3GPP TSG-RAN WG2 Meeting #119bis electronic [R2-2210803](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210803.zip)

Online, August, 2022

Source: Session Chair (InterDigital)

Title: Report from Session on NES and UAV

**Email discussions:**

* [AT119bis-e][300] Organizational Diana – NES and UAV]

Scope:

* + - Share plans for the meetings and list of ongoing email discussions for the sessions related to Rel-17 URLLC/IIoT, Small data, RA Partitioning, R15-16 UP, Rel-18 UAV and NES
    - Share meetings notes and agreements for review and endorsement

## 8.3 Network energy savings for NR

(xx-Core; leading WG: RAN1; REL-18; WID: RP-213554)

Time budget: 1 TU

Tdoc Limitation: 3 tdocs

### 8.3.1 Organizational

LS, workplan, email discussion etc

[R2-2209365](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2209365.zip) LS on skeleton of TR 38.864 for NR network energy savings (R3-225203; contact: Huawei) RAN3 LS in Rel-18 FS\_Netw\_Energy\_NR To:RAN1 Cc:RAN2

[R2-2210415](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210415.zip) Work plan for NR network energy savings Huawei, HiSilicon Work Plan Rel-18 FS\_Netw\_Energy\_NR

[R2-2210416](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210416.zip) TR 38.864 skeleton for study on network energy savings for NR Huawei, HiSilicon discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2210417](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210417.zip) Report of [POST119-e][313][NES] Details of solutions (Huawei) Huawei, HiSilicon discussion Rel-18 FS\_Netw\_Energy\_NR

=> Revised in [R2-2210792](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210792.zip)

[R2-2210792](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210792.zip) Report of [POST119-e][313][NES] Details of solutions (Huawei) Huawei, HiSilicon discussion Rel-18 FS\_Netw\_Energy\_NR

Proposal: RAN2 will continue studying the following aspects:

1) Common signals related:

1-1) SSB/SIB/Paging-less (multi-carrier case is studied first)

1-2) On-demand SSB/SIB1 (e.g., triggered by WUS)

1-3) Extended SSB/SIB1 periodicity

2) Group signalling/configuration related:

2-1) Group HO/CHO

2-2) NW DTX/DRX

2-3) BWP adaptation

3) Cell selection/reselection.

### 8.3.2 gNB and UE supporting techniques

Contributions should focus on how to achieve more efficient operation dynamically and/or semi-statically and finer granularity adaptation of transmissions and/or receptions in one or more of network energy saving techniques in time, frequency, spatial, and power domains, with potential support/feedback from UE, and potential UE assistance information

DTX/DRX

[R2-2209757](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2209757.zip) Further discussion on NW DTX-DRX Apple discussion Rel-18 FS\_Netw\_Energy\_NR

Proposal 2: RAN2 confirm that NW DTX/DRX is necessary to be introduced for Network energy saving:

1) NW DTX/DRX is also applied to IDLE/INACTIVE state while CDRX is only for CONNECTED state.

2) NW DTX/DRX includes also TX behaviour while UE CDRX includes only RX behaviours.

Proposal 5: Although 3GPP generally don't specify gNB behavior, RAN2 discuss the expected gNB DTX and DRX behaviors during NW DTX/DRX OFF duration, and then specify corresponding UE behavior based on clarified gNB expected behavior.

Proposal 6: RAN2 discuss expected gNB DTX / DRX behavior with details of different TX / RX types:

• Expected dynamic transmission / reception of data traffic (e.g. DG-PDSCH, DG-PUSCH, PDCCH)

• Expected periodic / semi-periodic transmission / reception of data traffic (e.g. SPS, CG-PUSCH)

• Expected periodic / semi-periodic transmission / reception of reference signals (e.g. SR, RACH)

Proposal 7: RAN2 discuss whether to allow multiple expected gNB DTX and DRX behaviors during NW DRX / DTX OFF duration which are associated with different NES states.

[R2-2210369](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210369.zip) Network energy saving techniques Qualcomm Incorporated discussion Rel-18

Proposal 1: NW DTX applies to connected UEs and comprises discontinuation of transmission on PDCCH and DL-SCH.

Proposal 2: The gNB informs the connected UE about NW DTX via dynamic signaling

Proposal 3: RAN2 to consider group signaling for exchange of NW DTX information

[R2-2210420](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210420.zip) Discussion on network DTX Huawei, HiSilicon discussion Rel-18 FS\_Netw\_Energy\_NR

Proposal 1: RAN2 to discuss whether the intention of DTX/DRX enhancement is UE alignment, or group common signaling, or both.

Proposal 2: Discussion for DTX/DRX is under the assumption that during DRX OFF period, the gNB still transmits common signals/channel and reference signals.

Proposal 3: Discuss in which scenarios the UE alignment can be achieved.

Proposal 4: RAN2 to discuss mechanisms to support dynamic and/or cell-specific/group-common configuration of NW DTX.

**Cell Selection/Re-selection**

[R2-2210129](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210129.zip) Mobility and Access Control for NES Nokia, Nokia Shanghai Bell discussion Rel-18 FS\_Netw\_Energy\_NR

Observation 1: RAN2 should consider in reselection handling scenarios where whole frequency is utilizing NES (e.g. SCell frequency turned off) as well as only subset of cells on a frequency utilize NES

Observation 2: RAN2 should have a mechanism where legacy UEs could be control camping on cells/frequencies utilizing NES

Observation 3: NW could handle legacy UEs not to camp on NES applying cells by utilizing Intra/InterFreqExcludedCellList

Proposal 1:. NW should be able to allow NES capable UEs to camp on NES utilizing cells even if legacy UEs are prevented camping on those

[R2-2210255](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210255.zip) Handling of Legacy UEs on a NES Capable Cell Ericsson discussion

Observation 1 Cell barring through SIB can be used to account for new features not supported by legacy, e.g., as in NTN, IAB-MT.

Proposal 1 For NES features that are configurable per serving cell and that impact legacy UEs, enhance cell barring through MIB with cell barring through SIB.

Proposal 2 For the cell selection/reselection solution, RAN2 should focus on how to handle the impact on legacy UEs.

[R2-2210369](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210369.zip) Network energy saving techniques Qualcomm Incorporated discussion Rel-18

Proposal 9: RAN2 to confirm the following scenarios for mobility of idle/inactive UEs:

- Scenario 1: Deprioritize the selection/reselection of NES cells by UEs with no associated NES capability

- Scenario 2: Prioritize (or deprioritize) the selection/reselection of NES cells by UEs with associated NES capability

Proposal 10: RAN2 to study the following options for NES-aware cell selection/reselection:

- Option 1: selective barring of NES cells

- Option 2: selective blacklisting of NES cells

- Option 3: NES-aware frequency priorities

- Option 4: NES-aware cell selection/ranking

**SSB adaptation/SIB-less cells**

[R2-2210666](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210666.zip) Techniques in various domains and UE assistance information for network energy saving ZTE corporation, Sanechips discussion Rel-18

Proposal 1: For network energy saving, DL common signal/channel (i.e., SSB, SIB) reduction can be considered in multi-carrier (CA) and single-carrier case.

 In multi-carrier (CA) case, SSB-less SCell can be considered for inter-band case.

 In single-carrier case, SSB/SIB reduction can be considered

[R2-2210128](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210128.zip) Common Channel Updates for NES Nokia, Nokia Shanghai Bell discussion Rel-18 FS\_Netw\_Energy\_NR

Proposal 3: RAN2 to study procedures and signalling to enable dynamic SSB/SIB1 reduction/adaptation.

[R2-2210418](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210418.zip) Discussion on SSB-less and SIB1-less techniques for NES Huawei, HiSilicon discussion Rel-18 FS\_Netw\_Energy\_NR

Proposal 1: To support the SSB-less SCell for inter-band case, RAN2 impacts only require a new UE capability reporting and some essential field description clarification. The existing procedure defined for intra-band case can be re-used in general.

Proposal 2: Support the SIB1-less operation where UE perform access to an ES carrier by receiving SIB1 on the anchor carrier, and study the potential RAN2 impact (including e.g. cell search, cell selection/reselection).

[R2-2210141](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210141.zip) Discussion on time domain NES solutions CMCC discussion Rel-18 FS\_Netw\_Energy\_NR

Proposal 1: SSB/SIB/paging less solution can be supported in both intra- frequency and inter-frequency of multi-carries scenario.

Proposal 2: RAN2 is kindly asked to focus on the multi carrier scenario.

**Connected mode mobility (CHO/Group mobility)**

[R2-2210019](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210019.zip) Discussion on network energy savings OPPO discussion Rel-18 FS\_Netw\_Energy\_NR

Proposal 4 RAN2 considers the NES-state aware CHO, i.e. in CHO, the UE takes the cell NES states into account and could deprioritize/exclude the cell in the NES state when selecting a cell to hand over.

[R2-2210369](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210369.zip) Network energy saving techniques Qualcomm Incorporated discussion Rel-18

Proposal 6: RAN2 to confirm the following scenarios for mobility of connected UEs:

- Scenario 1: UEs are HO’ed due to switch of SOURCE cell to NES mode

- Scenario 2: UEs are HO’ed due to source link degradation, where TARGET cell is selected based on its mode of operation

Proposal 7: Discussion on group handover should be confined to the CHO framework.

[R2-2209758](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2209758.zip) Discussion on Network energy saving for CONNECTED UE - group CHO and BWP adaptation Apple discussion Rel-18 FS\_Netw\_Energy\_NR

During the email discussion, we think there were actually 3 solutions discussed within this aspect, and some confusion was caused. To align company view, we share our understanding on the 3 discussed solutions as below:

• Solution 1: CHO with L1/L2 UE group common signaling as new trigger condition

• Solution 2: Enhanced CHO by prioritizing NES cells in CHO condition evaluation

• Solution 3: PCell fast swapping with one of its SCell

Proposal 2: For solution of CHO with L1/L2 UE group common signaling as new HO execution condition, no need to introduce new measurement and reporting (e.g. UE location and mobility status).

Proposal 3: Hold on the discussion on solution of enhanced CHO by prioritizing NES cells in CHO condition evaluation until it is clear whether / what new measurement quantities are introduced for NES cell.

Proposal 4: Leave the study on solution of PCell fast swapping with SCell to Rel-18 WI of further mobility enhancement.

[R2-2209474](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2209474.zip) On solutions aiming at reducing periodic DL transmissions (1-4) CATT discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2209475](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2209475.zip) Autonomous SCell activation and gNB DTX/DRX CATT discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2209476](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2209476.zip) Assistance Information from the UE CATT discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2209735](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2209735.zip) Group signalling for network energy saving techniques Intel Corporation discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2209736](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2209736.zip) Assistance information from UE Intel Corporation discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2209759](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2209759.zip) Discussion on Network energy saving for IDLE and INACTIVE UE - cell (re)selection and SSB-less Apple discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2209809](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2209809.zip) Discussions on time domain techniques for network energy saving vivo discussion Rel-18

[R2-2209810](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2209810.zip) cell (re)selection and handover considering network energy saving vivo discussion Rel-18

[R2-2209811](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2209811.zip) Discussions on frequency domain techniques for network energy saving vivo discussion Rel-18

[R2-2209886](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2209886.zip) Aspects on Network energy savings VODAFONE Group Plc discussion Rel-18

[R2-2209964](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2209964.zip) Discussion on supporting of network energy savings for NR Lenovo discussion Rel-18

[R2-2209965](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2209965.zip) NES impact to RRC\_CONNECTED UE Lenovo discussion Rel-18

[R2-2210020](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210020.zip) Discussion on the UE assistance information OPPO, Apple discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2210053](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210053.zip) Energy saving for On-demand other SIBs Xiaomi discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2210105](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210105.zip) Consideration on network energy saving Fujitsu discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2210142](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210142.zip) Discussion on UE assistance information for NES CMCC discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2210143](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210143.zip) Discussion on Mobility issues CMCC discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2210185](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210185.zip) Details on time domain solutions for NES Nokia, Nokia Shanghai Bell discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2210225](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210225.zip) Discussion on idle and inactive state UE grouping for NES gNB DTX Sony discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2210226](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210226.zip) SIB-less and UE wake up request signal Sony discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2210227](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210227.zip) Handover enhancement for NES Sony discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2210235](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210235.zip) Aspects on Network Energy Saving Techniques Fraunhofer IIS, Fraunhofer HHI discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2210252](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210252.zip) Energy Saving from RRC Idle Operation Lenovo discussion FS\_Netw\_Energy\_NR

[R2-2210253](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210253.zip) Further aspects on NW DTX/DRX Ericsson discussion

[R2-2210254](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210254.zip) Paging Enhancements for Beams Ericsson discussion

[R2-2210282](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210282.zip) Time domain NES aspects InterDigital discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2210283](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210283.zip) Frequency domain NES aspects InterDigital discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2210284](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210284.zip) UE assistance information for NES InterDigital discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2210337](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210337.zip) UE awareness by gNB and coexistence with legacy UEs for NES NEC Telecom MODUS Ltd. discussion

[R2-2210370](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210370.zip) NES Proposed Common Signalling Techniques Assessment Qualcomm Incorporated discussion Rel-18

[R2-2210383](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210383.zip) NW DTX/DRX operation for NES ETRI discussion

[R2-2210419](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210419.zip) Discussion on cell activation triggered by UL WUS Huawei, HiSilicon discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2210478](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210478.zip) Discussion on network energy saving Sharp discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2210556](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210556.zip) Considerations on Energy saving KDDI Corporation discussion

[R2-2210595](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210595.zip) Discussion on resource adaptation for NES LG Electronics Inc. discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2210611](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210611.zip) Assistance Information for NES Samsung discussion Rel-18

[R2-2210612](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210612.zip) Cell Prioritization for NES Samsung discussion Rel-18

[R2-2210613](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210613.zip) Resource Adaptation for NES Samsung discussion Rel-18

[R2-2210653](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210653.zip) SSB/SIB/Paging and Group HO LG Electronics Finland discussion Rel-18

[R2-2210656](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210656.zip) Considerations on Network Energy Saving techniques MediaTek Inc. discussion Rel-18

=> Revised in [R2-2210772](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210772.zip)

[R2-2210772](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210772.zip) Considerations on Network Energy Saving techniques MediaTek Inc. discussion Rel-18

[R2-2210665](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210665.zip) Supporting access via NES cell ZTE corporation, Sanechips discussion Rel-18

[R2-2210667](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210667.zip) Supporting multiple power states ZTE corporation, Sanechips discussion Rel-18

[R2-2210707](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210707.zip) Discussion on Network Energy Saving in RAN2 study NTT DOCOMO INC. discussion Rel-18

## 8.8 NR support for UAV

(xx-Core; leading WG: RAN1; REL-18; WID: RP-213600)

Time budget: 0.5 TU

Tdoc Limitation: 2

### 8.8.1 Organizational

[R2-2209307](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2209307.zip) LS response to 3GPP RAN on Location Services for Drones (LI(21)P61035r1; contact: ETSI) ETSI TC LI LS in To:RAN, RAN2 Cc:SA3LI

[R2-2210354](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210354.zip) Uncrewed Aerial Vehicles in Rel-18 - updated workplan Nokia, Nokia Shanghai Bell Work Plan Rel-18 NR\_UAV-Core

### 8.8.2 Measurement reporting

Contributions should focus on enhancement to measurement reports, for example UE-triggered measurement report based on configured height thresholds, Reporting of height, location and speed in measurement report, Flight path reporting, Measurement reporting based on a configured number of cells (i.e. larger than one) fulfilling the triggering criteria simultaneously

Note: Work done in LTE is a starting point for this objective. NR-specific enhancements can be considered, if needed, while overall the LTE and NR solutions should be harmonized as much as possible.

[R2-2210885](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210885.zip) Summary of Agenda 8.8.2 (Nokia)

*Proposal 1: Discuss if the timestamp needs to be always reported as a part of flight path plan, considering when it may not be available and whether the information provided via waypoint without timestamp is still useful for the network.*

*Options:*

*- Optional*

*- Mandatory*

*Proposal 2: Discuss the scenarios where flight path modification may be needed and how to implement such path plan updating procedure.*

*Options:*

*- Previously reported flight path can be updated*

*- No update needed*

*Proposal 3: Discuss the definition of waypoints, whether they should have a fixed or configurable granularity in space domain, if the waypoint related to the flight destination should be signalled*

*(Nokia, Denso)*

*Proposal 4: Discuss the scenarios where NW-configured height-dependent parameter adjustment is beneficial. Consider both IDLE/Inactive and CONNECTED mode UEs.*

*- Height-dependent scaling of TTT*

*- A3 offset*

*- A4 threshold*

*- No scaling at all*

[R2-2209582](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2209582.zip) UAV support for NR Intel Corporation discussion Rel-18 NR\_UAV-Core

Proposal 2: There is no need for TTT scaling for event H1/2.

Proposal 3: RAN2 consider studying the combination of multiple events configurations to have better/ more useful event trigger and reduce the number of measurement reports.

[R2-2210504](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210504.zip) Potential issues and enhancements for UAV measurements Huawei, HiSilicon discussion Rel-18 NR\_UAV-Core

Proposal 1: A height adaptive TTT should be considered for NR UAV.

[R2-2210161](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210161.zip) Measurement Reporting for NR UAV CMCC discussion Rel-18 NR\_UAV-Core

Proposal 1: Send LS to RAN1/RAN4 to request some simulation results to help evaluate the specific RRM parameters needed scaling.

Proposal 2: We kindly suggest RAN2 to agree the LS in[3].

[R2-2210355](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210355.zip) On measurements and measurement reporting enhancements for Rel-18 UAVs Nokia, Nokia Shanghai Bell discussion Rel-18 NR\_UAV-Core

Proposal 1: RAN2 is asked to support adjusting the UAV UE’s mobility parameters (e.g. A3/A4 TTT, A3 Offset or A4 Threshold) based on UAV UEs altitude (e.g. using H1 or H2).

*Proposal 5: Identify the scenarios where measurement reporting reduction is necessary (e.g. UAV UE ascending/descending). Consider possible solutions, such as multi-cell triggering and/or prohibit timer.*

*Proposal 6: Consider the following aspects for multi-cell measurement report triggering (see below – some papers to be presented to describe idea problem):*

1. *Multi-cell trigger for reportOnLeave*

*b) Applying numberOfTriggeringCells for inter-RAT events (i.e. B1 and B2 triggering)*

*c) Beam-level measurement criteria in addition to cell-level triggering*

*d) Enhanced multi-cell triggering, when cellsTriggeredList changes by a number of cells*

***Multi-cell measurement report triggering***

[R2-2210489](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210489.zip) Discussion on measurement reporting for NR UAV Xiaomi discussion Rel-18 NR\_UAV-Core

*Proposal 8: Event A3, A4 and A5 can be configured with the configured number of cells (numberofTriggeringCells).*

***Applying numberOfTriggeringCells for inter-RAT events (i.e. B1 and B2 triggering)***

[R2-2210435](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210435.zip) Discussion on measurement reporting for NR UAV Sharp discussion

Proposal 2: The numberofTriggeringCells can be applied to Events B1, B2 to reduce inter-RAT measurement report.

***Multi-cell trigger for reportOnLeave and enhanced multi-cell triggering***

[R2-2210356](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210356.zip) On measurement reporting based on a configured number of cells triggering – evaluation results Nokia, Nokia Shanghai Bell discussion Rel-18 NR\_UAV-Core

Proposal 2: Study the feasibility of joint configuration of white cell list and numberOfTriggeringCells which can be beneficial to further enhance the reporting and make the triggering conditional on PCIs.

Proposal 3: Introduce an enhanced multi-cell A4 event with numberOfChangedTriggeringCells as single configuration parameter (in addition to the required A4 Thres parameter).

[R2-2210648](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210648.zip) Measurement Report Enhancement LG Electronics Finland discussion Rel-18

Proposal 5. The number of triggering cells applies to the measurement report for a leaving condition.

***Beam-level measurements***

[R2-2209446](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2209446.zip) Measurement and reporting enhancements Qualcomm Incorporated discussion Rel-18 NR\_UAV-Core

Proposal 5. To reduce the number of beam measurements (and reporting), different height thresholds for measurement of specific beams is introduced.

Proposal 6. Further study the activation of measurement configurations utilizing UE’s flight path.

[R2-2210623](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210623.zip) Further discussion on NR support for UAV NTT DOCOMO, INC. discussion Rel-18

Proposal2: Introduce numberOfTriggeringBeams for limiting the excessive measurement reporting (i.e. to control the cells that can be included in cellsTriggeredList.)

[R2-2210175](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210175.zip) On measurement reporting enhancements for NR UAV ZTE Corporation, Sanechips discussion Rel-18 NR\_UAV-Core

Proposal 1: RAN2 to consider enhancements on UE-triggered height report, e.g. to support per-beam/per-cell height thresholds.

[R2-2210441](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210441.zip) Measurement reporting for UAV InterDigital discussion Rel-18 NR\_UAV-Core

*Proposal 1: A UE indicates whether flight plan information is available within the RRCReconfigurationComplete, RRCReestablishmentComplete, RRCResumeComplete, or RRCSetupComplete message*

[R2-2210602](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210602.zip) Discussion on flight path reporting for NR UAV vivo discussion Rel-18 NR\_UAV

Proposal 1 Flight path update is reported to network whenever UAV flight path changes.

[R2-2209368](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2209368.zip) Conditional HO in NR UAV CATT discussion Rel-18 NR\_UAV-Core

[R2-2209418](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2209418.zip) Measurement Enhancement for UAV OPPO discussion Rel-18

[R2-2209532](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2209532.zip) Measurement reports Ericsson discussion Rel-18

[R2-2209754](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2209754.zip) Considerations on Measurement Reports Enhancements NEC Europe Ltd discussion Rel-18 NR\_UAV-Core

[R2-2209795](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2209795.zip) User consent on UAV location reporting Apple discussion Rel-18 NR\_UAV

[R2-2209934](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2209934.zip) Measurement enhancement for NR UAV Lenovo discussion Rel-18

[R2-2210219](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210219.zip) Considerations about UAV mobility and user consent Sony discussion Rel-18 NR\_UAV

[R2-2210535](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210535.zip) Consideration on flight path reporting of UAV for NR DENSO CORPORATION discussion NR\_UAV-Core

Proposal 3: RAN2 to investigate necessity of the mechanism to allow UE to report (modify) its flight path information dynamically

Proposal 4: RAN2 to investigate if a parameter is required to specify the granularity of waypoints (distance between each point)

[R2-2210601](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210601.zip) Discussion on measurement reporting enhancement for NR UAV vivo discussion Rel-18 NR\_UAV

[R2-2210652](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210652.zip) Flight path information report enhancement LG Electronics Finland discussion Rel-18

[R2-2210675](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210675.zip) Draft LS on Scaling the RRM Parameters for UAV UE CMCC LS out Rel-18 NR\_UAV-Core To:RAN4,RAN1

[R2-2210753](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210753.zip) Discussion on flight path reporting and user consent for location reporting Samsung discussion Rel-18 NR\_UAV-Core

### 8.8.3 Subscription-based aerial-UE identification

Contributions should focus on signaling required to support subscription-based aerial-UE identification

Note: Work done in LTE is a starting point for this objective. NR-specific enhancements can be considered, if needed, while overall the LTE and NR solutions should be harmonized as much as possible.

[R2-2209369](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2209369.zip) Subscription-based Aerial-UE Identification for NR CATT discussion Rel-18 NR\_UAV-Core

[R2-2209419](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2209419.zip) Subscription-based aerial-UE identification OPPO discussion Rel-18 [R2-2207234](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2207234.zip)

[R2-2209447](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2209447.zip) Enhancements for subscription-based aerial-UE identification Qualcomm Incorporated discussion Rel-18 NR\_UAV-Core

[R2-2209755](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2209755.zip) Considerations on Subscription-based Identification for NR UAV NEC Europe Ltd discussion Rel-18 NR\_UAV-Core

[R2-2210162](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210162.zip) Subscription-based aerial-UE identification for NR UAV CMCC discussion Rel-18 NR\_UAV-Core

[R2-2210176](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210176.zip) Discussion on subscription based identification for NR UAV ZTE Corporation, Sanechips discussion Rel-18 NR\_UAV-Core

[R2-2210505](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210505.zip) Consideration on subscription-based UAV identification Huawei, HiSilicon discussion Rel-18 NR\_UAV-Core

[R2-2210739](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210739.zip) Discussion on subscription-based aerial-UE identification for NR UAV Samsung Electronics Co., Ltd discussion Rel-18 NR\_UAV-Core [R2-2208630](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2208630.zip)

### 8.8.4 UAV identification broadcast

Study and specify, if needed, enhancements for UAV identification broadcast

NOTE: This Agenda Item will not be treated in this meeting

[R2-2209531](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2209531.zip) On broadcasting UAV identification Ericsson discussion Rel-18

[R2-2209923](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2209923.zip) UAV Identity broadcast and Identification Beijing Xiaomi Mobile Software discussion Rel-18 NR\_UAV-Core

[R2-2209935](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2209935.zip) Discussion on broadcasting remote id for UAV Lenovo discussion Rel-18

[R2-2210220](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210220.zip) UAV identification broadcast Sony discussion Rel-18 NR\_UAV

[R2-2210781](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_119bis-e\Docs\R2-2210781.zip) OG0022\_LS-MITRE-Engenuity Open Generation DAA input\_PC5\_DAA\_RID\_PRS OG0022 (contact: vivo) MITRE Engenuity Open Generation 5G Consortium LS in NR\_UAV-Core To:SA2 Cc:RAN2