3GPP TSG-RAN WG2 Meeting #119bis electronic [R2-2210803](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210803.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
* [AT119bis][302][NES] Cell Selection/Reseletion and SSB/SIB-less (Huawei)

- Discuss and agree aspects of cell selection/reselection based on contributions submitted to meeting (including both legacy and NES capable devices)

- Discuss and agree on aspects of SSB adaptation/SIB-less based on contributions submitted to meeting (both SSB/SIB-less and adaptation are included)

Deadline: to be set by rapporteur so agreable proposals can be ready by Monday morning for review.

* [AT119bis][303][NES] TP on NW DTX/DRX (Huawei/Apple)

- Review TP for NW DTX/DRX. Aim to capture some details on how DTX/DRX.

- Identify remaining questions/details that are required to be discussed for next meeting.

Deadline: Friday, Oct. 21th

## 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%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2209365.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

=> Noted

[R2-2210415](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210415.zip) Work plan for NR network energy savings Huawei, HiSilicon Work Plan Rel-18 FS\_Netw\_Energy\_NR

=> Noted

[R2-2210416](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210416.zip) TR 38.864 skeleton for study on network energy savings for NR Huawei, HiSilicon discussion Rel-18 FS\_Netw\_Energy\_NR

=> Noted

[R2-2210417](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210417.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%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210792.zip)

[R2-2210792](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210792.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%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2209757.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.*

- CATT doesn’t think that we need to study DTX for idle/inactive. We should focus only on connected UEs. Huawei agrees with second proposal but not sure what to do for idle/inactive. Lenovo thinks that idle/inactive case is important. Ericsson is not sure if there is an impact in idle/inactive until the RAN1 defines.

=> Let’s start with understanding solution in the context of connected

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)

• Example 1: gNB is expected to turn off all transmission and reception for data traffic and reference signal during Cell DTX / DRX OFF duration.

• Example 2: gNB is expected to turn off its transmission / reception only for data traffic during Cell DTX / DRX OFF duration (i.e. gNB will still transmit / receive reference signals).

• Example 3: gNB is expected to turn off its dynamic transmission / reception during Cell DTX / DRX OFF duration (i.e. gNB is expected to still perform periodic transmission / reception, including SPS, CG-PUSCH, SR, RACH, and SRS).

• Example 4: gNB is expected to only transmit reference signals (e.g. CSI-RS for measurement).

**=> RAN2 assumes that the options above are possible for gNB DTX/DRX behavior and discuss UE RAN2 behavior/impact during the DTX/DRX.**

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.

- LG thinks that this makes our discussion more complicated and we should defer it until. InterDigital agrees with LG.

- Lenovo thinks that we should assume only one behavior is in use at any point in time.

**=> For the purpose of our discussion we will focus on a single UE behavior at any point in time. FFS if we allow multiple configuration of NW DRX/DTX behaviors.**

[R2-2210369](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210369.zip) Network energy saving techniques Qualcomm Incorporated discussion Rel-18

Proposal 2: The gNB informs the connected UE about NW DTX via dynamic L1/L2 signaling

Proposal 3: RAN2 to consider group signaling from NW to provide NW DTX information

- ZTE asks what DTX information is referring to and what is exchange. DTX information includes configuration

[R2-2210420](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210420.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.

- Franhoufer thinks that it is important to pursue UE alignment. Vivo thinks that we should allow separate DTX configuration.

- Apple thinks this is up to NW implementation (NW can release UE CDRX if it would like)

- Vodafone thinks that we can’t prevent UE from transmitting

- Samsung thinks that UE alignment is more important.

- Lenovo thinks that the alignment is already possible today by network configuration. Qualcomm explains that some mechanisms are new, e.g. dynamic signaling and group signaling.

- Qualcomm thinks that the purpose of alignment and group signaling is just an optimization.

- BT supports UE alignment

- Intel thinks that C-DRX alignments among the UEs is necessary to allow good NES gains

- Ericsson thinks we should update wording with UE DRX aligns with network DRX/DTX

- CATT thinks that DTX should be aligned with all the UEs

*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 (DRX aligned with DTX) can be achieved.*

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

**Agreements**

=> Periodic DTX is assumed as a baseline. The gNB provides indication to UE about NW DTX mode/configuration via dedicated dynamic L1/L2 signaling.

=> Dynamic L1/L2 group signalling from NW to provide NW DTX mode/configuration is also considered in RAN2

=> It is beneficial to align UE DRX with network DTX and DRX alignment among multiple UEs. Details are FFS, including UE transmission/reception behavior during DTX. RAN2 to study the alignment.

**Cell Selection/Re-selection**

[R2-2210995](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210995.zip) Report of [Offline-302][NES] Cell Selection/Reselection and SSB/SIB-less (Huawei)

Discussion

*Proposal 2: Whether to bar legacy UEs is configurable by NES cells, and both Option 1 and Option 2 can be considered.*

*- (8) Option 1: Use Intra/InterFreqExcludedCellList (FFS on the exact mechanism and impact)*

*- (22) Option 2: Use cellBarred in MIB and add a new cellBarred-NES in SIB1*

- Nokia doesn’t think these are exclusive options and option 2 doesn’t work for reselection and is not very useful for legacy UEs and both are needed. LG agrees with Nokia.

- Intel agrees that option 2 is the baseline and it does effect cell reselection.

- Vodafone asks why we need to bar NES UEs, if we bar NES UEs then we end up with an empty cell.

- LG asks why we didn’t consider cell reservation field. Apple also thinks that we can use cell reservation.

*Proposal 3: (16 vs 6) The need for NES capable UEs to (de)prioritize NES cells can be considered for both (13) frequency and (11) cell levels, FFS on whether the existing mechanism is sufficient.*

- CATT still hasn’t understood the basic motivation for having to prioritize/deprioritize NES cells. Vodafone explains that to achieve gains you should have as less UEs as possible and these UEs should be kept away. CATT thinks that this discussion is for connected mode UEs. Huawei explains that this is for idle and inactive mode. One example for prioritization is for load balancing.

- Apple explains that there is a motivation as it may prioritize a legacy cell for performance benefit and NES cells for load balancing. LG, Oppo and Samsung agrees. QC also sees that there is a motivation especially for cases where there is DTX. BT agrees and there are cases where operators want the UE to camp on the NES with different capabilities.

- Vodafone would not like the NES UE to prioritize NES cells.

- Huawei agrees on the motivation but there is already mechanism to do it and it is unclear what needs to be done. Nokia agrees with Huawei and at least for cell level there isn’t much that will be needed, maybe frequence level we think a bit more.

- Intel asks if it is cell DTX/DRX for a NES cell, then the changes to the priority can be quite fast. How is this priority going to be set? Apple thinks that if DTX is very fast the cell won’t be able to sleep.

*(7 vs 9) Proposal 5: For SSB-less solution, intra-band mechanism can be used as a baseline/starting point. FFS whether there are other impacts for RAN2 according to other WGs discussion.*

- Mediatek is not sure whether SSB-less is necessary and are we waiting for RAN1.

- Nokia asks why we are discussing this. Huawei explains it is because from RAN2 perspective the impacts are similar.

- Vivo asks if we are going to support SBB-less solution in Idle mode. Huawei explains that vivo’s proposal is linked to on-demand and wake signal and it’s not part of the discussion and not excluded.

*(10 vs 9) Proposal 6: For SIB-less solution, it can be considered that an NES cell does not have to transmit SIB, and the anchor cell transmits SIB and other necessary information for UEs to access to NES cell directly. FFS on RAN2 impacts, e.g., necessary information for UE to access to NES cell, and RACH procedure on NES cell.*

*[The UE accesses the NES capable cell by acquiring SIB information from anchor cell]*

*[UE is not expected to receive any SSB and/or SIB on non-anchor cell]*

*[both idle/inactive and connected mode will be covered]*

*[FFS whether paging can be transmitted on non-anchor cell. Both to be considered?]*

- Vodafone asks what is anchor cell and if we have this definition in NR. Huawei explains that it is the cell that transmits SIBs for other cells and this definition is in NB-IoT and it would be introduced to NR. Apple thinks that we only have the definition of anchor carrier and not cell.

- Huawei explains that it is both to connected and idle.

- Vivo asks if the SSB can be transmitted in the NES cell. Huawei explains both can be consider.

- LG asks what is “other necessary information”? Does it mean Paging?. Huawei says that it is the essential SIBs to access the NES cells and we do not exclude whether we receive paging.

- Oppo asks SIB1 or SIB1+OSI? Also think that we should only consider the connected mode.

- Intel thinks that for max NES gain, it should be SIB-less and SSB-less. Vivo agrees with Intel and the anchor cell involves both prop 5&6. Vodafone also agrees with Intel.

- Fraunhofer If SSB is not transmitted, how is that different from proposal 5 (SSB-less)?

- CMCC thinks that this beneficial for spectrum efficiency purposes as well

- ZTE and Huawei think we should go beyond NB-IoT

- Qualcomm doesn’t see energy gains in idle mode

- Huawei explains that for NB-IoT the anchor carrier motivation was for load balancing. SSB-less would introduce new challenges with regards to synchronization.

- InterDigital asks if we can assume that the non-anchor NES cell doesn't transmit SSB, SI, and paging as a start.

- Nokia doesn’t see the need for idle mode and thinks the UE can access the cell in anchor cell and then the network can send the UE in NES cell. Vivo explains that RA on non-anchor cell can save handover. CMCC indicates that access directly to NES cell is good for RA offloading.

=> Capture the solutions in more details over the email discussion and clarify the definition on anchor cell. (e.g. 1) non-anchor NES cell doesn’t transmit SSB and SI 2) non-anchor cell doesn’t transmit SIB) FFS for paging in both mechanisms.

**Agreements:**

1. There is a need to allow NES cells to prevent legacy UEs from camping. FFS the definition of NES cells.
2. Whether to bar legacy UEs is configurable by NES cells in Idle/Inactive mode and the network should be able to allow NES-capable UEs to camp on the NES cell. Options to bar UEs to be considered are 1) UseIntra/InterFreqExcludedCellList (FFS on the exact mechanism and spec impact) and 2) use cellBarred or cell reservation fields in MIB/SIB.
3. The network should be able to configure NES capable UEs to (de)prioritize NES cells. mechanism such as can be considered for both frequency and cell levels cell selection/reselection (de)prioritization. FFS on whether the existing mechanism is sufficient.
4. For SSB/SIB-less solution, RAN2 starts with multi-carrier case
5. RAN2 assumes that the SSB-less solution for inter-band CA in connected mode we can consider to use the intra-band CA mechanism as a baseline/starting point. FFS whether there are other impacts for RAN2 according to other WGs discussion
6. For SIB-less/SSB-less, capture the solutions in more details over the email discussion and clarify the definition on anchor cell. (e.g. 1) non-anchor NES cell doesn’t transmit SSB and SI 2) non-anchor cell doesn’t transmit SIB) FFS for paging in both mechanisms.

[R2-2210129](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210129.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%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210255.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%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210369.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%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210666.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%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210128.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%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210418.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%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210141.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%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210019.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.

- Lenovo asks why the network would configure the NES cell in the first place. Oppo explains that the cell state can change and the network wouldn’t know at which stage the UE would do the handover and the UE can read the information of the SIB of the NES cell. Lenovo explains that the UE is not required to read the SIB of target cell today.

- Intel thinks that this requires constant CHO reconfiguration, doesn't sound efficient or to read the SIB of neighbour cell

- Huawei explains that this requires the UE to make the decision and not clear why this is better.

- Ericsson is not sure if we will have many connected mode UEs to need these enhancements.

- Vodafone thinks that if the UE is in an NES cell and is making a HO to another cell it would be good to adjust parameters to get away from the NES cell.

=> No support for the proposal

[R2-2210369](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210369.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*

- Lenovo asks what’s new from UE perspective.

- Vodafone, Nokia, LG, Samsung and Apple agrees on Scenario 1.

- Apple thinks we can deprioritize scenario 2.

- Samsung asks what is the difference between scenario 2 and oppo’s proposal. Qualcomm explain that this can be done on the UE differently

- Nokia asks what is new with scenario 2? Qualcomm asks whether the UE should chose the best quality cell or a cell that is best for network energy saving.

- CATT asks for both S1 and S2, what prevents NW to implement them today? HO is under NW control.

- Ericsson is not sure there is an issue but is ok to look at the scenario

- InterDigital thinks scenario 1 is important to consider and for S2 it is important to ensure that the UE doesn’t HO into a sleeping cell and we should clarify this is for CHO.

- Huawei asks why we don’t do unicast CHO as there aren’t many UEs in the cell. Ericsson, Nokia, Vivo agree with HW. Apple explains that low load doesn’t mean few UEs. It can mean many UEs with low load. Intel thinks group handover will allow for more timely manner than using dedicated

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

=> Scenario 1: UEs are HO’ed due to switch of SOURCE cell to NES mode is considered for further study. FFS whether any enhancements is needed.

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

=> As a first priority, discussion on RAN2 group handover are confined to the CHO framework

[R2-2209758](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2209758.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*

- Lenovo asks whether group CHO mobility means use of a new RNTI addressing all UEs in one shot. Apple explains that it can be a group-common RNTI. Lenovo explains CHO allows some spread of access on the target side since different UEs fulfill execution cond at different point in time

• 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%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2209474.zip) On solutions aiming at reducing periodic DL transmissions (1-4) CATT discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2209475](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2209475.zip) Autonomous SCell activation and gNB DTX/DRX CATT discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2209476](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2209476.zip) Assistance Information from the UE CATT discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2209735](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2209735.zip) Group signalling for network energy saving techniques Intel Corporation discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2209736](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2209736.zip) Assistance information from UE Intel Corporation discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2209759](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2209759.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%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2209809.zip) Discussions on time domain techniques for network energy saving vivo discussion Rel-18

[R2-2209810](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2209810.zip) cell (re)selection and handover considering network energy saving vivo discussion Rel-18

[R2-2209811](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2209811.zip) Discussions on frequency domain techniques for network energy saving vivo discussion Rel-18

[R2-2209886](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2209886.zip) Aspects on Network energy savings VODAFONE Group Plc discussion Rel-18

[R2-2209964](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2209964.zip) Discussion on supporting of network energy savings for NR Lenovo discussion Rel-18

[R2-2209965](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2209965.zip) NES impact to RRC\_CONNECTED UE Lenovo discussion Rel-18

[R2-2210020](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210020.zip) Discussion on the UE assistance information OPPO, Apple discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2210053](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210053.zip) Energy saving for On-demand other SIBs Xiaomi discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2210105](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210105.zip) Consideration on network energy saving Fujitsu discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2210142](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210142.zip) Discussion on UE assistance information for NES CMCC discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2210143](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210143.zip) Discussion on Mobility issues CMCC discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2210185](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210185.zip) Details on time domain solutions for NES Nokia, Nokia Shanghai Bell discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2210225](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210225.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%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210226.zip) SIB-less and UE wake up request signal Sony discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2210227](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210227.zip) Handover enhancement for NES Sony discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2210235](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210235.zip) Aspects on Network Energy Saving Techniques Fraunhofer IIS, Fraunhofer HHI discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2210252](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210252.zip) Energy Saving from RRC Idle Operation Lenovo discussion FS\_Netw\_Energy\_NR

[R2-2210253](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210253.zip) Further aspects on NW DTX/DRX Ericsson discussion

[R2-2210254](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210254.zip) Paging Enhancements for Beams Ericsson discussion

[R2-2210282](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210282.zip) Time domain NES aspects InterDigital discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2210283](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210283.zip) Frequency domain NES aspects InterDigital discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2210284](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210284.zip) UE assistance information for NES InterDigital discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2210337](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210337.zip) UE awareness by gNB and coexistence with legacy UEs for NES NEC Telecom MODUS Ltd. discussion

[R2-2210370](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210370.zip) NES Proposed Common Signalling Techniques Assessment Qualcomm Incorporated discussion Rel-18

[R2-2210383](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210383.zip) NW DTX/DRX operation for NES ETRI discussion

[R2-2210419](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210419.zip) Discussion on cell activation triggered by UL WUS Huawei, HiSilicon discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2210478](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210478.zip) Discussion on network energy saving Sharp discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2210556](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210556.zip) Considerations on Energy saving KDDI Corporation discussion

[R2-2210595](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210595.zip) Discussion on resource adaptation for NES LG Electronics Inc. discussion Rel-18 FS\_Netw\_Energy\_NR

[R2-2210611](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210611.zip) Assistance Information for NES Samsung discussion Rel-18

[R2-2210612](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210612.zip) Cell Prioritization for NES Samsung discussion Rel-18

[R2-2210613](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210613.zip) Resource Adaptation for NES Samsung discussion Rel-18

[R2-2210653](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210653.zip) SSB/SIB/Paging and Group HO LG Electronics Finland discussion Rel-18

[R2-2210656](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210656.zip) Considerations on Network Energy Saving techniques MediaTek Inc. discussion Rel-18

=> Revised in [R2-2210772](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210772.zip)

[R2-2210772](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210772.zip) Considerations on Network Energy Saving techniques MediaTek Inc. discussion Rel-18

[R2-2210665](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210665.zip) Supporting access via NES cell ZTE corporation, Sanechips discussion Rel-18

[R2-2210667](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210667.zip) Supporting multiple power states ZTE corporation, Sanechips discussion Rel-18

[R2-2210707](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210707.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%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2209307.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

=> Let RAN respond to this LS and can provide details on the UAV WI if needed

=> Noted

[R2-2210354](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210354.zip) Uncrewed Aerial Vehicles in Rel-18 - updated workplan Nokia, Nokia Shanghai Bell Work Plan Rel-18 NR\_UAV-Core

=> Noted

### 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%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210885.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*

*Discussion:*

- Samsung thinks that the UE may not have the information on the timestamp. QC explains that there are use cases where you can use flightpath without timestamp. Intel thinks that there are cases where the network can benefit from having the info without the timestamp.

- Ericsson explains that even if it is mandatory the network cannot mandate/require the UE to send it and be at the place at that time.

- Nokia thinks that we should perhaps thinks of ways to make it more accurate.

- Huawei explains that in LTE if the UE is configured and is available the UE has to report it and it shouldn’t be different.

- Qualcomm wonders if we want RAN4 to be involved in accuracy.

*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*

- Samsung thinks that flight path is semi-static and doesn’t need to be updated.

*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.*

- Ericsson indicates that we should discuss point vs. area vs. volume

- CATT thinks that the waypoint is up to UE implementation and keep it configurable.

- Xiaomi thinks that UAV size and speed may influence over way point granularity.

- Huawei thinks that in RAN2 there is no reason for us to discuss flight points as this is an application layer. Intel and Lenovo agree with HW. Ericsson explain that LTE coding doesn’t match the application layer as they have volume, landing spots etc. QC has sympathy for Ericsson

- Oppo thinks that we should first define the details of waypoints.

- Nokia explains that we should discuss in general what is the purpose of flight path plan.

*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*

*- combing criteria*

*- No scaling at all*

[R2-2209582](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2209582.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%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210504.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%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210161.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%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210355.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%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210489.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%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210435.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.

**Agreements:**

1. The time information reported as part of flight path plan is optional. UE includes time info, if configured by the network and available at the UE. FFS on flight path details (waypoints and what is time information).
2. Allow the flight path to be updated. FFS on the details.
3. FFS on reporting format and initial flight path reporting (i.e. what information to report and how) – next meeting
4. Continue to study height-depending scaling, triggering and combinations
5. As in LTE, as a baseline, events A3, A4 and A5 can be configured with the configured number of cells (numberofTriggeringCells)

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

[R2-2210356](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210356.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%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210648.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.

R2-2210504 Potential issues and enhancements for UAV measurements Huawei, HiSilicon discussion Rel-18 NR\_UAV-Core

*Proposal 10: The UE sends the MR to the NW only when the cell which is leaving the cellsTriggeredList, has been reported to the NW beforehand.*

***Discussions***

- Vodafone asks how this will be done in practice as the UE can see lots of cells around and many repeated PCIs. Nokia thinks that the network knows the cells around and configure the UE.

- Intel asks if we can use allowed/not allowed cell list.

- Ericsson thinks that it is risky to configure only some cells as the use case for this events is to detect interference among cells.

- Huawei thinks that we should at least remove the triggering for cells that were never reported to the network in the first place. Ericsson asks if this is for multi-cell trigger only. Huawei explains that the report on leave stays as is and we just cut some reports for cells that were never reported.

- Qualcomm thinks that we also need to try to reduce the measurements in addition to the reports

- Nokia thins that we need to actually agree on the metric to optimize.

***Beam-level measurements***

[R2-2209446](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2209446.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.

- ZTE has some sympathy on Qualcomm’s proposal as it is helpful for UE power savings

- Nokia is ok to continue study

[R2-2210623](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210623.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%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210175.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%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210441.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%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210602.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%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2209368.zip) Conditional HO in NR UAV CATT discussion Rel-18 NR\_UAV-Core

[R2-2209418](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2209418.zip) Measurement Enhancement for UAV OPPO discussion Rel-18

[R2-2209532](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2209532.zip) Measurement reports Ericsson discussion Rel-18

[R2-2209754](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2209754.zip) Considerations on Measurement Reports Enhancements NEC Europe Ltd discussion Rel-18 NR\_UAV-Core

[R2-2209795](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2209795.zip) User consent on UAV location reporting Apple discussion Rel-18 NR\_UAV

[R2-2209934](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2209934.zip) Measurement enhancement for NR UAV Lenovo discussion Rel-18

[R2-2210219](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210219.zip) Considerations about UAV mobility and user consent Sony discussion Rel-18 NR\_UAV

[R2-2210535](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210535.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%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210601.zip) Discussion on measurement reporting enhancement for NR UAV vivo discussion Rel-18 NR\_UAV

[R2-2210652](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210652.zip) Flight path information report enhancement LG Electronics Finland discussion Rel-18

[R2-2210675](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210675.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%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210753.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%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2209369.zip) Subscription-based Aerial-UE Identification for NR CATT discussion Rel-18 NR\_UAV-Core

[R2-2209419](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2209419.zip) Subscription-based aerial-UE identification OPPO discussion Rel-18 [R2-2207234](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2207234.zip)

[R2-2209447](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2209447.zip) Enhancements for subscription-based aerial-UE identification Qualcomm Incorporated discussion Rel-18 NR\_UAV-Core

[R2-2209755](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2209755.zip) Considerations on Subscription-based Identification for NR UAV NEC Europe Ltd discussion Rel-18 NR\_UAV-Core

[R2-2210162](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210162.zip) Subscription-based aerial-UE identification for NR UAV CMCC discussion Rel-18 NR\_UAV-Core

[R2-2210176](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210176.zip) Discussion on subscription based identification for NR UAV ZTE Corporation, Sanechips discussion Rel-18 NR\_UAV-Core

[R2-2210505](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210505.zip) Consideration on subscription-based UAV identification Huawei, HiSilicon discussion Rel-18 NR\_UAV-Core

[R2-2210739](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210739.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%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2208630.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%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2209531.zip) On broadcasting UAV identification Ericsson discussion Rel-18

[R2-2209923](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2209923.zip) UAV Identity broadcast and Identification Beijing Xiaomi Mobile Software discussion Rel-18 NR\_UAV-Core

[R2-2209935](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2209935.zip) Discussion on broadcasting remote id for UAV Lenovo discussion Rel-18

[R2-2210220](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210220.zip) UAV identification broadcast Sony discussion Rel-18 NR\_UAV

[R2-2210781](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210781.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