**3GPP TSG RAN WG1 #112bis-e R1-23nnnnn**

**e-Meeting, April 17th – April 26th, 2023**

**Source: Ad-Hoc Chair (AT&T)**

**Title: Session Notes of AI 9.17.4**

**Agenda Item:** **9.17.4**

**Document for:** **Endorsement**

### UE features for NR NCR

*Initial input on UE features for NR NCR to be provided by rapporteur.*

[112bis-e-R18-UE\_features-01] Email discussion on UE features for NR NCR by April 26 – Ralf (AT&T)

* Check points: April 21, April 26

**Agreement: Introduce the following new FG/row, while keeping the yellow highlighting, if any, as shown**

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| 43. NR\_netcon\_repeater | 43-1 | Basic NCR support [for C-link and backhaul link] | 1. Support of fixed beam for C-link/backhaul link  2. Support of TDMed UL transmission of C-link and backhaul link  [3. ON-OFF operation]  [4. TDD UL/DL determination]  [5. Timing determination of backhaul/access link]  6. Support of beam correspondence of the DL/UL of the access link at NCR-Fwd  [7. Support of backhaul link beam determination based on predefined rule] | FFS | N/A | Yes | NCR is not supported | Per NCR-MT | No | No | Yes | A NCR-MT must support FG 43-1  [Component 3 candidate values: FFS]  [Component 4 candidate values: FFS]  [Component 5 candidate values: FFS] | Optional [with/without] capability signaling |
| 43. NR\_netcon\_repeater | 43-2 | Periodic beam indication for access link | 1.Support periodic beam indication for access link | 43-1 | N/A | Yes | NCR-MT cannot decode the periodic beam indication | Per NCR-MT | No | No | Yes | Note: at least one of FGs 43-2, 43-3, 43-4 will be merged with 43-1, FFS which one | Optional with capability signaling |
| 43. NR\_netcon\_repeater | 43-3 | Aperiodic beam indication for access link | 1.Support aperiodic beam indication for access link  [2. Supported slot-offset k values for reference slot] | 43-1 | N/A | Yes | NCR-MT cannot decode the aperiodic beam indication | Per NCR-MT | No | No | Yes | Note: at least one of FGs 43-2, 43-3, 43-4 will be merged with 43-1, FFS which one | Optional with capability signaling |
| 43. NR\_netcon\_repeater | 43-4 | Semi-persistent beam indication for access link | 1.Support semi-persistent beam indication for access link | 43-1 | N/A | Yes | NCR-MT cannot decode the semi-persistent beam indication | Per NCR-MT | No | No | Yes | Note: at least one of FGs 43-2, 43-3, 43-4 will be merged with 43-1, FFS which one | Optional with capability signaling |

**Agreement: Introduce the following new FG/row, while keeping the yellow highlighting, if any, as shown**

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| 43. NR\_netcon\_repeater | 43-4a | Beam index updates for semi-persistent beam indication | 1.Support of [temporary] override of the RRC configuration of the beam index(es) in semi-persistent beam indication | 43-1, 43-4 | N/A | Yes | The semi-persistent beam indication cannot provide updates for the beam index(es). | Per NCR-MT | No | No | Yes | FFS: whether to merge this FG with 43-4 | Optional with capability signaling |

**Agreement: Introduce the following new FG/row, while keeping the yellow highlighting, if any, as shown**

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| 43. NR\_netcon\_repeater | 43-1a | Adaptive beam for NCR backhaul link[/C-link] | 1. [Support adaptive beam for NCR C-link]   2. Support adaptive beam for NCR backhaul link | 43-1 | N/A | Yes | The beam for backhaul link and C-link is fixed. | Per NCR-MT | No | No | Yes | FFS: Component candidate values: {Rel-15/16, Rel-17, both}  FFS: relation between 43-4 and existing UE features for beam operation | Optional with capability signaling |

**Agreement: Introduce the following new FG/row, while keeping the yellow highlighting, if any, as shown**

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| 43. NR\_netcon\_repeater | 43-5 | Simultaneous UL transmission of backhaul link and C-link | 1. Simultaneous UL transmission of backhaul link and C-link | 43-1 | N/A | Yes | NCR only supports TDMed UL transmission of C-link and backhaul link | Per NCR-MT | No | No | Yes |  | Optional with capability signaling |

**Agreement: Introduce the following new FG/row, while keeping the yellow highlighting, if any, as shown**

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| 43. NR\_netcon\_repeater | 43-6 | Dedicated signalling for backhaul link beam indication | 1. Support dedicated signalling for backhaul link beam indication | 43-1, 43-1a | N/A | Yes | Dedicated signalling for backhaul link beam indication is not supported | Per NCR-MT | No | No | Yes | [Component candidate values: {Rel-15/16, Rel-17, both}] | Optional with capability signaling |

**Agreement: Introduce the following new FG/row, while keeping the yellow highlighting, if any, as shown**

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| 43. NR\_netcon\_repeater | 43-7 | Priority flag | Priority flag for periodic/semi-persistent indication | 43-1, one of 43-2 or 43-4 | N/A | Yes | Priority flag is not supported | Per NCR-MT | No | No | Yes | FFS: whether to split this FG into two separate FGs for periodic and semi-persistent indication or whether to merge with FGs 43-2 and 43-4, respectively | Optional with capability signaling |

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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| 43. NR\_netcon\_repeater | 43-1 | Basic NCR support ~~[for C-link and backhaul link]~~ | 1. Support of fixed beam for C-link/backhaul link  2. Support of TDMed UL transmission of C-link and backhaul link  ~~[~~3. Support of ON-OFF operation for backhaul link and C-link based on access link beam indication~~]~~  ~~[~~4. Support of TDD UL/DL determination for backhaul/access link based on TDD UL/DL configuration of C-link~~]~~  ~~[~~5. Support of Tx/Rx timing determination for backhaul/access link based on Tx/Rx timing of C-link~~]~~  6. Support of beam correspondence of the DL/UL of the access link at NCR-Fwd  7. Support periodic beam indication for access link  8. Support aperiodic beam indication for access link  ~~[7. Support of backhaul link beam determination based on predefined rule]~~ | FFS | N/A | Yes | NCR is not supported | Per NCR-MT | No | No | Yes | A NCR-MT that includes *ncr-NodeIndication* in RRC Setup Complete must support FG 43-1  ~~[Component 3 candidate values: FFS]~~  ~~[Component 4 candidate values: FFS]~~  ~~[Component 5 candidate values: FFS]~~ | Optional ~~[with/~~without~~]~~ capability signaling |
| ~~43. NR\_netcon\_repeater~~ | ~~43-2~~ | ~~Periodic beam indication for access link~~ | ~~1.Support periodic beam indication for access link~~ | ~~43-1~~ | ~~N/A~~ | ~~Yes~~ | ~~NCR-MT cannot decode the periodic beam indication~~ | ~~Per NCR-MT~~ | ~~No~~ | ~~No~~ | ~~Yes~~ | ~~Note: at least one of FGs 43-2, 43-3, 43-4 will be merged with 43-1, FFS which one~~ | ~~Optional with capability signaling~~ |
| 43. NR\_netcon\_repeater | 43-3 | Slot-offset for aperiodic beam indication for access link | 1.~~Support aperiodic beam indication for access link~~  ~~[2.~~ Supported slot-offset k values for reference slot~~]~~ | 43-1 | N/A | Yes | NCR-MT cannot decode the aperiodic beam indication | Per NCR-MT | No | No | Yes | [Component 2 candidate values: FFS]  ~~Note: at least one of FGs 43-2, 43-3, 43-4 will be merged with 43-1, FFS which one~~ | Optional with capability signaling |
| 43. NR\_netcon\_repeater | 43-4 | Semi-persistent beam indication for access link | 1.Support semi-persistent beam indication for access link | 43-1 | N/A | Yes | NCR-MT cannot decode the semi-persistent beam indication | Per NCR-MT | No | No | Yes | ~~Note: at least one of FGs 43-2, 43-3, 43-4 will be merged with 43-1, FFS which one~~ | Optional with capability signaling |
| 43. NR\_netcon\_repeater | 43-2 | Backhaul link beam determination based on predefined rule | Support of backhaul link beam determination based on predefined rule | 43-1 | N/A | Yes | Backhaul link beam determination based on predefined rule is not supported | Per NCR-MT | No | No | Yes |  | Optional with capability signaling |

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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| 43. NR\_netcon\_repeater | 43-4a | Beam index updates for semi-persistent beam indication | 1.Support of ~~[temporary]~~ override of the RRC configuration of the beam index(es) by the beam index(es) in semi-persistent beam indication | 43-1, 43-4 | N/A | Yes | The semi-persistent beam indication cannot provide updates for the beam index(es). | Per NCR-MT | No | No | Yes | ~~FFS: whether to merge this FG with 43-4~~ | Optional with capability signaling |

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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| 43. NR\_netcon\_repeater | 43-1a | Adaptive beam for NCR backhaul link~~[~~/C-link~~]~~ | 1. ~~[~~Support adaptive beam for NCR C-link~~]~~  2. Support adaptive beam for NCR backhaul link | 43-1 | N/A | Yes | The beam for backhaul link and C-link is fixed. | Per NCR-MT | No | No | Yes | FFS: Component candidate values: {Rel-15/16, Rel-17, both}  FFS: relation between ~~43-4~~ 43-1a and existing UE features for beam operation | Optional with capability signaling |

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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| 43. NR\_netcon\_repeater | 43-5 | 1. Simultaneous UL transmission of backhaul link and C-link  2. Power allocation/sharing between C-link and B-link of an NCR | 1. Simultaneous UL transmission of backhaul link and C-link | 43-1 | N/A | Yes | NCR only supports TDMed UL transmission of C-link and backhaul link | Per NCR-MT | No | No | Yes |  | Optional with capability signaling |

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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| 43. NR\_netcon\_repeater | 43-7 | Priority flag | Priority flag for periodic/semi-persistent indication | 43-1~~, one of 43-2 or 43-4~~ | N/A | Yes | Priority flag is not supported | Per NCR-MT | No | No | Yes | ~~FFS: whether to split this FG into two separate FGs for periodic and semi-persistent indication or whether to merge with FGs 43-2 and 43-4, respectively~~ | Optional with capability signaling |

**Proposal: Send LS to RAN2 informing them that dynamic DL/UL operation related UE features FG 3-6, FG 5-1a and Component 7 of FG 5-1 are not supported for NCR.**

**Proposal: Send LS to RAN2 informing them that NCR-MT supports the following layer-1 mandatory UE features:**

* **0-1, 0-3, 0-4, 1-1, 2-1, 2-5, 2-6, 2-12, 2-16, 2-16a, 2-32 (only components 1-4 and 7), 2-50 (only components 1,2), 2-52 (only components 1, 2), 3-1 (only components 1,2,3,4,5), 4-1, 4-10, 5-1 (only components 1/2/3/4/5/6/9/10/12), 6-1, 7-1, 8-3**

**Proposal: Send LS to RAN2 informing them that beam management related UE features should be revised for NCR-MT as follows:**

* **The mandatory features for beam management should be changed to optional.**
  + **FGs 1-3, 1-7, 2-21, 2-22, 2-23, 2-23a, 2-24, 2-25, 2-26, 2-27, 2-28, 2-29, 2-29a, 2-30, 2-31, 2-59, 2-60, 2-61, 2-62**
* **FG 43-1a Adaptive beam for NCR backhaul link/C-link should be added in the** **prerequisite feature group.**
  + **FGs 2-21, 2-22, 2-23, 2-23a, 2-24, 2-25, 2-26, 2-27, 2-28, 2-29, 2-29a, 2-30, 2-31, 2-59, 2-60, 2-61, 2-62**

[R1-2302514](file:///C:\Users\youns\OneDrive\Documents\3GPP\RAN1%20tdocs\TSGR1_112b-e\Docs\R1-2302514.zip) Discussion on UE features for NCR vivo

[R1-2302898](file:///C:\Users\youns\OneDrive\Documents\3GPP\RAN1%20tdocs\TSGR1_112b-e\Docs\R1-2302898.zip) Initial views on UE features for Network Controlled Repeaters Nokia, Nokia Shanghai Bell

[R1-2302917](file:///C:\Users\youns\OneDrive\Documents\3GPP\RAN1%20tdocs\TSGR1_112b-e\Docs\R1-2302917.zip) Discussion on UE features for NR NCR Fujitsu

[R1-2303158](file:///C:\Users\youns\OneDrive\Documents\3GPP\RAN1%20tdocs\TSGR1_112b-e\Docs\R1-2303158.zip) Discussion on UE features for NR NCR Samsung

[R1-2303177](file:///C:\Users\youns\OneDrive\Documents\3GPP\RAN1%20tdocs\TSGR1_112b-e\Docs\R1-2303177.zip) Discussion on other aspects of NCR RAN1, Comba

[R1-2303208](file:///C:\Users\youns\OneDrive\Documents\3GPP\RAN1%20tdocs\TSGR1_112b-e\Docs\R1-2303208.zip) Discussion on NCR features ETRI

[R1-2303259](file:///C:\Users\youns\OneDrive\Documents\3GPP\RAN1%20tdocs\TSGR1_112b-e\Docs\R1-2303259.zip) Discussion on UE feature of NR NCR CMCC

[R1-2303293](file:///C:\Users\youns\OneDrive\Documents\3GPP\RAN1%20tdocs\TSGR1_112b-e\Docs\R1-2303293.zip) Discussion on the UE feature for NCR Rapporteur(ZTE)

R1-2303652 Summary of UE features for NR NCR Moderator (AT&T)

[R1-2303753](file:///C:\Users\youns\OneDrive\Documents\3GPP\RAN1%20tdocs\TSGR1_112b-e\Docs\R1-2303753.zip) Discussion on UE features for NR NCR LG Electronics

[R1-2303862](file:///C:\Users\youns\OneDrive\Documents\3GPP\RAN1%20tdocs\TSGR1_112b-e\Docs\R1-2303862.zip) UE features for NCR Huawei, HiSilicon

[R1-2303872](file:///C:\Users\youns\OneDrive\Documents\3GPP\RAN1%20tdocs\TSGR1_112b-e\Docs\R1-2303872.zip) Legacy UE features for NCR Ericsson