**3GPP TSG-RAN WG2 Meeting #122 *R2-230xxxx***

**Incheon, South Korea, 22– 26 May 2023**

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| *CR-Form-v12.2* | | | | | | | | |
| **DRAFT CHANGE REQUEST** | | | | | | | | |
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|  | **38.300** | **CR** | **draftCR** | **rev** | **-** | **Current version:** | **17.4.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **x** | Radio Access Network | **X** | Core Network |  |

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| ***Title:*** | Stage-2 running CR for TS 38.300 for Rel-18 NTN enhancements | | | | | | | | | |
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| ***Source to WG:*** | THALES (Rapporteur) | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_NTN\_enh-core | | | | |  | ***Date:*** | | | 2023-06 |
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| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-18 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
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| ***Reason for change:*** | | Enhancements for Non-Terrestrial Networks support | | | | | | | | |
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| ***Summary of change:*** | | Update of specific NTN architecture and protocols aspects for Release 18 | | | | | | | | |
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| ***Consequences if not approved:*** | | NR NTN enhancements are not supported | | | | | | | | |
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| ***Clauses affected:*** | | 16.14 | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ...  TS/TR ... CR ...  TS/TR ... CR ...  TS/TR ... CR ... | | |
| ***affected:*** | |  | **x** | Test specifications | | | |  | | |
| ***(show related CRs)*** | |  | **x** | O&M Specifications | | | |  | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

*First Modified Subclause*

### 16.14.3 Mobility and State transition

#### 16.14.3.1 Mobility in RRC\_IDLE and RRC\_INACTIVE

The same principles as described in 9.2.1 apply to mobility in RRC\_IDLE for NTN and the same principles as described in 9.2.2 apply to mobility in RRC\_INACTIVE for NTN unless hereunder specified.

The network may broadcast multiple Tracking Area Codes (TACs) per PLMN in an NR NTN cell. A TAC change in the System Information is under network control, i.e. it may not be exactly synchronised with real-time illumination of beams on ground.

The UE can determine the network type (terrestrial or non-terrestrial) implicitly by the existence of *cellBarredNTN* in SIB1. If the UE cannot determine the network type for a neighbour cell configured on a frequency band number shared by TN and NTN (e.g. n1), UE assumes this is a TN cell.

The NTN ephemeris is provided in SIB19. It includes serving cell's NTN payload ephemeris and optionally neighbouring cell's NTN payload ephemeris.

The network broadcasts the information on TN coverage areas for UEs supporting NTN. The coverage information consists in a list of geographical TN areas associated to the frequency information.

#### 16.14.3.2 Mobility in RRC\_CONNECTED

##### 16.14.3.2.1 Handover

The same principle as described in 9.2.3.2 applies unless hereunder specified:

During mobility between NTN and Terrestrial Network (TN), a UE is not required to connect to both NTN and TN at the same time.

NOTE: NTN TN handover refers to mobility in both directions, i.e. from NTN to TN (hand-in) and from TN to NTN (hand-out).

DAPS handover is not supported for NTN in this release of the specification.

UE may support mobility between gNBs operating with NTN payloads in different orbits (e.g., GSO, NGSO at different altitudes).

RACH-less handover procedure is supported in NTN-NTN mobility as a L3 mobility procedure for intra-satellite handover with the same feeder link and can be supported for intra-satellite handover with different feeder link (i.e. GTW/gNB switch-over) and inter-satellite handover.

##### 16.14.3.2.2 Conditional Handover

The same principle as described in 9.2.3.4 applies to NTN unless hereunder specified.

NTN supports the following additional trigger conditions upon which UE may execute CHO to a candidate cell, as defined in TS 38.331 [12]:

- The RRM measurement-based event A4;

- A time-based trigger condition;

- A location-based trigger condition.

A time-based or a location-based trigger condition is always configured together with one of the measurement-based trigger conditions (CHO events A3/A4/A5) as defined in TS 38.331 [12].

It is up to UE implementation how the UE evaluates the time- or location-based trigger condition together with the RRM measurement-based event.

#### 16.14.3.3 Measurements

The same principle as described in 9.2.4 applies to measurements in NTN unless hereunder specified.

The network can configure:

- multiple SMTCs in parallel per carrier and for a given set of cells depending on UE capabilities;

- measurement gaps based on multiple SMTCs;

- assistance information (e.g., ephemeris, Common TA parameters) provided in SIB19 for UE to perform measurement on neighbour cells in RRC\_IDLE/RRC\_INACTIVE/RRC\_CONNECTED.

NW-controlled adjustment of SMTCs can be based on UE assistance information reported in RRC\_CONNECTED. A UE in RRC\_IDLE/RRC\_INACTIVE can adjust SMTCs based on its location and assistance information in SIB19.

UE assistance information includes the service link propagation delay difference(s) between serving the cell and neighbour cell(s). In the earth-moving cell scenario, it also includes the necessary parameters to assist UE to estimate when the serving cell stops providing coverage.

For a UE in Idle/Inactive mode it's up to UE implementation whether to perform NTN neighbour cell measurements on a cell indicated in SIB4 but not included in SIB19.

For a UE in Connected mode, it's up to UE implementation whether to perform NTN neighbour cell measurements on a cell included in the measurement configuration but not included in SIB19.

In the quasi-earth fixed cell scenario, UE can perform time-based and location-based measurements on neighbour cells in RRC\_IDLE/RRC\_INACTIVE:

- The timing and location information associated to the serving cell is provided in SIB19;

- Timing information refers to the UTC time when the serving cell stops serving the current geographical area;

- Location information refers to the reference location of the serving cell and a distance threshold to the reference location.

Measurement rules for cell re-selection based on timing information and location information are specified in clause 5.2.4.2 in TS 38.304 [10].

In the earth-moving cell scenario, location based measurement initiation for cell selection/reselection is supported using similar rule as in quasi-earth fixed location-based measurement, i.e. UE initiates measurements when its location to serving cell reference location is larger than the configured SIB19 distance threshold (The serving cell reference location and distance threshold are broadcasted in the cell).  
The time-based measurement initiation is used to address the feeder link switch-over case for cell (re)selection

Time-based cell reselection criteria is not supported.

*Next Modified Subclause*

### 16.14.4 Switchover

#### 16.14.4.1 Definitions

A feeder link switchover is the procedure where the feeder link is changed from a source NTN Gateway to a target NTN Gateway for a specific NTN payload. The feeder link switchover is a Transport Network Layer procedure. Service link switch refers to a change of the serving NTN payload.

Both hard and soft feeder link switchover are supported in NTN.

#### 16.14.4.2 Assumptions

A feeder link switch over may result in transferring the established connection for the affected UEs between two gNBs.

For soft feeder link switch over, an NTN payload is able to connect to more than one NTN Gateway during a given period, i.e. a temporary overlap can be ensured during the transition between the feeder links.

For hard feeder link switch over, an NTN payload connects to only one NTN Gateway at any given time, i.e. a radio link interruption may occur during the transition between the feeder links.

#### 16.14.4.3 Procedures

The NTN Control function (see Annex B.4) determines the point in time when the feeder link switch over between two gNBs is performed. The transfer of the affected UE(s)' context between the two gNBs at feeder link switch over is performed by means of either NG based or Xn based handover, and it depends on the gNBs' implementation and configuration information provided to the gNBs by the NTN Control function.

t-Service in SIB19 can also be interpreted by UE in Connected mode to know that a satellite or feeder link switchover happens.

*Next Modified Subclause*

### 16.14.8 UE location

#### 16.14.8.1 Coarse UE location reporting

Upon network request, after AS security is established in connected mode, a UE should report its coarse UE location information (most significant bits of the GNSS coordinates, ensuring an accuracy in the order of 2 km) to the NG-RAN if available.

#### 16.14.8.2 Network verification

The verification of the UE reported location (i.e. GNSS coordinates) is optional for a UE to access network services. The procedure can be triggered by the CN only when the UE is in RRC connected.

NOTE 1: NTN UE does not support positioning measurement and report in RRC inactive.

The multi-RTT positioning method with a single satellite in view is used to determine the UE location.

NOTE 2: The procedure re-use the LCS framework of the LMF with the LPP and NRRPa positioning protocols.

*End of Changes*

*The following appendices* ***shall be removed from final CR***

# A Appendix: RAN2 agreements for WI NR-NTN\_Core

## Coverage enhancements

**RAN2#119-e**

RAN2 understands that, based on the WID, only solutions that address the NTN specific characteristics (e.g. related to propagation delays, coverage loss, satellite movement) should be considered. But the identified solutions could then also be applicable to other cases (TN networks). In any case this will be discussed case by case (this understanding is not meant to change the WID description)

**RAN2#119-bis-e**

RAN2 thinks a UE may use application layer frame aggregation by implementation (no RAN2 spec impacts). (RAN2 can further discuss whether RAN needs to know whether UE is using frame aggregation in the voice packet)

RAN2 understands that it is up to network implementation to decide whether to configure SDAP header and integrity protection for a VoNR DRB to reduce the protocol overhead (no RAN2 spec impacts)

**RAN2#120**

From RAN2 perspective we don’t consider msg3 repetition enhancements in R18 NR NTN (apart from msg3 for CFRA, if decided by RAN1)

RAN2 will consider enhancements to enable initial blind Msg3 retransmission grant reception in Rel-18 NTN

RAN2 doesn’t consider using shorter PDCP SN for VoNR in NTN.

Using RLC TM mode for VoNR in NTN is not supported.

RAN2 doesn’t consider MAC enhancement to reduce MAC header size for VoNR in NTN

RAN2 will not specify signalling whereby the RAN knows the UE’s frame aggregation information in a voice packet

**RAN2#121-bie-e**

Rel-18 NTN coverage enhancements work will focus on addressing the RAN2 impact (if any) from RAN1 agreements on PUCCH enhancements for MSG4 HARQ-ACK and DMRS bundling for PUSCH. No further enhancements are pursued in this release

## Network verified UE location

**RAN2#119-e**

The UE location information is considered verified if the reported GNSS position is consistent with the network based assessment to within 5-10 km (similar to terrestrial network macro cell size) (it is assumed that there is no RAN2 spec impact due to this)

RAN2 should consider, as starting point, the re-use of the LCS framework of the LMF network for the network verification procedure. Send an LS to SA2 indicating RAN2 assumption on this

The network verification of the UE reported location may combine one or several 3GPP defined RAT dependent positioning methods (e.g. Multi RTT, DL/UL-TDOA, DL-AoA, NR E-CID, etc.).

**RAN2#119-bis-e**

RAN2 assumes that the network is able to compute possible UE locations independently from the GNSS location reported by UE

RAN2 assumes that the UE location verification procedure can be triggered by the CN and it is up to the CN to decide when to trigger the procedure

RAN2 should consider in priority the NGSO case with earth moving and earth fixed beams for the definition of the UE location verification procedure

Multi-connectivity involving multiple NTN NG-RAN nodes or NTN NG-RAN node and TN NG-RAN node is not part of the Rel-18 study on UE location verification

RAN2 assumes that the verification of the consistency (within 5-10 km) between the actual reported UE location with the UE location(s) computed by the network is up to the 5GC. (this doesn’t mean that RAN2 has nothing to do for this WI objective)

**RAN2#120**

From RAN2 point of view, assuming the NW may allow the UEs access to services before verifying the UE reported location, the latency of the NW verification can be handled by the NW

RAN2 agrees the re-use of the LCS framework of the LMF for the network verification of UE reported location information in NTN.

RAN2 will work on the details of radio protocol aspects of the verification procedure based on the solution investigated by RAN1

**RAN2#121**

For network verified UE location, the verification procedure can only be triggered by the CN.

Network initiated verification procedure can be triggered by the NW when the UE is in RRC Connected. FFS whether the NTN UE can perform/report measurements also when in Inactive state.

RAN2 will not specify an AS mechanism to prevent UEs not supporting the required RAT dependent positioning methods to access the network

RAN2 assumes that, as a baseline, legacy signalling procedure of location service can be reused for the purpose of network verified UE location in NTN

RAN2 assumes that in general the mirror point issue can be resolved by properly configuring neighbor cell measurement to UE, for example, measurement of two neighbor cells in the opposite side of a satellite beam. FFS if there are any cases that require anything in the specs

**RAN2#121-bis-e**

NTN UE doesn’t support positioning measurement and report in RRC INACTIVE

**RAN2#122**

In order to resolve the mirror point ambiguity issue, the network relies on the legacy signaling and procedure to configure NTN UE to measure and report neighbor cells or reference signals/beams. No spec changes to radio interface are needed from RAN2 perspective. Unclear if changes are needed to other interfaces, NRPPa protocol (RAN2 will no longer discuss this)

## NTN-TN and NTN-NTN mobility and service continuity enhancements

**RAN2#119-e**

RAN2 to work on a solution so that measurements for TN’s coverage are performed only when relevant (FFS what relevant means).

RAN2 to work on assistance information that can be provided to NTN UEs for the above.

Cell reselection enhancements (for both NTN-NTN and NTN-TN mobility) are considered for both Earth-moving and (quasi-)Earth-fixed scenarios, at least via the use of system information for broadcasting necessary parameters (dedicated signalling is not precluded). FFS whether the same or different solutions are used for Earth-moving and (quasi-)Earth-fixed scenarios

**RAN2#119-bis-e**

For NTN-NTN cell reselection with earth moving cell, RAN2 will consider providing parameters of serving cell to UE, for UE to estimate when the serving cell stops providing coverage at the present UE location (FFS whether this will be an optional UE feature) (this does not exclude any time-based or location-based approach) (other solutions can also be considered)

To enhance NTN-TN cell reselection, means are defined for a UE to differentiate when camping in an area only covered by NTN network (earth-moving or earth-fixed) vs an area where TN network(s) is/are also available.

System information is the basic means for providing necessary parameters to assist UE to estimate when the serving cell stops providing coverage at the present UE location.

UE is not required to perform neighbour cell measurements for TN neighbour cells in an area where there is no TN network coverage.

The method of detecting the transmission energy or SIB presence to determine the NTN coverage when a UE currently camps on a TN cell is not pursued.

In Earth-moving cell, the reference location and distance threshold of serving cell are provided by network for UE to estimate when the serving cell stops providing coverage at the present UE location. FFS how the reference location and/or distance threshold are provided to the UE

RAN2 can further consider whether some information in the handover command that can be common to all UEs, can be delivered to UEs in common signalling and if there is real benefit (in terms of signalling overhead reduction) in this

Send an LS to RAN1 (cc RAN4) listing the scenarios (intra-satellite, inter-satellite with same or different feeder links) and check with RAN1 in which scenarios RACH-less is possible (with no indication of RAN2 preference)

Continue the discussion (in future meeting) on group HO / “UE specific pre-configuration of the target cell + group HO” indication in the next meeting, also on the possible real benefits

RAN2 confirms that at least for the moving cell case the next serving cells can be largely predicted in NTN (at least for UEs not at the cell edge) thanks to the existence of predefined satellite orbits and negligible UE’s mobility in comparison to satellite’s motion (we can further discuss at the next meeting whether this applies to idle mode UEs as well)

New Proposal 2: RAN2 continues the discussion (e.g. at RAN2#120) on the solution with keeping the same PCI after switching of the satellites. Clarify at least the following:

* RAN1 impact
* The need to perform UL beam switching and/or RA
* Applicability to hard or soft satellite switching

**RAN2#120**

RAN2 will first continue the investigation on the details of the TN coverage data (e.g. accuracy requirements for describing where TN network(s) is/are available) and UE storage overhead before deciding how to send the information to the UE.

Continue the discussion on whether to introduce explicit indication to identify TN cells from inter-frequency list and inter-RAT frequency list (FFS on the granularity) or whether we rely on implicit information.

**RAN2#121**

TN coverage area information will be associated to the frequency information.

RAN2 adopts explicit description of geographical TN area, and focuses on the following options for further discussion, taking the signalling overhead into account (FFS on the accuracy of the information):

Option 1: The corresponding geographical area information is provided by network with location coordinates of area center and radius.

Option 2: a boundary line is provided by network in the format of a list of location coordinates, additionally an indication can be used to indicate which side is the TN side

Option 6: for each TN area, a list of locations is provided by network, and the corresponding close shape could be illustrated by a polygon connecting these points within the list.

As a baseline, broadcast signalling is used to provide the information on the TN coverage area for UEs supporting NTN.

Also based on the signalling overhead of the broadcast solution, RAN2 will further consider the option that UE-specific update can be optionally be provided via dedicated signalling, overriding the broadcast configuration (FFS if via RRC or higher layers. FFS on the validity time, if provided by RRC)

We don’t introduce additional cell reselection prioritization rules for NTN vs TN in Rel-18 (e.g. per service type, per mobility state, or per UE type) on top of what specified in Rel-17

In R18, for earth-moving system, satellite with steerable beam is not considered as part of mobility enhancement in NTN.

A serving cell reference location and a distance threshold/radius will be broadcast for earth-moving cell. FFS on whether the R17 IEs are reused or not. FFS on whether additional information needs to be broadcast to inform the UE how the reference location moves over time or if this can be derived from other information (e.g. Epoch time and ephemeris).

For cell selection/reselection, location-based measurement initiation is supported in earth-moving cell

For earth-moving cell, the location-based cell measurement rules of quasi-fixed cell is reused, i.e., for cell reselection in earth-moving cell, UE initiates measurements when its location to serving cell reference location is larger than the configured distance threshold.

Continue in the next meeting, to show the possible signalling gain of the proposal to have some common (C)HO configuration. FFS the number of cells that could be signalled. FFS whether broadcast or groupcast signalling could be used.

For location-based CHO for earth-moving cells we follow the solution being investigated for cell reselection to allow the UE to derive the serving cell’s reference locations as the cells move. FFS whether the same mechanism can also be used for the candidate cell’s reference location

Support RACH-less Handover in Rel-18.

RACH-less Handover in NR NTN is a L3 mobility procedure (FFS if this is combined with the unchanged PCI approach, if supported) and uses the LTE’s RACH-less Handover procedure as a baseline. FFS on TA acquisition

In NTN RACH-less handover, network indicates (implicitly or explicitly) whether NTA in the target cell is identical to the source cell or explicitly provided by the NW.

Support dynamic grant from the target cell for RACH-less PUSCH transmission to reduce random access congestion in the target cell. FFS whether to limit the solution to same feeder link/gateway scenario

**RAN2#121-bis-e**

For signaling the TN coverage, the corresponding geographical area information is provided by broadcast signalling by the network via a list of (possibly overlapping) areas where each area is defined using center location coordinates + radius (where the area is meant to describe a group of cells, not just a single one). FFS on the SIB. FFS on whether additional information in dedicated signalling is needed/useful

Area center location and its radius for TN coverage information is signalled using Ellipsoid-Point and radius separately. FFS if Rel-17 referenceLocation and distanceThresh are directly reused

Decision on the size of TN coverage area list is postponed until more is known on the format of this information and how is it sent.

The discussion on how to indicate the frequency information for each TN coverage area should be combined with the discussion on which SIB will be used to indicate the TN coverage area, possibly based on evaluation of the signalling overhead

The acquired TN area coverage information remains valid until the next system information update of the SIB including TN coverage info

On a frequency band number shared by TN and NTN (e.g., n1), if NTN-specific assistance information is NOT provided for a neighbour cell configured in SIB3/SIB4, UE assumes this is a TN neighbour cell. This understanding is also applicable for Rel-17 and it does not need any spec update

RAN2 understands that for earth-moving cell reselection, the UE can derive the trajectory of serving cell with rough accuracy based on serving satellite ephemeris and epochTime, with the assumption that the serving cell reference location broadcast by the network is the one at Epoch time (FFS whether a new epochTime IE is needed). RAN2 understanding is that both PVT and orbital parameters can be used for this. FFS if additional information is needed to allow more accurate measurements.

For earth-moving cell, new IE is introduced to indicate the reference location of serving cell.

For cell (re)selection in earth-moving system, a distance threshold is introduced for location-based measurement initiation, which reuses distanceThresh in SIB19.

For cell (re)selection in earth-moving system, time-based measurement initiation is used to address feeder-link switch case.

Time-based cell reselection criteria is not pursued in R18.

In Rel-18 we don’t aim at RACH-less HO for NTN-TN mobility

For initial UL transmission in RACH-less HO, support pre-allocated grant in RACH-less HO command

NTN RACH-less HO is supported for Intra-satellite handover with the same feeder link. i.e., with same gateway/gNB;

NTN RACH-less HO can be supported for intra-satellite handover with different feeder links, i.e., with gateway/gNB switch, inter-satellite handover with gateway/gNB switch, and inter-satellite handover with same gateway/gNB.

RAN2 confirms the general UE procedure for NTN RACH-less HO

1. receive a RACH-less HO command which can include pre-allocated grant optionally. FFS N\_TA is optional. (RRC)
2. start timer T304 for the target cell (RRC)
3. perform DL and UL synchronization, and start timer T430. FFS how to perform RACH-less UL synchronization to NTN target cell. (RRC, MAC)
4. start time alignment timer (MAC)
5. monitor target cell PDCCH for dynamic grant if pre-allocated grant is not configured in RACH-less HO command (MAC, PHY)
6. send initial UL transmission including RRCReconfigurationComplete message using the available UL grant (RRC, MAC, PHY)
7. consider RACH-less HO is completed upon receiving NW confirmation. FFS how to confirm RACH-less HO is successfully completed. (RRC, MAC)
8. stop timer T304 for the target cell. (RRC)

The pre-allocated grant is provided as type-1 CG

Send an LS to RAN1 informing RAN2 agreements on NTN RACH-less HO and check RAN1 views on the following aspects:

* whether the pre-allocated grant is provided with association to SSBs; if so, whether a RSRP threshold is configured for SSB selection.
* to monitor target cell PDCCH for dynamic grant for initial UL transmission, whether beam indication can be provided in RACH-less HO command.
* power control for initial UL transmission

At least for pre-allocated grant, for the confirmation of RACH-less HO completion we reuse of LTE approach, i.e., UE Contention Resolution Identity MAC CE is used but UE ignores the content of this field. FFS if anything else is needed for dynamic grant

Consider to support combining RACH-less HO with time-based CHO for NTN, taking into account the 1) validity of pre-allocated grant and potential waste of reserved resource; 2) when/how to provide dynamic grant in PDCCH.

In quasi-earth fixed cell case, for hard satellite switch in the same SSB frequency and same gNB (no key change), satellite switching without PCI changing (not requiring L3 mobility) is supported, unless major technical issues are identified by RAN1 (as usual RAN2 will aim at minimizing the specification impact so that it fits in Rel-18)

Remove the part in brackets “as usual RAN2 will aim at minimizing the specification impact so that it fits in Rel-18” in the LS to RAN1. The action to RAN1 will also ask for feedback for the hard satellite switch (not only the soft satellite switch case), e.g. action to RAN1 is to see if there are any major technical issues (as in the agreement).

**RAN2#122**

An RRC\_IDLE/RRC\_INACTIVE UE is not required to perform neighbour cell measurements for cell reselection for a TN frequency in the area, if configured, where there is no coverage of that frequency, regardless of the frequency priority.

Reuse the same format of Rel-17 referenceLocation and distanceThresh for signaling the TN coverage area centre and radius.

TN coverage info is NOT included in SIB19. FFS if we use an existing SIB or a new one.

We don’t introduce RRC dedicated signalling to provide more accurate TN coverage information.

We no longer consider option 3 from R2-2306643 alone for signaling the frequency information for TN coverage area (in case option 3 should be combined with option 1). Come back in the next meeting to decide between option 2 (plus possible fixes if needed) and option 1+3.

Re-use epochTime-r17 in ntn-Config IE to provide the time reference for an Earth moving cell reference location.

Re-use t-Service-r17 format for the IE used to trigger UE neighbour cell measurements prior to cell replacement due to feeder link switch. FFS whether we reuse exactly the same IE name as in R17 (updating the field description) or a new one.

Location-based cell reselection criteria are not pursued in R18.

Come back to the proposal to broadcast the target cell’s servingCellConfigCommon (as common (C)HO signalling) after feedback from RAN3.

Send al LS to RAN3 asking whether, in case target cell’s servingCellConfigCommon is broadcast in the source cell (as common (C)HO signalling), the target cell’s servingCellConfigCommon can be transferred to the source cell in the inter-gNB HO case in R18.

Group handover related to P1~P4 from R2-2304736 is not supported in Rel-18.

In NTN RACH-less handover, NW either indicates NTA in the target cell is identical to the source cell, or the NTA explicitly provided by the NW is 0. RAN2 will not discuss the case where NTA does not equal to 0.

From RAN2 perspective synchronization among source and target cells is not an issue in NTN RACH-less HO.

Release pre-allocated UL grant after RACH-less HO completion.

LTE approach (of confirming the HO completion) is reused for both pre-allocated grant and dynamic grant. FFS any enhancement to the confirmation of RACH-less HO completion, e.g. the NW does not send the UE Contention Resolution Identity MAC CE, and sends PDCCH/PDSCH addressed to C-RNTI.

Remove “FFS how to perform RACH-less UL synchronization to NTN target cell”, RAN2 assumes the UL sync handling in the target cell is the same in RACH-based HO and RACH-less HO, except how to acquire NTA (FFS on the spec impact , if any).

t-Service in SIB19 can also be interpreted by Rel-18 UE in Connected mode to know that a satellite change or feeder link change happens.

In hard switch unchanged PCI scenario (i.e. no handover), the UE needs to know the time the UE attempts to re-synchronize. (FFS whether a new “t-Start” / a t-gap is needed or whether t-Service can be reused (i.e. no other IE) if the gap is very short/zero).

# B Appendix: Who to contact about their comments

|  |  |  |
| --- | --- | --- |
| **Name** | **Company** | **Email** |
| Flavien Ronteix-Jacquet | Thales | flavien.ronteix-jacquet@thalesaleniaspace.com |
|  |  |  |