3GPP TSG-RAN WG2 Meeting #122 R2-2306549

Incheon, Korea, May 22-26, 2023

**Source: Session Chair (Apple)**

**Title: Report from NC Repeater breakout session**

**Status of At-Meeting Email Discussions**

*This subclause is not an Agenda Item. It contains a running summary of the email discussions assigned to take place during the meeting weeks. This section will be moved to an appendix in the final version of the report.*

**[AT122][700][NCR] Organisational Sasha – NCR (Apple)**

Scope: Organisational discussions and announcements, as needed throughout the meeting weeks

Intended outcome: Well-informed participants

**[Pre122][702][NCR] Summary of AI 7.1.2 on signalling for SCI (Fujitsu)**

Scope: Summary of agenda item 7.1.2

Intended outcome: Report in [R2-2306560](./Docs/R2-2306560.zip)

**[Pre122][702][NCR] Summary of AI 7.1.3 on other RAN2 aspects (ZTE)**

Scope: Summary of agenda item 7.1.2

Intended outcome: Report in [R2-2306758](./Docs/R2-2306758.zip)

## 7.1 NR network-controlled repeaters

(NR\_NetConRepeater; leading WG: RAN1; REL-18; WID: [RP-230175)](./Docs/RP-230175).zip)

Time budget: 0.5 TU

Tdoc Limitation: 2 tdocs

### 7.1.1 Organizational

Including LSs and any rapporteur inputs.

[R2-2305400](./Docs/R2-2305400.zip) RRC running CR for R18 NCR ZTE Corporation draftCR Rel-18 38.331 17.4.0 B NR\_netcon\_repeater [R2-2304425](./Docs/R2-2304425.zip)

* [AT122][704][NCR] RRC CR for NCR (ZTE)

Scope: Discuss remaining issues and implement agreements from the meeting

Intended outcome: CR in [R2-2306601](./Docs/R2-2306601.zip)

Deadline: Friday CB session

[R2-2306601](./Docs/R2-2306601.zip) Running 38.331 CR for R18 Network-controlled repeaters ZTE Corporation (Rapporteur)

Samsung: some fields are not sorted alphabetically

* Sort field names alphabetically
* With this change the CR is agreed unseen in [R2-2306609](./Docs/R2-2306609.zip)

[R2-2305795](./Docs/R2-2305795.zip) Introducing support for Network Controlled Repeaters to 38.321 Samsung CR Rel-18 38.321 17.4.0 1554 3 B NR\_netcon\_repeater-Core [R2-2304415](./Docs/R2-2304415.zip)

* [AT122][705][NCR] MAC CR for NCR (Samsung)

Scope: Discuss remaining issues and implement agreements from the meeting

Intended outcome: CR in [R2-2306602](./Docs/R2-2306602.zip)

Deadline: Friday CB session

[R2-2306602](./Docs/R2-2306602.zip) Introducing support for Network Controlled Repeaters to 38.321 Samsung

Fujitsu: suggest to move “configured” after “SRI” in 6.1.3.y to after

* “configured in the active UL BWP and referring to an SRS-ResourceID” -> “referring to an SRS-ResourceID configured in the active UL BWP”
* With this change the CR is agreed unseen in [R2-2306608](./Docs/R2-2306608.zip)

[R2-2305951](./Docs/R2-2305951.zip) UE capabilities for NCR Intel Corporation CR Rel-18 38.306 17.4.0 0922 - B NR\_netcon\_repeater

[R2-2305952](./Docs/R2-2305952.zip) UE capabilities for NCR Intel Corporation CR Rel-18 38.331 17.4.0 4122 - B NR\_netcon\_repeater

* [AT122][706][NCR] Capability CRs for NCR (Intel)

Scope: Discuss remaining issues and implement agreements from the meeting

Intended outcome: CRs in [R2-2306603](./Docs/R2-2306603.zip), [R2-2306604](./Docs/R2-2306604.zip)

Deadline: Friday CB session

[R2-2306603](./Docs/R2-2306603.zip) UE capabilities for NCR Intel Corporation

* Agreed

[R2-2306604](./Docs/R2-2306604.zip) UE capabilities for NCR Intel Corporation

* Agreed

[R2-2306235](./Docs/R2-2306235.zip) 38.304 running CR for R18 NCR CATT draftCR Rel-18 38.304 17.4.0 B NR\_netcon\_repeater

* [AT122][707][NCR] 38.304 CR for NCR (CATT)

Scope: Discuss remaining issues and implement agreements from the meeting

Intended outcome: CR in [R2-2306605](./Docs/R2-2306605.zip)

Deadline: Friday CB session

[R2-2306605](./Docs/R2-2306605.zip) 38.304 CR for R18 NCR CATT

Apple: changes on changes should be fixed

* Remove “changes on changes”
* With this change the CR is agreed unsee in [R2-2306610](./Docs/R2-2306610.zip)

[R2-2306434](./Docs/R2-2306434.zip) 38.300 Running CR for NCR Ericsson draftCR Rel-18 38.300 17.4.0 B NR\_netcon\_repeater

* [AT122][708][NCR] stage-2 CR for NCR (E///)

Scope: Discuss remaining issues and implement agreements from the meeting

Intended outcome: CR in [R2-2306606](./Docs/R2-2306606.zip)

Deadline: Friday CB session

[R2-2306606](./Docs/R2-2306606.zip) Introducing support for Network-Controlled Repeaters to 38.300 Ericsson

* Agreed
* [AT122][709][NCR] LS to CT1 (Samsung)

Scope: agreeable draft LS

Intended outcome: [R2-2306607](./Docs/R2-2306607.zip)

Deadline: Friday CB

[R2-2306607](./Docs/R2-2306607.zip) LS on applicability of UAC for Network Controlled Repeater

Chair: repetitive text in “to take the agreement into account the above agreement”

Huawei: is the text “introduce specification text for an NCR node to skip access control check.” needed?

* “RAN2 asks CT1 to take the agreement into account the above agreement and introduce specification text for an NCR node to skip access control check” -> “RAN2 asks CT1 to take the above agreement into account”
* Remove “TDoc”
* With these changes the LS is approved unseen in [R2-2306611](./Docs/R2-2306611.zip)
* Chair to report the WI is complete from RAN2 perspective

### 7.1.2 Signalling for side control information

Signalling and procedures for for side control information, based on RAN1 agreements.

[R2-2306560](./Docs/R2-2306560.zip) [Pre122][701][NCR] Summary of AI 7.1.2 on signalling for SCI Fujitsu (moderator)

Proposal 1: For NCR DL/UL backhaul link beam indication MAC CEs, RAN2 to clarify the indicated TCI state and SRI are associated with active DL/UL BWP, and capture the confirmation in the MAC spec.

HW: what about RRC\_INACTIVE?

ZTE: when UE enters inactive it follows the last configuration received in CONNECTED

HW: what is BWP changes?

Fujitsu: then the network should send new indication

Proposal 2: For the UL beam indication in the case of joint TCI state, RAN2 to discuss whether the TCI state is selected from the TCI state list in the active DL BWP.

Proposal 3: RAN2 to discuss whether SRI is referred to SRS Resource Indicator.

NEC: we confirmed this with our RAN1 delegates it should be SRS resource ID

Samsung: we agree with the proposal.

Fujitsu: agree with NEC

Nokia: agree with Fujitsu; shall we send LS to RAN1

* To be discussed offline in MAC CE offline

Proposal 3a: If Proposal 3 is agreed, RAN2 to add the abbreviation of SRI in the Abbreviation sub clause in MAC spec.

Proposal 4: If Proposal 3 is agreed, RAN2 to discuss whether the 6 rightmost bits of *SRS-ResourceId* is contained in the “UL TCI state or SRI” field in NCR Uplink Backhaul Link Beam Indication MAC CE.

Proposal 5: RAN2 to confirm the “downlink TCI state ID” field in NCR Downlink Backhaul Link Beam Indication MAC CE refers to the TCI-state ID configured by *tci-StatesToAddModList* or *dl-OrJointTCI-StateToAddModList*.

Samsung: does this require changes in the CR?

ZTE: suggest to clarify it in the CR

Proposal 6: RAN2 to discuss whether a new MAC CE is introduced or an existing MAC CE is reused for the UL beam indication in the case of joint TCI state.

Samsung: we could have done just 1 MAC CE, but we agreed in two and we want to stick to the agreement

HW: agree with Samsung

Proposal 6a: If introducing a new MAC CE is agreed, RAN2 to confirm the MAC CE is only used for the joint TCI state indication and the MAC CE consists of 1 bit R field and 7 bits Joint TCI state field.

Proposal 6b: If reusing an existing MAC CE, such as NCR Downlink Backhaul Beam Indication MAC CE or NCR Uplink Backhaul Beam Indication MAC CE, is agreed, RAN2 to confirm the R bit field is redefined to indicate if joint TCI state or DL (or UL) TCI state is carried.

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| Agreements:  The TCI state and SRI indicated in MAC CE are associated with active DL/UL BWP.  For the UL beam indication in the case of joint TCI state, the TCI state is selected from the TCI state list in the active DL BWP.  The “downlink TCI state ID” field in NCR Downlink Backhaul Link Beam Indication MAC CE refers to the TCI-state ID configured by *tci-StatesToAddModList* or *dl-OrJointTCI-StateToAddModList* |

[R2-2304962](./Docs/R2-2304962.zip) Discussion on UL backhaul link beam indication Fujitsu discussion Rel-18 NR\_netcon\_repeater

[R2-2305402](./Docs/R2-2305402.zip) Remaining issue for side control information ZTE Corporation, Sanechips discussion Rel-18 NR\_netcon\_repeater

[R2-2306181](./Docs/R2-2306181.zip) On MAC CE for Joint TCI State Indication vivo discussion Rel-18

### 7.1.3 Other RAN2 aspects

Other RAN2 aspects, including: SI impacts, RRC states, RRM, capabilities and others not covered by 8.1.2.

[R2-2306758](./Docs/R2-2306758.zip) [Pre122][702][NCR] Summary of AI 7.1.3 on other RAN2 aspects ZTE (moderator)

Proposal 1 Besides OAM based solution (which has no specification impact), to discuss whether to introduce explicit wake-up timer in RRCRelease message.

Chair: this issue has been discussed for long time, there is no consensus. The chair thinks the feature can work without the timer.

Samsung: can we at least consider the timer as optional?

Intel: we disagree it is simple, as shown in p2 below

Vivo: Samsung’s proposal is a reasonable compromise; OAM is not flexible enough

Apple: we think OAM solution works

Proposal 2 If RAN2 agrees to introduce wake-up timer in RRCRelease message, then:

* The network can only configure the timer when releasing the NCR-MT to RRC\_IDLE state;
* The NCR-MT starts the timer when it receives the timer in RRCRelease message;
* Upon timer expires, the NCR-MT’s AS layer informs its NAS layer to trigger RRC connection establishment (FFS on sending LS to CT1);
* FFS on the value range;
* FFS on whether to stop the timer and initiate RRC connection establishment upon cell reselection.
* FFS on the necessity of prohibit timer;

Proposal 3 (Stick to previous RAN2 agreement) when NCR-MT enters RRC\_INACTIVE state, the NCR-Fwd uses the last backhaul beam that was indicated by the network while the NCR-MT was in RRC\_CONNECTED, the NCR-Fwd does not change the backhaul beam used for forwarding operation while the NCR-MT is in RRC\_INACTIVE.

QCOM: NCR may have backhaul link failure in inactive and if it reselects its configuration is not valid anymore, so it should stop forwarding; we think this problem can occur even without cell reselection. So we think in case of beam failure NCR should stop forwarding and resume. At least we should agree that if the backhaul link degrades based on implementation specific criteria NCR should stop forwarding.

ZTE: we acknowledge the issue, but we think it can be solved in implementation.

HW: the issue is there is no beam management in RRC\_INACTIVE; we prefer to revert the agreement so that if the network release the UE into inactive forwarding should be off

Intel, NEC: agree with HW

Samsung: we want to keep the agreement, beam management in inactive can be left to implementation. We also acknowledge the issue and agree that UE should resume when beam quality degrades

AT&T, ZTE: support Samsung

ZTE: NCR is a stationary device so we think the issue is not frequent

AT&T: we are OK to leave the beam management issue to implementation

HW: what would be resume cause in this case?

* Discuss the need for a new resume cause offline

Proposal 4 In Rel-18, RAN2 does not specify any beam monitoring/recovery functionality for NCR-MT in RRC\_INACTIVE state. If needed, beam monitoring can be done by implementation without specification impact.

Proposal 5 Regarding the OAM configured allowed/forbidden cell list, no need to capture additional UE behaviour in TS 38.304.

ZTE: based on RAN3 cells forbidden cell list should not be considered

Intel: agree with ZTE

Proposal 6 The NCR-MT in RRC\_INACTIVE does not discard the stored NCR-Fwd configuration autonomously; it is up to the network to reconfigure the configuration upon RRC resume procedure.

QCOM: NCR should just wait for the new configuration

Nokia: this is the proposal (to wait for new configuration)

ZTE: the intention is to ensure that UE and network configurations match. With this proposal the network would always know what configuration the UE has.

HW: the current behavior as captured in the CR matches the proposal

Apple: support the clarification in the proposal

Proposal 7 Send LS to CT1 on UAC not being applicable for NCR node.

* Send the LS with the understanding that WI completion does not depend on this

Proposal 8 To discuss whether NCR-FWD is turned OFF when T310 timer starts, and turned ON when T310 stops due to the reception of the consecutive in-sync indications. (i.e. handling of NCR-FWD configuration regarding T310 start/stop is same as BFD/BFR case)

ZTE: when beam failure detection occurs forwarding will stop anyway

Proposal 9. To discuss whether NCR-FWD is turned OFF when TAT is expired, and turned ON when TAT is started again. (i.e. handling of NCR-FWD configuration regarding TAT expiration/its recovery is same as BFD/BFR case)

Proposal 10 Clarify NCR-Fwd does not remain forwarding if RRCSetup is received in response to RRCResumeRequest.

Proposal 11 RAN2 to discuss whether NCR-Fwd should remain ON when receiving RRCReject in response to an RRCResumeRequest.

Samsung: this is for the case when the network is congested, which is why it is different from p10

QCOM: but the NCR may have a valid reason to resume

Proposal 12 NCR-Fwd is turned OFF if an NCR-MT selects another cell during cell selection after released to RRC inactive.

Proposal 13 RAN2 to discuss whether to introduce a separate capability for indicating the support of NCR-Fwd ON/OFF following last configuration when NCR-MT is in RRC\_INACTIVE state.

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| Agreements:  Do not introduce wake-up timer in RRC in this release.  Add a note in stage-2: when backhaul beam degrades in RRC\_INACTIVE, based on implementation criteria, NCR should stop forwarding and should attempt to resume.  NCR-Fwd does not remain forwarding if RRCSetup is received in response to RRCResumeRequest.  NCR-Fwd keeps the current forwarding state after receiving RRCReject in response to an RRCResumeRequest.  NCR-Fwd is turned OFF if an NCR-MT selects another cell during cell selection after released to RRC inactive.  Note: this clarifies the previous agreement on reselection which erroneously said “gNB” instead of “cell”.  OAM configured forbidden cell list and cells other than in allowed cell list should not be considered by NCR during cell (re)selection. |

[R2-2304824](./Docs/R2-2304824.zip) Discussion on the remaining CP issues for NCR Huawei, HiSilicon discussion Rel-18 NR\_netcon\_repeater

[R2-2304825](./Docs/R2-2304825.zip) Discussion on NCR-MT capability Huawei, HiSilicon discussion Rel-18 NR\_netcon\_repeater

[R2-2305051](./Docs/R2-2305051.zip) NCR access link beam update capability Nokia, Nokia Shanghai Bell discussion Rel-18 NR\_netcon\_repeater

[R2-2305052](./Docs/R2-2305052.zip) NCR remaining RRM issues Nokia, Nokia Shanghai Bell discussion Rel-18 NR\_netcon\_repeater

[R2-2305061](./Docs/R2-2305061.zip) Discussion on remaining issues for NCR Apple discussion Rel-18 DUMMY

[R2-2305157](./Docs/R2-2305157.zip) TPs to 38304 and 3833 on NCR operation Qualcomm Inc. discussion Rel-18 NR\_netcon\_repeater Withdrawn

[R2-2305356](./Docs/R2-2305356.zip) Discussion on NCR remaining open issues NEC discussion Rel-18 NR\_netcon\_repeater

[R2-2305401](./Docs/R2-2305401.zip) Discussion on NCR open issues ZTE Corporation, Sanechips discussion Rel-18 NR\_netcon\_repeater

[R2-2305501](./Docs/R2-2305501.zip) Discussion on NCR remaining open issues Intel Corporation discussion Rel-18 NR\_netcon\_repeater

[R2-2305694](./Docs/R2-2305694.zip) Discussion on RRC states for NCR-MT Lenovo discussion Rel-18

[R2-2306029](./Docs/R2-2306029.zip) Discussion on NCR operation (TPs to 38304 and 38331) Qualcomm Inc. discussion Rel-18 NR\_netcon\_repeater, NR\_netcon\_repeater-Core

[R2-2306050](./Docs/R2-2306050.zip) Discussion on wake-up timer solution Fujitsu discussion Rel-18 NR\_netcon\_repeater

[R2-2306139](./Docs/R2-2306139.zip) Considerations on short term link failure on NCR backhaul link Samsung R&D Institute UK discussion

[R2-2306151](./Docs/R2-2306151.zip) Remaining issues on NCR Kyocera discussion Rel-18

[R2-2306182](./Docs/R2-2306182.zip) Discussion on Support of RRC\_IDLE vivo discussion Rel-18

[R2-2306340](./Docs/R2-2306340.zip) Consideration on remaining issues for NCR China Telecom Corporation Ltd. discussion

[R2-2306435](./Docs/R2-2306435.zip) Remaining issues for NCR Ericsson discussion Rel-18 NR\_netcon\_repeater

[R2-2306436](./Docs/R2-2306436.zip) Discussion on transitioning from IDLE to CONNECTED Ericsson discussion Rel-18 NR\_netcon\_repeater

[R2-2306487](./Docs/R2-2306487.zip) Further considerations on NCR procedures Samsung Suzhou discussion Rel-18 NR\_netcon\_repeater

[R2-2306560](./Docs/R2-2306560.zip) [Pre122][701][NCR] Summary of AI 7.1.2 on signalling for SCI Fujitsu Limited discussion Rel-18 NR\_netcon\_repeater

### 7.1.4 Repeater management

RAN2 aspects of repeater management (if any).

Note: this AI is assumed to be handled in RAN3, no contributions are expected in RAN2.

## Summary

### **Agreed Documents**

[R2-2306609](./Docs/R2-2306609.zip) Running 38.331 CR for R18 Network-controlled repeaters ZTE Corporation (Rapporteur)

[R2-2306608](./Docs/R2-2306608.zip) Introducing support for Network Controlled Repeaters to 38.321 Samsung

[R2-2306603](./Docs/R2-2306603.zip) UE capabilities for NCR Intel Corporation

[R2-2306604](./Docs/R2-2306604.zip) UE capabilities for NCR Intel Corporation

[R2-2306610](./Docs/R2-2306610.zip) 38.304 CR for R18 NCR CATT

[R2-2306606](./Docs/R2-2306606.zip) Introducing support for Network-Controlled Repeaters to 38.300 Ericsson

[R2-2306611](./Docs/R2-2306611.zip) LS on applicability of UAC for Network Controlled Repeater

### **Post-meeting email discussions**

none