**3GPP TSG RAN WG1 Meeting #108-e R1-220xxxx**

**e-Meeting, February 21st – March 3rd , 2022**

**Agenda Item: 8.4**

**Source: Moderator (Thales)**

**Title: Summary of [108-e-R17-RRC-NR-NTN] Email discussion on Rel-17 RRC parameters for NR to support NTN**

**Document for: Discussion**

# Introduction

There were preliminary discussions on RRC parameters for NR to support NTN [1]. In current RAN1 meeting, RRC parameters pertinent for NR NTN will be further discussed.

This document is the Summary of [108-e-R17-RRC-NR-NTN] Email discussion on Rel-17 RRC parameters for NR to support NTN

* 1st check point for first LS in [108-e-R17-RRC]: February 24
* Final check point for second LS in [108-e-R17-RRC] if necessary: March 3

# Timing relationship enhancements

## Related RRC parameters

Based on the agreements to date (up to RAN1#107-e) and the companies proposals submitted to RAN1#108-e, an updated list of RRC parameters pertinent to NR NTN and related to the timing relationship enhancements is given within the following table:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter name in the spec** | **New or existing?** | **Description** | **Value range** | **Default value aspect** | **Per (UE, cell, TRP, …)** | **UE-specific or Cell-specific** | **Specification** | **Comment** | **Status [108-e]** |
| CellSpecific\_Koffset | New | The CellSpecific\_K\_offset is a scheduling offset used for the timing relationships that need to be modified for NTN [see TS 38.2xy]. The unit of K\_offset is number of slots for a given subcarrier spacing of 15 kHz | 0 ...1023 ms |   | cell | Cell-specific | 38.331 | For the reference subcarrier spacing value for the unit of K\_offset in FR1, a value of 15 kHz is used.• FFS: FR2 |  |
| K\_mac | New | K\_mac is a scheduling offset provided by network if downlink and uplink frame timing are not aligned at gNB. It is needed for UE action and assumption on downlink configuration indicated by a MAC-CE command in PDSCH [see TS 38.2xy].When UE is not provided by network with a K\_mac value, UE assumes K\_mac = 0.For the reference subcarrier spacing value for the unit of K\_mac in FR1, a value of 15 kHz is used.The unit of K\_mac is number of slots for a given subcarrier spacing. | 1 ...512 ms |   | cell | Cell-specific | 38.331 | The clarifications on the usage of the parameters by “It is needed … “ would be captured in [see TS 38.2xy]If a UE is provided with a K\_mac value, when the UE would transmit a PUCCH with HARQ-ACK information in uplink slot n corresponding to a PDSCH carrying a MAC CE command on a downlink configuration, the UE action and assumption on the downlink configuration shall be applied starting from the first slot that is after slot n+〖3N〗\_slot^(subframe,µ)+K\_mac, where µ is the SCS configuration for the PUCCH. For the reference subcarrier spacing value for the unit of K\_mac in FR1, a value of 15 kHz is used.• FFS: FR2 |  |
| dl-DataToUL-ACK-r17 | extension of R16 | For unpaired spectrum, extend the value range of K1 from (0..15) to (0..31)  | (0..31) |   | Per BWP | UE specific |   |   |  |

## Company views’ collection for 1st round

Companies contribution to RAN1#108-e:

Nokia, Nokia Shanghai Bell [R1-2201648] made the following proposals:

**Proposal 4:** Update the RRC parameter table, such that *CellSpecific\_Koffset* and *K\_mac* are marked as both cell-specific and UE specific parameters.

**Proposal 6:** Write an LS to RAN2 to inform of the suggested and required changes of RRC parameter properties and names.

Moderator view: Proposal 4 from Nokia is not clear. CellSpecific\_Koffset is broadcast in the SIB and it is obviously a cell specific (by definition).

UE specific K\_offset is different: RAN1 made an agreement (recopied hereafter) on UE specific K\_offset which is configured via MAC CE.

The information of K\_mac is carried in system information so it is a cell specific parameter.

|  |
| --- |
| **Agreement (107-e)**For determining UE specific K\_offset * Option 2: MAC CE provides a differential UE specific K\_offset value. The full UE specific K\_offset value equals the cell specific K\_offset value minus the differential UE specific K\_offset value.
	+ FFS: whether/how to resolve ambiguity of which cell-specific K\_offset value to use during the SIB modification period

**RAN1#106-e Agreement:**The information of K\_mac is carried in system information |

Companies are encouraged to provide comments on RRC parameters list (section 2.1):

|  |  |
| --- | --- |
| Nokia, Nokia Shanghai Bell | As briefly discussed in our contribution on this topic, we are in full agreement that the cell-specific K\_offset and K\_mac are parameters that have been agreed to be broadcast in SIB. However, if the gNB is allowed to change the value of these parameters at any point in time, we would also need a mechanism to provide the update for UEs that are configured for a bandwidth part which is not having a common search space configured.Possible options here would be:Option a: Cell-specific K\_offset and K\_mac can never be modified by the gNBOption b: Any UE operating NR over NTN can never be configured on a BWP which is not having a common search space configuredOption c: Cell specific K\_offset and K\_mac may also be updated using UE specific signaling.In our opinion, option c is the least restrictive, and to be honest, since RAN1 has decided to provide serving satellite ephemeris and Common TA related information as UE dedicated signaling, the Cell-specific K\_offset and K\_mac should be treated the same way. |
| Ericsson | We think Nokia is right that if the parameters can be signaled in both UE-specific and cell-specific signaling, they should be marked "UE-specific and cell-specific". A comment could be added in the table to clarify what we mean. |
| MediaTek | RAN1#107-e made agreement that K\_mac should also be utilized in BFR of PRACH. Hence, the description and comment should be updated accordingly.AgreementOn beam failure recovery procedure, for PRACH transmission in uplink slot n, UE monitors the corresponding PDCCH starting from downlink slot “n + K\_mac + 4” within a corresponding RAR window. |
| QC | There is no UE-specific Kmac. Hence we don’t need to add a label “cell-specific” for Kmac.  |
| ZTE | We share the views as QC that no need to add the label “cell-specific” for K\_mac. The concern from Nokia is actually more related to the signalling design with the assumption that “UEs that are configured for a bandwidth part which is not having a common search space configured”. In this way, the updates via SIB may not be directly available for the UEs in different BWPs. In our view, it’s related to the gNB’s scheduling mechanism as well as the BWP-beam mapping. No further updates on the signaling are preferred. |
| Xiaomi | We share ZTE’s view. The main concern is on how the SIB information is delivered. The parameter itself is cell-specific. No change is needed. |

# Enhancements on UL time and frequency synchronization

## Related RRC parameters

Based on the agreements to date (up to RAN1#107-e) and the companies proposals submitted to RAN1#108-e, an updated list of RRC parameters pertinent to NR NTN and related the enhancements on UL time and frequency synchronization is given within the following table:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter name in the spec** | **New or existing?** | **Description** | **Value range** | **Default value aspect** | **Per (UE, cell, TRP, …)** | **UE-specific or Cell-specific** | **Specification** | **Status [108-e]** |
| TACommon  | New | TACommon is a network-controlled common TA, and may include any timing offset considered necessary by the network.TACommon with value of 0 is supported. The granularity of TACommon is 4.07 × 10^(-3) μsValues are given in unit of corresponding granularity | 0 ...66485757 (i.e: 0… 270.73 ms)  |   | cell | Cell-specific | 38.331 |  |
| TACommonDrift | New | Indicate drift rate of the common TAThe granularity of TACommonDrift is 0.2 × 10^(-3) μs⁄sValues are given in unit of corresponding granularity | - 261935… + 261935 (i.e: --53.33 μs⁄s … +-53.33 μs⁄s ) |   | cell | Cell-specific | 38.331 |  |
| TACommonDriftVariation | New | Indicate drift rate variation of the common TAThe granularity of TACommonDriftVariation is 0.2×10^(-4) μs⁄s^2 Value are given in unit of corresponding granularity | 0…29470 (i.e. 0…0.60 μs⁄s^2 ) |   | cell | Cell-specific | 38.331 |  |
| ServingSatelliteEphemerisStateVectorX | New | Indicate the x-coordinate of serving Satellite position state vector in ECEF The unit is mThe quantization step is 1.3m for position | -42200000…+42200000 |   | cell | Cell-specific | 38.331 |  |
| ServingSatelliteEphemerisStateVectorY | New | Indicate the y-coordinate of serving Satellite position state vector in ECEF The unit is mThe quantization step is 1.3m for position | -42200000…+42200000 |   | cell | Cell-specific | 38.331 |  |
| ServingSatelliteEphemerisStateVectorZ | New | Indicate the z-coordinate of serving Satellite position state vector in ECEF The unit is m The quantization step is 1.3m for position | -42200000…+42200000 |   | cell | Cell-specific | 38.331 |  |
| ServingSatelliteEphemerisStateVectorVx | New | Indicate the x-coordinate of serving Satellite velocity state vector in ECEF The unit is m/sThe quantization step is 0.06 m/s for Velocity | - 8000…+ 8000-7864, +7863 |   | cell | Cell-specific | 38.331 |  |
| ServingSatelliteEphemerisStateVectorVy | New | Indicate the y-coordinate of serving Satellite velocity state vector in ECEFThe unit is m/sThe quantization step is 0.06 m/s for Velocity | - 8000…+ 8000-7864, +7863 |   | cell | Cell-specific | 38.331 |  |
| ServingSatelliteEphemerisStateVectorVz | New | Indicate the z-coordinate of serving Satellite velocity state vector in ECEF The unit is m/sThe quantization step is 0.06 m/s for Velocity | - 8000…+ 8000-7864, +7863 |   | cell | Cell-specific | 38.331 |  |
| ServingSatelliteEphemerisSemiMajorAxis | New | Indicate the following ephemeris orbital parameter for the serving satellite:- Semi-major axis α The unit of Semi-major axis α is m | 6500 000… 43000 000 |   | cell | Cell-specific | 38.331 |  |
| ServingSatelliteEphemerisEccentricityE | New | Indicate the following ephemeris orbital parameter for the serving satellite:- Eccentricity e  | 0…0.015 |   | cell | Cell-specific | 38.331 |  |
| ServingSatelliteEphemerisArgumentOfPeriapsis | New | Indicate the following ephemeris orbital parameter for the serving satellite:- Argument of periapsis ωThe unit of Argument of periapsis ω is Radian | 0…2π |   | cell | Cell-specific | 38.331 |  |
| ServingSatellite EphemerisLongitudeOfAscendingNode | New | Indicate the following ephemeris orbital parameter for the serving satellite:- Longitude of ascending node ΩThe unit of Longitude of ascending nod is Radian | 0…2π |   | cell | Cell-specific | 38.331 |  |
| ServingSatelliteEphemerisInclinationI | New | Indicate the following ephemeris orbital parameter for the serving satellite:- Inclination i The unit of Inclination is Radian | - π/2 ...+ π/2 |   | cell | Cell-specific | 38.331 |  |
| ServingSatelliteEphemerisMeanAnomalyM | New | Indicate the following ephemeris orbital parameter for the serving satellite:- Mean anomaly M [rad] at epoch time toThe unit of Mean anomaly M is Radian | 0… 2π |   | cell | Cell-specific | 38.331 |  |
| ntnUlSyncValidityDuration | New | A validity duration configured by the network for uplink synchronization assistance information (i.e. Serving satellite ephemeris and Common TA parameters) which indicates the maximum time during which the UE can apply assistance information without having acquired new assistance information.The unit of ntnUlSyncValidityDuration is second | { 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 120, 180, 240} |   | Cell | Cell-specific | 38.331 |  |
| EpochTime  | New | Indicate the epoch time for assistance information (i.e. Serving satellite ephemeris and Common TA parameters). When explicitly provided through SIB, or through dedicated signaling, EpochTime is the starting time of a DL sub-frame, indicated by a SFN and a sub-frame number signaled together with the assistance information.The reference point for epoch time of the serving satellite ephemeris and Common TA parameters is the uplink time synchronization reference point. | 0 to 1023 to indicate SFN and 0 to 9 to indicate the sub-frame number. |   | Cell | Cell-specific | 38.331 |  |

## Company views’ collection for 1st round

Companies contribution to RAN1#108-e:

Huawei, HiSilicon [R1-2200938] made the following observation and proposal:

**Observation 1:** The velocity range (+/- 8000 m/s) is not correct for the current agreement.

**Proposal 1:** The velocity range of +/- 8000 m/s should change to [-7864, 7863] according to the bit allocation and granularity.

Nokia, Nokia Shanghai Bell [R1-2201648] made the following proposals:

**Proposal 1:** Update the RRC parameter table such that the following parameters are marked as both cell-specific and UE specific parameters: TACommon, TACommonDrift, TACommonDriftVariation, ServingSatelliteEphemerisStateVectorX, ServingSatelliteEphemerisStateVectorY, ServingSatelliteEphemerisStateVectorZ, ServingSatelliteEphemerisStateVectorVx, ServingSatelliteEphemerisStateVectorVy, ServingSatelliteEphemerisStateVectorVz, ServingSatelliteEphemerisSemiMajorAxis, ServingSatelliteEphemerisEccentricityE, ServingSatelliteEphemerisArgumentOfPeriapsis, ServingSatellite EphemerisLongitudeOfAscendingNode, ServingSatelliteEphemerisInclinationI, ServingSatelliteEphemerisMeanAnomalyM, ntnUlSyncValidityDuration, EpochTime.

**Proposal 2:** Change the RRC parameter name of ServingSatelliteEphemerisInclinationI to ServingSatelliteEphemerisInclination.

**Proposal 3:** Change the RRC parameter name of ServingSatelliteEphemerisMeanAnomalyM to ServingSatelliteEphemerisMeanAnomaly.

**Proposal 4:** Update the RRC parameter table, such that *CellSpecific\_Koffset* and *K\_mac* are marked as both cell-specific and UE specific parameters.

**Proposal 5:** RAN1 to update the descriptions and ranges for the above discussed NTN related RRC parameters in order to ensure clear and well-defined interpretations of these.

**Proposal 6:** Write an LS to RAN2 to inform of the suggested and required changes of RRC parameter properties and names.

Apple [[**R1-2201772**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_108-e/Docs/R1-2201772.zip)**]** made the following proposal:

**Proposal 4:** In the higher layer parameter list for NR NTN,

 includes the quantization step for serving satellite ephemeris position and velocity state vector parameters,

 includes the bit allocation for serving satellite ephemeris orbital parameters.

Moderator note: on Proposal 1, Nokia provided the following reason:

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| R1-2201648 - Nokia, Nokia Shanghai Bell:And the subsequent definition of RRC parameters for supporting serving satellite ephemeris information as well as Common TA related information for NR over NTN seems to correctly reflect these, as they are all denoted as they are defined on a per-cell level and designated to be cell-specific.However, when looking at the agreement on the Epoch time which was reached at the same meeting, it reads:Agreement* When explicitly provided through SIB, Epoch time of assistance information (i.e. Serving satellite ephemeris and Common TA parameters) is the starting time of a DL sub-frame, indicated by a SFN and a sub-frame number signaled together with the assistance information.
* Otherwise, when indicated in SIB (other than SIB1), epoch time of assistance information (i.e. Serving satellite ephemeris and Common TA parameters) is implicitly known as the end of the SI window during which the SI message is transmitted.
* When provided through dedicated signaling, epoch time of assistance information (i.e. Serving satellite ephemeris and Common TA parameters) is the starting time of a DL sub-frame, indicated by a SFN and a sub-frame number.

Which agreement clearly indicates that the assistance information, which is subject to the Epoch time, may be provided either as cell-specific information (as broadcast information) or UE-specific information (as indicated through “through dedicated signaling”). This formulation was introduced to ensure that it is possible to convey the ephemeris related information to UEs that are assigned to a bandwidth part which does not have a common search space configured. If this is not ensured, it would not be possible to have such operation. Hence, the following parameters in the provided list of RRC parameters need to have their properties modified and RAN2 need to be informed by an LS of the needed change. |

Moderator view: Following R1-2110415 - Recommendations for RAN1 RRC Parameter Preparation: Column N: cell-specific or UE-specific to indicate if a parameter is common to all UEs or specific to UE, respectively.

Therefore, Moderator understanding is the parameters mentioned in Nokia Proposal are cell-specific (ephemeris, common TA parameters…).

We may add comment to indicate that these parameters can be provided through dedicated signaling?

Moderator note: Discussions on additional value (s) for ntnUlSyncValidityDuration in case of GEO and an optimal Keplerian/orbital parameter bit allocation are ongoing within AI 8.4.2. The RRC parameter list will be updated accordingly.

Based on the above proposals related RRC parameters are updated/modified.

Companies are encouraged to provide comments on updated RRC parameters list (section 3.1):

|  |  |
| --- | --- |
| Nokia, Nokia Shanghai Bell | According to our calculations, the value range for TACommon should be updated: (i.e: 0… 270.597031 ms)According to our calculations, the value range for TACommonDrift should be updated: (i.e: -52.387 μs⁄s … +52.387 μs⁄s)According to our calculations, the value range for TACommonDriftVariation should be updated: (i.e. 0…0.5894 μs⁄s^2)For indicating the x,y,z position, we would suggest to also include the actual value range in [m] for the provided parameter span.For indicating the x,y,z velocity, we would suggest to also include the actual value range in [m/s] for the provided parameter span.For the indication of the x,y,z velocity, it is a bit unclear whether the value range is the signaled value (with integer values) or the provided value span (in m/s).For the orbital parameters there is no indication of the granularity.Additionally, all parameters discussed in this part need to be conveyed to the UE through UE specific signaling such that UEs configured with a BWP which does not have a common search space configured may still be operational. |
| Ericsson | * The RAN1 agreements from RAN1#107-e on value ranges for the state vector ephemeris parameters are not consistent with the agreements on field sizes and step sizes. To align, we propose to adjust the value ranges based on current agreements on field sizes and step sizes:
	+ Position state vectors: 26 bits with step size 1.3 m 🡪 value range = {-33554432..33554431} \* 1.3 m = {-43620761.6 m, -43620760.3 m,…, 43620759.0 m, 43620760.3 m}
	+ Velocity state vectors: 18 bits with step size 0.06 m/s 🡪 value range = {-131072..131071} \* 0.06 m/s = {-7864.32 m/s, -7864.26 m/s,…, 7864.20 m/s,7864.26 m/s}
* We think Nokia is right that if the parameters can be signaled in both UE-specific and cell-specific signaling, they should be marked "UE-specific and cell-specific". A comment could be added in the table to clarify what we mean.
 |
| MediaTek | Ephemeris range details should first be discussed and agreed in AI 8.4.2, then corresponding RRC parameters can be revised accordingly. |
| ZTE | It can be concluded once the agreement is made. Regarding the discussion on “UE/Cell specific”, similar as previous comment, no further updates on the signaling are preferred. |
| LG Electronics | Regarding “ServingSatellite EphemerisLongitudeOfAscendingNode”, we don’t need a space within a parameter name.Also, regarding “ntnUlSyncValidityDuration”, the validity duration value for GEO should be updated if initial proposal 5 in AI 8.4.2 is determined.Furthermore, if initial proposal 4 in AI 8.4.2. is agreed, the RRC parameter name of state vector format should be considered to change.(e.g., ServingSatelliteEphemerisStateVectorX 🡺 ~~ServingSatellite~~EphemerisStateVectorX) |

# Enhancements on HARQ

## Related RRC parameters

Based on the agreements to date (up to RAN1#107-e) and the companies proposals submitted to RAN1#108-e, an updated list of RRC parameters pertinent to NR NTN and related to the enhancements on HARQ is given within the following table:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter name in the spec** | **New or existing?** | **Description** | **Value range** | **Default value aspect** | **Per (UE, cell, TRP, …)** | **UE-specific or Cell-specific** | **Specification** | **Comment** | **Status [108-e]** |
| harq-ProcessNumberSizeDCI-1-2-r17 | extension of R16 | Configure the number of bits for the field "HARQ process number" in DCI format 1\_2 (see TS 38.212 , clause 7.3.1). |  0..5  |   | BWP | UE-specific | 38.331 |   |  |
| HARQ-ProcessNumberSizeDCI-0-2-r17 | extension of R16 | Configure the number of bits for the field "HARQ process number" in DCI format 0\_2 (see TS 38.212 , clause 7.3.1). |  0..5  |   | BWP | UE-specific | 38.331 |  R17: For enhancement on the HARQ process indication, extend the HARQ process ID field up to 5 bits for DCI 0-2  |  |
| HARQ-ProcessNumberSizeDCI-1-1-r17 | New | Configure the number of bits for the field "HARQ process number" in DCI format 1\_1 |  5 |   | BWP | UE-specific | 38.331 |   |  |
| HARQ-ProcessNumberSizeDCI-0-1-r17 | New | Configure the number of bits for the field "HARQ process number" in DCI format 0\_1 | 5 |   | BWP | UE-specific | 38.331 |   |  |
| nrofHARQ-ProcessesForPDSCH-r17 | extension of R16 | The number of HARQ processes to be used on the PDSCH of a serving cell. Value n2 corresponds to 2 HARQ processes, value n4 to 4 HARQ processes, and so on. If the field is absent, the UE uses 8 HARQ processes (see TS 38.214 , clause 5.1). | {n2, n4, n6, n10, n12, n16, n32}  |   | BWP | UE-specific | 38.331 | The maximal supported HARQ process number is up to 32. |  |
| nrofHARQ-ProcessesForPUSCH-r17 | New | The number of HARQ processes to be used on the PUSCH of a serving cell. Value n16 corresponds to 16 HARQ processes, value n32 to 32 HARQ processes. If the field is absent, the UE uses 16 UL HARQ processes (see TS 38.214 , clause X.Y). | { n16, n32}  |   | BWP | UE-specific | 38.331 | The maximal supported HARQ process number is up to 32. |  |
| nrofHARQ-Processes-r17 | extension of R16 | The number of HARQ processes configured for UL configured grant. It applies for both Type 1 and Type 2. See TS 38.321 , clause 5.4.1 | 1..32 |   | BWP | UE-specific | 38.331 |   |  |
| nrofHARQ-Processes-r17 | extension of R16 | Number of configured HARQ processes for SPS DL. see TS 38.321, clause 5.8.1 | 1..32 |   | BWP | UE-specific | 38.331 |   |  |
| HARQ-feedbackEnablingforSPSactive-r17 | New | If enabled, UE reports ACK/NACK for the first SPS PDSCH after activation, regardless of if HARQ feedback is enabled or disabled corresponding to the first SPS PDSCH after activationOtherwise, UE follows configuration of HARQ feedback enabled/disabled corresponding to the first SPS PDSCH after activation | BOOLEAN |   | BWP | UE-specific | 38.331 |   |  |
| HARQ-feedbackEnabling-disablingperHARQprocess-r17 | New | To enble/disable the HARQ-feedback per HARQ process | Bitmap with corresponding length determined by max(nrofHARQ-ProcessesForPDSCH-r17, nrofHARQ-Processes-r17) |   | BWP | UE-specific | 38.331 |   |   |

## Company views’ collection for 1st round

Companies are encouraged to provide comments on RRC parameters list (section 4.1):

|  |  |
| --- | --- |
| Nokia, Nokia Shanghai Bell | No comments on this section for now. |
| Ericsson | * HARQ-feedbackEnabling-disablingperHARQprocess-r17
	+ Description: "enble" 🡪 "enable"
	+ Value range: clarify that "nrofHARQ-Processes-r17" is the DL parameter giving the number of configured HARQ processes for SPS DL.
 |
| ZTE | Agree the updates from Ericsson. |
|  |  |
|  |  |

# Others

## Related RRC parameters

Based on the agreements to date (up to RAN1#107-e) and the companies proposals submitted to RAN1#108-e, an updated list of RRC parameters related to the polarization indication in NR NTN is given within the following table:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter name in the spec** | **New or existing?** | **Description** | **Value range** | **Default value aspect** | **Per (UE, cell, TRP, …)** | **UE-specific or Cell-specific** | **Specification** | **Comment** | **Status [108-e]** |
| ntnPolarizationDL | New | If present, this parameter indicates polarization information for Downlink transmission on service link: including Right hand, Left hand circular polarizations (RHCP, LHCP) and Linear polarization | {RHCP, LHCP, Linear } |   | cell | Cell-specific | 38.331 | The indicated polarization information refers to the polarization type used at satellite side for DL transmission.  |  |
| ntnPolarizationUL | New | If present, this parameter indicates Polarization information for Uplink service link.If not and ntnPolarizationDL is present, UE assumes a same polarization for UL and DL | {RHCP, LHCP, Linear } |   | cell | Cell-specific | 38.331 | The indicated polarization information refers to the polarization type used at satellite side for UL reception. |  |

## Company views’ collection for 1st round

Companies are encouraged to provide comments within the following table:

|  |  |
| --- | --- |
| **Companies** | **Comments**  |
| Nokia, Nokia Shanghai Bell | Depending on whether or not a cell is allowed to change this parameter, this may potentially also need to be UE specific (again, to address UEs which are configured with a BWP, which does not have a common search space configured). |
| Ericsson | At RAN1#106bis-e, the following agreements were made:* Support polarization signalling for target serving cell in handover command message
* Support polarization signalling for non-serving cell in RRM measurement configuration

To make RAN2 aware of these agreements, RAN1 should include information about these UE-specific parameters in the RRC parameter list. |
| QC | Only signaling using SIB is agreed. Although dedicated RRC signaling and UE specific could be possible, we need to wait for further discussion beyond Rel-17. |
| ZTE | 1. Share the view as Ericsson
2. Regarding the value range of this parameter, we still prefer to introduce the list of polarization information (to support the case that one cell with multiple beams + polarization for frequency reuse), may be updates on this meeting is possible according to the discussion in section 8.4.4.
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| LG Electronics | Regarding on Ericsson’s comment, we have same view, but this issue can be handled in AI 8.4.2.  |
|  |  |

# Reference

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|  | 1. R1-2112849 Summary of [107-e-R17-RRC-NR-NTN] Email discussion on Rel-17 RRC parameters for NR to support NTN, November 2021, Thales
2. R1-2200938 Maintenance on UL time and frequency synchronization enhancement for NTN Huawei, HiSilicon
3. R1-2201648 Maintenance aspects of RRC parameters for Rel-17 NR over NTN Nokia, Nokia Shanghai Bell
4. R1-2110415 Recommendations for RAN1 RRC Parameter Preparation, Moderator (Ericsson)
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|  |  |