator's proposal, even if we think it is a bit odd that SUL for RedCap is supported "only when" RedCap-specific initial BWP is not configured. In addition, we think MediaTek's suggestion looks good, since RAN did not make this point clear before.

8 – HuaWei Technologies Co.

The difference between 2950 and 2970 is one line of ASN.1. With 2950, separate Redcap initial BWP configuration is precluded for SUL, thus not consistent with the prior RAN agreement. Therefore we strongly prefer 2970. Given the always difficult discussion on SUL and in order not to further waste RAN WGs effort, we can reluctantly consider the moderator proposal. But in this case we believe this discussion should close and not go back to RAN2 and RAN4 again. Regarding MTK's comment, it is unclear to us what kind of misunderstanding would be and we don't see need for it.

9 – Ericsson LM

We agree with the moderator's proposal and with Nordic Semiconductor's explanation about CR 2950 and SUL.

10 – vivo Mobile Communication Co.

We could accept the moderator proposal with the clarification that SUL operation for RedCap is not precluded. Besides, we also think there is no need to go back to RAN2 and RAN4.

11 – China Unicom

We think CR 2950 shall not preclude SUL for RedCap UE. We support the CR 2970. Anyway, we need a final decision in RAN plenary.

12 – China Mobile Com. Corporation

We don't think CR2970 against previous RAN agreement as we commented in previous rounds of email discussion. However, for the sake of progress, we can accept moderator proposal as compromise. And moderator proposal is clear enough, we don't see a need to further revise it as proposed by MTK.

13 – CATT

We have to point out that CR 2950 actually precludes SUL for RedCap UE in IDLE mode. Agian, we still believe the 'missing of initial UL BWP configuration on SUL' is the actual 'spec change for RedCap'. If the group decides to create such difference between RedCap UE and normal UE, regardless technical analysis, we are OK to put an end to the discussion as suggested by moderator, and not pushing it back to WGs.

4.7 Summary of the discussion on Issue 7 after intermediate round

No discussion, not pursued.

5 Conclusions

5.1 For Issue 1

Offline Agreement 1

- **No exception sheet for RAN1 in this meeting**
- **The SR includes no RAN1 open issue**

Offline Agreement 2

- **Confirm all the tasks of RAN4 except ”Agree RedCap operating band list in FR1 and add the operating band clause” in RP-220292**
  - **Whether to keep ”Agree RedCap operating band list in FR1 and add the operating band clause” in the final exception sheet is decided by the outcome of Issue 5.**

Feedback Form 23: Please comment only when you can not live with Offline Agreement 1 or Offline Agreement 2

5.2 For Issue 2

Possible Agreement 3 (single company disagree)

- **FG 28-1 is reported per UE, and FG 28-3 is reported per band**
-

Feedback Form 24: Please comment only when you can not live with Possible Agreement 3

1 – Qualcomm Incorporated

Qualcomm objects to this proposal.

We believe there is still some misunderstanding regarding what kind of UEs the per band 28-1 proposal targets (it is not wearables and it is not low end smartphones). Best would be to clarify this first.

5.3 For Issue 3

Possible Agreement 4(single company disagree)

- **It is not pursued to support RRM relaxation for non-RedCap UE in Rel-17.**

- ~~**Note: eDRX for non-RedCap UEs in Rel-17 can be revisited in RAN#96 if necessary.**~~

Feedback Form 25: Please comment only when you can not live with Possible Agreement 4

5.4 For Issue 5

Based on the answers from companies to question "**Can RedCap UE be supported without approving CR in RP-220462?**",

7 of the 9 companies confirm that RedCap UE can be supported without approving this CR,

1 company comments that this CR can be helful for improving clarity, but without the CR, the specification is not broken.

1 company strong prefer approving this CR from standard effort and specification implementation.

In addtion, some companies prefer to continue to discuss it in RAN4, while some companies comment it does not make more sense to repeat this discussion and it should be concluded in this meeting.

Possible Agreement 5

- **It is not pursued to approve the CR in RP-220462 in Rel-17.**

Feedback Form 26: Please comment only when you can not live with Possible Agreement 5

1 – Ericsson LM

We have concerned on the proposed agreement from moderator. It is technical issue. Our concern is that if the CR is not approved in R17 then first time RAN4 will introduce bands (since it means RedCap requirements apply to all bands) for certain features for which there is missing requirements or some are irrelevant.

We suggest to discuss this in GTW session to make sure all companies understand the consequence of not pursuing the CR to define the RedCap bands.

5.5 For Issue 6

Offline Agreement 6

- **Approve 2950 with the understanding that SUL operation for RedCap is not precluded by 2950**

Feedback Form 27: Please comment only when you can not live with Possible Agreement 6

6 References

1. RP-220135 Status report for WI: Support of reduced capability NR devices; rapporteur: Ericsson RAN1
2. RP-220292 Rel-17 Work Item Exception for Support of reduced capability NR devices Ericsson
3. RP-220293 Revised WID on support of reduced capability NR devices Ericsson
4. RP-220305 Discussion on RedCap basic feature group Panasonic Corporation
5. RP-220315 On RedCap UE capabilities Ericsson
6. RP-220396 Discussion on Rel-17 UE features and capabilities for RedCap Spreadtrum communications
7. RP-220403 Rel-17 Specification Finalization Nokia
8. RP-220462 CR on RedCap FR1 Operating Bands in Rel-17 Ericsson, Qualcomm Incorporated
9. RP-220526 Do not use RedCap to develop lower-tier NR eMBB smartphones Futurewei
10. RP-220602 Discussion on RedCap features for non-RedCap UE vivo
11. RP-220613 Views on outstanding issues of NR R17 RedCap UE Features Qualcomm, Verizon, Vivo, Guangdong Genius, Xiaomi
12. RP-220651 Discussing on whether Rel-17 RRM relaxation applying to any Rel-17 UE Xiaomi
13. RP-220742 Views on UE feature for Rel-17 NR RedCap CATT
14. RP-220753 Views on Rel-17 Redcap RRM requirements MediaTek Inc.
15. RP-220782 On RedCap support indication Nokia, Nokia Shanghai Bell, Deutsche Telekom, Telecom Italia, Orange, KT Corp., KPN
16. RP-220784 Discussion on Rel-17 RedCap ZTE, Sanechips
17. RP-220836 RAN2 endorsed CRs on Introduction of RedCap RAN2
18. RP-212634 Moderator’s summary for discussion [93e-16-RedCap-WI] (for discussion in Friday GTW), Intel (email discussion moderator), RAN#94-e