**3GPP TSG RAN WG1 Meeting #107-e R1-2111376**

**e-Meeting, November 11th – 19th, 2021**

**Agenda Item: 8.15**

**Source: Moderator (MediaTek)**

**Title: Summary of [107-e-R17-RRC-IoT-NTN] Email discussion on Rel-17 RRC parameters for NB-IoT/eMTC support for NTN**

**Document for: Discussion**

# Introduction

There was a preliminary email discussion on RRC parameters for NB-IoT/eMTC to support NTN [4]. RRC parameters pertinent for IoT NTN will be further discussed in RAN1#106bis-e.

This document is the Summary of [107-e-R17-RRC-IoT-NTN] Email discussion on Rel-17 RRC parameters for IoT over NTN – Gilles (MediaTek)

* Email discussion to start on November 15

# 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#107 -e, a preliminary list of RRC parameters for Rel-17 IoT NTN and related to 8.15.1 Enhancements to time and frequency synchronization is provided below:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **WI code** | **Sub-feature group** | **RAN1 specification** | **Section** | **RAN2 Parant IE** | **RAN2 ASN.1 name** | **Parameter name in the spec** | **New or existing?** | **Parameter name in the text** | **Description** | **Value range** | **Default value aspect** | **Per (UE, cell, TRP, …)** | **UE-specific or Cell-specific** | **Specification** | **Comment** | | **Status** |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronization | 36.213 |  |  |  | ULPre-compensation-NB-r17 | new | UL Time Pre-compensation-NB-r17 | If set, UE does the following: 1. UE specific TA calculation on the service link in RRC\_IDLE / RRC\_CONNECTED state based on its GNSS-acquired position and the serving satellite ephemeris. 2. UE-specific calculation frequency pre-compensation to counter shift the Doppler experienced on the service link in RRC\_IDLE / RRC\_CONNECTED state based on its GNSS-acquired position and the serving satellite ephemeris. | 0, 1 | 0 | Cell | Cell-specific | 36.331 | For NB-IoT Configuration parameter used in the specifications. If it is set, operations related to UE pre-compensation for UL synchronization apply. | | Stable |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronization | 36.213 |  |  |  | NTACommon-NB-r17 | new | NTA common-NB-r17 | NTACommon is a network-controlled common TA, and may include any timing offset considered necessary by the network.  NTACommon with value of 0 is supported. he granularity of TACommon is 32.55208 ×10^(-3) μs  Values are given in unit of corresponding granularity | 0, ..., 8316827 | 0 | Cell | Cell-specific | 36.331 | For NB-IoT Ts=32.55208 µs (TS 36.211), field is 23 bits | | Stable |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronization | 36.213 |  |  |  | NTACommonDrift-NB-r17 | new | NTA commonDrift-NB-r17 | Indicate drift rate variation of the common TA  The granularity of TACommonDriftVariation is 0.2×10^(-4) μs⁄s^2  Value are given in unit of corresponding granularity | - 261935, …, + 261935 | 0 | Cell | Cell-specific | 36.331 | For NB-IoT  field is 19 bits TBC | | Stable |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronization | 36.213 |  |  |  | NTACommonDriftVariation-NB-r17 | new | NTA common-NB-r17 | Indicate drift rate variation of the common TA  The granularity of TACommonDriftVariation is 0.2×10^(-4) μs⁄s^2  Value are given in unit of corresponding granularity | 0, ..., 29479 | 0 | Cell | Cell-specific | 36.331 | For NB-IoT  , field is 15 bits TBC | | Stable |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronization | 36.213 |  |  |  | ServingSatelliteEphemerisStateVectorX-NB-r17 | new | ServingSatelliteEphemerisStateVectorX-NB-r17 | Indicate the X-coordinate of serving Satellite position state vector in ECEF The unit is m | -42200000…+42200000 | 0 | Per Cell | Cell-specific | 36.331 | For NB-IoT | | Stable |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronization | 36.213 |  |  |  | ServingSatelliteEphemerisStateVectorY-NB-r17 | new | ServingSatelliteEphemerisStateVectorY-NB-r17 | Indicate the Y-coordinate of serving Satellite position state vector in ECEF The unit is m | -42200000…+42200000 | 0 | Per Cell | Cell-specific | 36.331 | For NB-IoT | | Stable |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronization | 36.213 |  |  |  | ServingSatelliteEphemerisStateVectorZ-NB-r17 | new | ServingSatelliteEphemerisStateVectorZ-NB-r17 | Indicate the Z-coordinate of serving Satellite position state vector in ECEF The unit is m | -42200000…+42200000 |  | Per Cell | Cell-specific | 36.331 | For NB-IoT | | Stable |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronization | 36.213 |  |  |  | ServingSatelliteEphemerisStateVectorXv-NB-r17 | new | ServingSatelliteEphemerisStateVectorXv-NB-r17 | Indicate the X-coordinate of serving Satellite velocity state vector in ECEF (m/s) | - 8000…+ 8000 | 0 | Per Cell | Cell-specific | 36.331 | For NB-IoT | | Stable |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronization | 36.213 |  |  |  | ServingSatelliteEphemerisStateVectorYv-NB-r17 | new | ServingSatelliteEphemerisStateVectorYv-NB-r17 | Indicate the Y-coordinate of serving Satellite velocity state vector in ECEF (m/s) | - 8000…+ 8000 | 0 | Per Cell | Cell-specific | 36.331 | For NB-IoT | | Stable |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronization | 36.213 |  |  |  | ServingSatelliteEphemerisStateVectorZv-NB-r17 | new | ServingSatelliteEphemerisStateVectorZv-NB-r17 | Indicate the Z-coordinate of serving Satellite velocity state vector in ECEF (m/s) | - 8000…+ 8000 | 0 | Per Cell | Cell-specific | 36.331 | For NB-IoT | | Stable |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronization | 36.213 |  |  |  | ServingSatelliteEphemerisSemiMajorAxis-NB-r17 | new | ServingSatelliteEphemerisSemiMajorAxis-NB-r17 | 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 | 0 | Per Cell | Cell-specific | 36.331 | For NB-IoT | | Stable |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronization | 36.213 |  |  |  | ServingSatelliteEphemerisEccentricityE-NB-r17 | new | ServingSatelliteEphemerisEccentricityE-NB-r17 | Indicate the following ephemeris orbital parameter for the serving satellite: - Eccentricity e | 0…0.015 | 0 | Per Cell | Cell-specific | 36.331 | For NB-IoT | | Stable |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronization | 36.213 |  |  |  | ServingSatelliteEphemerisArgumentOfPeriapsis-NB-r17 | new | ServingSatelliteEphemerisArgumentOfPeriapsis-NB-r17 | Indicate the following ephemeris orbital parameter for the serving satellite:  - Argument of periapsis ω  The unit of Argument of periapsis ω is Radian | 0…2π | 0 | Per Cell | Cell-specific | 36.331 | For NB-IoT | | Stable |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronization | 36.213 |  |  |  | ServingSatellite EphemerisLongitudeOfAscendingNode-NB-r17 | new | ServingSatellite EphemerisLongitudeOfAscendingNode-NB-r17 | Indicate the following ephemeris orbital parameter for the serving satellite:  - Longitude of ascending node Ω  The unit of Longitude of ascending nod is Radian | 0…2π | 0 | Per Cell | Cell-specific | 36.331 | For NB-IoT | | Stable |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronization | 36.213 |  |  |  | ServingSatelliteEphemerisInclinationI-NB-r17 | new | ServingSatelliteEphemerisInclinationI-NB-r17 | Indicate the following ephemeris orbital parameter for the serving satellite:  - Inclination i  The unit of Inclination is Radian | - π/2 ...+ π/2 | 0 | Per Cell | Cell-specific | 36.331 | For NB-IoT | | Stable |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronization | 36.213 |  |  |  | ServingSatelliteEphemerisMeanAnomalyM-NB-r17 | new | ServingSatelliteEphemerisMeanAnomalyM-NB-r17 | Indicate the following ephemeris orbital parameter for the serving satellite:  - Mean anomaly M [rad] at epoch time to  The unit of Mean anomaly M is Radian | 0… 2π | 0 | Per Cell | Cell-specific | 36.331 | For NB-IoT | | Stable |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UL-Synchronization Validity | 36.213 |  |  |  | ntnServingSatULSyncValidityDuration-NB-r17 | new | ntnServingSatULSyncValidityDuration-NB-r17 | A validity duration configured by the network for satellite ephemeris data and common TA parameters which indicates the maximum time during which the UE can apply the satellite ephemeris without having acquired new satellite ephemeris.  The unit of ntnUlSyncValidityDuration is second | { 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 120, 180, 240} | 0 | Cell | Cell-specific | 36.331 | For NB-IoT  • FFS: Additional values for GEO (e.g. up to 2 hours)  The serving satellite ephemeris and common TA related parameters are signalled in the same SIB message and have the same epoch time. A single validity duration for both serving satellite ephemeris and common TA related parameters is broadcast on the SIB. Validity timer for UL synchronization should be started/restarted with configured timer validity duration at the epoch time of the assistance information. • FFS: Additional values for GEO (e.g. up to 2 hours)  The serving satellite ephemeris and common TA related parameters are signalled in the same SIB message and have the same epoch time. A single validity duration for both serving satellite ephemeris and common TA related parameters is broadcast on the SIB. Validity timer for UL synchronization should be started/restarted with configured timer validity duration at the epoch time of the assistance information. | | Stable |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UL-Synchronization Validity | 36.213 |  |  |  | EpochTime-NB-r17 | new | EpochTime-NB-r17 | 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. | 0 | Cell | Cell-specific | 36.331 |  | | Stable |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UL synchronization-Transmission-IoT NTN | 36.213 |  |  |  | TransmissionDurationNPRACH-NB-r17 | new | TransmissionDurationNPRACH-NB-r17 | Configuration of UL transmission segment is indicated on SIB | Format 0 and 1: [2.4.(TCP+TSEQ), 4.4.(TCP+TSEQ), 8.4.(TCP+TSEQ), 16.4.(TCP+TSEQ), 32.4.(TCP+TSEQ), 64.4.(TCP+TSEQ)]  -Format 2:  [1.6.(TCP+TSEQ), 2.6.(TCP+TSEQ), 4.6.(TCP+TSEQ), 8.6.(TCP+TSEQ), 16.6.(TCP+TSEQ) ] | 0 | TBD | TBD | 36.331 | For NB-IoT | Stable | |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UL synchronization-Transmission-IoT NTN | 36.213 |  |  |  | TransmissionDurationNPUSCH-NB-r17 | new | TransmissionDurationNPUSCH-NB-r17 | Configuration of UL transmission segment is indicated on SIB and reconfigured by RRC signalling in RRC\_CONNECTED | [2 ms, 4 ms, 8 ms, 16 ms, 32 ms, 64 ms, 128 ms, 256 ms ] | 0 | TBD | TBD | 36.331 | For NB-IoT | Stable | |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronizationUplink Time pre-compensation | 36.213 |  |  |  | ULPre-compensation-r17 | new | UL Time Pre-compensation-r17 | If set, UE does the following: 1. UE specific TA calculation on the service link in RRC\_IDLE / RRC\_CONNECTED state based on its GNSS-acquired position and the serving satellite ephemeris. 2. UE-specific calculation frequency pre-compensation to counter shift the Doppler experienced on the service link in RRC\_IDLE / RRC\_CONNECTED state based on its GNSS-acquired position and the serving satellite ephemeris. | [0, 1] | 0 | Cell | Cell-specific | 36.331 | For eMTC, Configuration parameter used in the specifications. If it is set, operations related to UE pre-compensation for UL synchronization apply. | Stable | |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronization | 36.213 |  |  |  | NTACommon-r17 | new | NTA common-r17 | NTACommon is a network-controlled common TA, and may include any timing offset considered necessary by the network.  NTACommon with value of 0 is supported. he granularity of TACommon is 32.55208 ×10^(-3) μs  Values are given in unit of corresponding granularity | 0, ..., 8316827 | 0 | Cell | Cell-specific | 36.331 | For eMTC  Ts=32.55208 µs (TS 36.211), field is 23 bits | Stable | |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronization | 36.213 |  |  |  | NTACommonDrift-r17 | new | NTA commonDrift-r17 | Indicate drift rate variation of the common TA  The granularity of TACommonDriftVariation is 0.2×10^(-4) μs⁄s^2  Value are given in unit of corresponding granularity | - 261935, …, + 261935 | 0 | Cell | Cell-specific | 36.331 | For eMTC, field is 19 bits TBC | Stable | |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronization | 36.213 |  |  |  | NTACommonDriftVariation-r17 | new | NTA common-r17 | Indicate drift rate variation of the common TA  The granularity of TACommonDriftVariation is 0.2×10^(-4) μs⁄s^2  Value are given in unit of corresponding granularity | 0, ..., 29479 | 0 | Cell | Cell-specific | 36.331 | For eMTC, field is 15 bits TBC | Stable | |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronizationUplink Time pre-compensation | 36.213 |  |  |  | ServingSatelliteEphemerisStateVectorX-r17 | new | ServingSatelliteEphemerisStateVectorX-r17 | Indicate the X-coordinate of serving Satellite position state vector in ECEF The unit is m | -42200000…+42200000 | 0 | Per Cell | Cell-specific | 36.331 | For eMTC, | Stable | |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronizationUplink Time pre-compensation | 36.213 |  |  |  | ServingSatelliteEphemerisStateVectorY-r17 | new | ServingSatelliteEphemerisStateVectorY-r17 | Indicate the Y-coordinate of serving Satellite position state vector in ECEF The unit is m | -42200000…+42200000 | 0 | Per Cell | Cell-specific | 36.331 | For eMTC | Stable | |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronizationUplink Time pre-compensation | 36.213 |  |  |  | ServingSatelliteEphemerisStateVectorZ-r17 | new | ServingSatelliteEphemerisStateVectorZ-r17 | Indicate the Z-coordinate of serving Satellite position state vector in ECEF The unit is m | -42200000…+42200000 |  | Per Cell | Cell-specific | 36.331 | For eMTC | Stable | |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronizationUplink Time pre-compensation | 36.213 |  |  |  | ServingSatelliteEphemerisStateVectorXv-r17 | new | ServingSatelliteEphemerisStateVectorXv-r17 | Indicate the X-coordinate of serving Satellite velocity state vector in ECEF (m/s) | - 8000…+ 8000 | 0 | Per Cell | Cell-specific | 36.331 | For eMTC | Stable | |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronizationUplink Time pre-compensation | 36.213 |  |  |  | ServingSatelliteEphemerisStateVectorYv-NB-r17 | new | ServingSatelliteEphemerisStateVectorYv-r17 | Indicate the Y-coordinate of serving Satellite velocity state vector in ECEF (m/s) | - 8000…+ 8000 | 0 | Per Cell | Cell-specific | 36.331 | For eMTC | Stable | |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronizationUplink Time pre-compensation | 36.213 |  |  |  | ServingSatelliteEphemerisStateVectorZv-NB-r17 | new | ServingSatelliteEphemerisStateVectorZv-r17 | Indicate the Z-coordinate of serving Satellite velocity state vector in ECEF (m/s) | - 8000…+ 8000 | 0 | Per Cell | Cell-specific | 36.331 | For eMTC | Stable | |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronizationUplink Time pre-compensation | 36.213 |  |  |  | ServingSatelliteEphemerisSemiMajorAxis-NB-r17 | new | ServingSatelliteEphemerisSemiMajorAxis-r17 | 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 | 0 | Per Cell | Cell-specific | 36.331 | For eMTC | Stable | |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronizationUplink Time pre-compensation | 36.213 |  |  |  | ServingSatelliteEphemerisEccentricityE-NB-r17 | new | ServingSatelliteEphemerisEccentricityE-r17 | Indicate the following ephemeris orbital parameter for the serving satellite: - Eccentricity e | 0…0.015 | 0 | Per Cell | Cell-specific | 36.331 | For eMTC | Stable | |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronizationUplink Time pre-compensation | 36.213 |  |  |  | ServingSatelliteEphemerisArgumentOfPeriapsis-r17 | new | ServingSatelliteEphemerisArgumentOfPeriapsis-r17 | Indicate the following ephemeris orbital parameter for the serving satellite:  - Argument of periapsis ω  The unit of Argument of periapsis ω is Radian | 0…2π | 0 | Per Cell | Cell-specific | 36.331 | For eMTC | Stable | |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronizationUplink Time pre-compensation | 36.213 |  |  |  | ServingSatellite EphemerisLongitudeOfAscendingNode-r17 | new | ServingSatellite EphemerisLongitudeOfAscendingNode-r17 | Indicate the following ephemeris orbital parameter for the serving satellite:  - Longitude of ascending node Ω  The unit of Longitude of ascending nod is Radian | 0…2π | 0 | Per Cell | Cell-specific | 36.331 | For eMTC | Stable | |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronizationUplink Time pre-compensation | 36.213 |  |  |  | ServingSatelliteEphemerisInclinationI-r17 | new | ServingSatelliteEphemerisInclinationI-r17 | Indicate the following ephemeris orbital parameter for the serving satellite:  - Inclination i  The unit of Inclination is Radian | - π/2 ...+ π/2 | 0 | Per Cell | Cell-specific | 36.331 | For eMTC | Stable | |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronizationUplink Time pre-compensation | 36.213 |  |  |  | ServingSatelliteEphemerisMeanAnomalyM-r17 | new | ServingSatelliteEphemerisMeanAnomalyM-r17 | Indicate the following ephemeris orbital parameter for the serving satellite:  - Mean anomaly M [rad] at epoch time to  The unit of Mean anomaly M is Radian | 0… 2π | 0 | Per Cell | Cell-specific | 36.331 | For eMTC | Stable | |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronizationUplink Time pre-compensation | 36.213 |  |  |  | ntnServingSatULSyncValidityDuration-NB-r17 | new | ntnServingSatULSyncValidityDuration-NB-r17 | A validity duration configured by the network for satellite ephemeris data and common TAparameters which indicates the maximum time during which the UE can apply the satellite ephemeris without having acquired new satellite ephemeris.  The unit of ntnUlSyncValidityDuration is second | { 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 120, 180, 240} | 0 | Cell | Cell-specific | 36.331 | For eMTC  • FFS: Additional values for GEO (e.g. up to 2 hours)  The serving satellite ephemeris and common TA related parameters are signalled in the same SIB message and have the same epoch time. A single validity duration for both serving satellite ephemeris and common TA related parameters is broadcast on the SIB. Validity timer for UL synchronization should be started/restarted with configured timer validity duration at the epoch time of the assistance information. • FFS: Additional values for GEO (e.g. up to 2 hours)  The serving satellite ephemeris and common TA related parameters are signalled in the same SIB message and have the same epoch time. A single validity duration for both serving satellite ephemeris and common TA related parameters is broadcast on the SIB. Validity timer for UL synchronization should be started/restarted with configured timer validity duration at the epoch time of the assistance information. | Stable | |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UL-Synchronization Validity | 36.213 |  |  |  | EpochTime-r17 | new | EpochTime-r17 | 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. | 0 | Cell | Cell-specific | 36.331 |  | Stable | |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronizationUplink Time pre-compensation | 36.213 |  |  |  | TransmissionDurationPRACH-r17 | new | TransmissionDurationPRACH-r17 | Configuration of UL transmission segment is indicated on SIB | (TCP+TSEQ+TGP), 2\*(TCP+TSEQ+TGP), 4\*(TCP+TSEQ+TGP), 8\*(TCP+TSEQ+TGP), 16\*(TCP+TSEQ+TGP), 32\*(TCP+TSEQ+TGP), 64\*(TCP+TSEQ+TGP), 128\*(TCP+TSEQ+TGP) | 0 | Per Cell | Cell-specific | 36.331 | For eMTC | Stable | |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronizationUplink Time pre-compensation | 36.213 |  |  |  | TransmissionDurationPUSCH-r17 | new | TransmissionDurationPUSCH-r17 | Configuration of UL transmission segment is indicated on SIB and reconfigured by RRC signalling in RRC\_CONNECTED | • Full-PRB allocation (unit: subframes): 2 4 8 16 32 64 128 256  • Sub-PRB allocation (unit: resource units): 1 2 4 8 16 32 64 128 | 0 | Per Cell | Cell-specific | 36.331 | For eMTC, | Stable | |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / UE pre-compensation for UL synchronizationUplink Time pre-compensation | 36.213 |  |  |  | TransmissionDurationPUCCH-r17 | new | TransmissionDurationPUCCH-r17 | Configuration of UL transmission segment is indicated on SIB and reconfigured by RRC signalling in RRC\_CONNECTED | (unit: subframes): 2 4 8 16 32 64 128 | 0 | Per Cell | Cell-specific | 36.331 | For eMTC, | Stable | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |

## Company views

MODERATOR NOTE: TBA

**Moderator]:**

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

|  |  |
| --- | --- |
| **Companies** | **Comments** |
|  |  |
|  |  |
|  |  |
|  |  |

## Updated list of RRC parameters based on company views (First round of email discussions)

## Updated list of RRC parameters based on company views (Second round of email discussions)

# Enhancements on 8.15.2 Timing relationship enhancements

## Related RRC parameters

Based on the agreements to date (up to RAN1#107-e) and the companies proposals submitted to RAN1#107-e, a preliminary list of RRC parameters for Rel-17 IoT NTN and related to 8.15.2 Timing relationship enhancements is provided below:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **WI code** | | **Sub-feature group** | **RAN1 specification** | **Section** | **RAN2 Parant IE** | **RAN2 ASN.1 name** | **Parameter name in the spec** | **New or existing?** | **Parameter name in the text** | **Description** | **Value range** | **Default value aspect** | **Per (UE, cell, TRP, …)** | **UE-specific or Cell-specific** | **Specification** | **Comment** | **Status** |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / Timing relationships enhancements | | 36.213 |  |  |  | CellSpecificKoffset-NB -r17 | new | CellSpecificKoffset-NB -r17 | The CellSpecific\_K\_offset is a scheduling offset used for the timing relationships that need to be modified for NTN [see TS 36.2xy].  The unit of K\_offset is number of slots for a given subcarrier spacing of 15 kHz  For IoT NTN, adopt the NR NTN agreement without modification for FR1: (a) the value range (i.e. 1 ms), (b) the quantity signalled (e.g. a differential UE specific K\_offset) for the UE specific K\_offset.  For IoT NTN, the UE specific K\_offset is provided and updated by the network using MAC CE. | 0 ...1023 ms | 0 | Per Cell | Cell-specific, | 36.331 | For NB-IoT RAN1#107-e agreement  For IoT NTN, adopt the NR NTN agreement without modification for FR1: (a) the value range (i.e. 1 ms), (b) the quantity signalled (e.g. a differential UE specific K\_offset) for the UE specific K\_offset. | Stable |
| ~~LTE\_NBIOT\_eMTC\_NTN~~ | ~~Basic IoT over NTN support / Timing relationships enhancements~~ | | ~~36.213~~ |  |  |  | ~~UESpecificKoffset-NB -r17~~ | ~~new~~ | ~~UESpecificKoffset-NB -r17~~ | ~~The K\_offset is a scheduling offset used for the timing relationships that need to be modified for NTN [see TS 36.2xy].~~  ~~The unit of K\_offset is number of slots for a given subcarrier spacing of 15 kHz~~ | ~~0 ...1023 ms~~ | ~~0~~ | ~~Per UE~~ | ~~UE-specific~~ | ~~36.331~~ | ~~For NB-IoT RAN1#107-e agreement~~  ~~For IoT NTN, adopt the NR NTN agreement without modification for FR1: (a) the value range (i.e. 1 ms), (b) the quantity signalled (e.g. a differential UE specific K\_offset) for the UE specific K\_offset.~~ | ~~Stable~~ |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / Timing relationships enhancements | | 36.213 |  |  |  | K\_mac-NB-r17 | new | K\_mac-NB-r17 | 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 36.2xy].  When UE is not provided by network with a K\_mac value, UE assumes K\_mac = 0.  The unit of K\_mac is number of slots for a given subcarrier spacing. | 1 ...512 ms. | 0 | Per Cell | Cell-specific | 36.331 | RAN1#107-e agreement  For NB-IoT  For IoT NTN, adopt the NR NTN agreement without modification for FR1 for the value range of Kmac. | Stable |
| LTE\_NBIOT\_eMTC\_NTN | TAreport-IoT NTN | |  |  |  |  | TA\_Report-NB-r17 | new | TA\_Report-NB-r17 | UE-specific TA reporting is supported in IoT-NTN Detail contents can be either a TA or UE location, as configured by network | TBD | 0 | Per UE | UE-specific | 36.331 | For NB-IoT NR NTN agreed the granularity of the reported TA is slot. • FFS how to round TA value to slot level granularity | Stable |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / Timing relationships enhancements | | 36.213 |  |  |  | CellSpecificKoffset-r17 | new | CellSpecificKoffset-r17 | The CellSpecific\_K\_offset is a scheduling offset used for the timing relationships that need to be modified for NTN [see TS 36.2xy].  The unit of K\_offset is number of slots for a given subcarrier spacing of 15 kHz  For IoT NTN, adopt the NR NTN agreement without modification for FR1: (a) the value range (i.e. 1 ms), (b) the quantity signalled (e.g. a differential UE specific K\_offset) for the UE specific K\_offset.  For IoT NTN, the UE specific K\_offset is provided and updated by the network using MAC CE. | 0 ...1023 ms | 0 | Per Cell | Cell-specific | 36.331 | For eMTC  For NB-IoT RAN1#107-e agreement  For IoT NTN, adopt the NR NTN agreement without modification for FR1: (a) the value range (i.e. 1 ms), (b) the quantity signalled (e.g. a differential UE specific K\_offset) for the UE specific K\_offset. | Stable |
| ~~LTE\_NBIOT\_eMTC\_NTN~~ | ~~Basic IoT over NTN support / Timing relationships enhancements~~ | | ~~36.213~~ |  |  |  | ~~UESpecificKoffset-r17~~ | ~~new~~ | ~~UESpecificKoffset-r17~~ | ~~The K\_offset is a scheduling offset used for the timing relationships that need to be modified for NTN [see TS 36.2xy].~~  ~~The unit of K\_offset is number of slots for a given subcarrier spacing of 15 kHz~~ | ~~0 ...1023 ms~~ | ~~0~~ | ~~Per UE~~ | ~~UE-specific~~ | ~~36.331~~ | ~~For eMTC~~  ~~For NB-IoT RAN1#107-e agreement~~  ~~For IoT NTN, adopt the NR NTN agreement without modification for FR1: (a) the value range (i.e. 1 ms), (b) the quantity signalled (e.g. a differential UE specific K\_offset) for the UE specific K\_offset.~~ | ~~Stable~~ |
| LTE\_NBIOT\_eMTC\_NTN | Basic IoT over NTN support / Timing relationships enhancements | | 36.213 |  |  |  | K\_mac-r17 | new | K\_mac-r17 | 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 36.2xy].  When UE is not provided by network with a K\_mac value, UE assumes K\_mac = 0.  The unit of K\_mac is number of slots for a given subcarrier spacing. | 1 ...512 ms. | 0 | Per Cell | Cell-specific | 36.331 | For eMTC  RAN1#107-e agreement  For NB-IoT  For IoT NTN, adopt the NR NTN agreement without modification for FR1 for the value range of Kmac. | Stable |
|  | TAreport-IoT NTN | |  |  |  |  | TA\_Report-r17 | new | TA\_Report-r17 | UE-specific TA reporting is supported in IoT-NTN Detail contents can be either a TA or UE location, as configured by network | TBD | 0 | Per UE | UE-specific | 36.331 | NR NTN agreed the granularity of the reported TA is slot. • FFS how to round TA value to slot level granularity | Stable |

## Company views

TBA

MODERATOR NOTE: TBA

**Moderator]:**

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

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| **Companies** | **Comments** |
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## Updated list of RRC parameters based on company views (First round of email discussions)

TBA

## Updated list of RRC parameters based on company views (Second round of email discussions)

**TBA**

3.3):

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| **Companies** | **Comments** |
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# Reference

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|  | 1. R1-2108672 List of RRC parameter for Rel-17 IoT-NTN, up to RAN1 #106-e, Moderator (MediaTek), RAN1#106-e, August 2021 2. R1-2110629 List of RRC parameter for Rel-17 IoT-NTN, up to RAN1 #106bis-e, Moderator (MediaTek), RAN1#106bis-e, October 2021 3. R1-2110628 Summary of [10bis-e-R17-RRC-IoT-NTN] Email discussion on Rel-17 RRC parameters for NB-IoT/eMTC support for NTN, Moderator (MediaTek), RAN1#106bis-e, October 2021 |
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