**3GPP TSG-RAN WG2 Meeting #118 electronic *R2-2206506***

**Online, May 9 – 20th, 2022**

**Agenda Item: 6.10.1.1**

**Source: Thales**

**Title: Summary of [AT118-e][119][NTN] Coarse UE location info (Thales)**

**Document for: Discussion and Decision**

# Introduction

This document aims to summarize the following discussion.

**[AT118-e][119][NTN] Coarse UE location info (Thales)**

Scope: Discuss the coarse UE location information format (e.g. whether to use the most significant bits of GNSS longitude/latitude or also consider the proposals in [R2-2205574](file:///C:\Data\3GPP\Extracts\R2-2205574%20Coarse%20location%20format.docx)) and the reporting mechanism (e.g. reuse the mechanism for reporting commonLocationInfo)

Intended outcome: Summary of the offline discussion with list of proposals

Deadline (for companies' feedback):  Thursday 2022-05-19 08:00 UTC

Deadline (for rapporteur's summary in R2-2206506):  Thursday 2022-05-19 10:00 UTC

Proposals marked "for agreement" in R2-2206506 not challenged until Thursday 2022-05-19 20:00 UTC will be declared as agreed via email by the session chair.

This offline discussion aims at defining the coarse location format as outcome of RAN2#118-e.

# Discussion

The following proposals on the coarse location format in [1] are submitted to the discussion.

## 2.1 Which definition to start from ?

Proposal 1 When defining a coarse UE location representation format, use the definition of EllipsoidPoinWithAltitude in TS 37.355 and round the coordinates to fewer bits to achieve a suitable accuracy.

**Question 4.5.1: Do companies agree with the proposal above ?**

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| --- | --- | --- |
| **Company** | **Agree/Disagree** | **Comments/Suggestions** |
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## 2.4 Altitude ?

Proposal 2 Make it configurable whether an indication of the altitude should be included in a report of a coarse UE location.

**Question 4.5.2: Do companies agree with the proposal above ?**

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| **Company** | **Agree/Disagree** | **Comments/Suggestions** |
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## 2.3 Compensation scheme for different latitudes

Proposal 3 Compensate for the different longitude density at different latitudes, so that a reported coarse UE location cannot be too accurate.

**Question 4.5.3: Do companies agree with the proposal above ?**

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| **Company** | **Agree/Disagree** | **Comments/Suggestions** |
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## 2.4 Representation format of coarse UE location information

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| --- | --- | --- | --- | --- |
| **Latitude range in degrees (°)** | **Latitude range represented with 11 bits** | **Number of bits representing the longitude** | **Longitude range** | **Number of steps a “latitude circle” is divided into** |
| 0° - 59.978022° | 0 - 1364 | 13 | ±4095 | 8191 |
| 59.978022° - 75.538462° | 1365 - 1718 | 12 | ±2047 | 4095 |
| 75.538462° - 82.835165° | 1719 - 1884 | 11 | ±1023 | 2047 |
| 82.835165° - 86.439560° | 1885 - 1966 | 10 | ±511 | 1023 |
| 86.439560° - 88.197802° | 1967 - 2006 | 9 | ±255 | 511 |
| 88.197802° - 89.120879° | 2007 - 2027 | 8 | ±127 | 255 |
| 89.120879° - 89.560440° | 2028 - 2037 | 7 | ±63 | 127 |
| 89.560440° - 89.824176° | 2038 - 2043 | 6 | ±31 | 63 |
| 89.824176° - 89.912088° | 2044 - 2045 | 5 | ±15 | 31 |
| 89.912088° - 89.956044° | 2046 | 4 | ±7 | 15 |
| 89.956044° - 90° | 2047 | 3 | ±3 | 7 |

Proposal 4 Adopt the above table for the definition of the representation format of a coarse UE location.

**Question 4.5.4: Do companies agree with the proposal above ?**

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| **Company** | **Agree/Disagree** | **Comments/Suggestions** |
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## 2.5 fields of coarse UE location information

Proposal 5 For representing a coarse UE location, use 12 bits for the latitude (where one bit indicates “north”/”south”), 3-13 bits for the longitude (where the number of bits depends on the latitude), and 4 bits for the optional altitude (where one bit is used to indicate “height”/”depth”).

**Question 4.5.5: Do companies agree with the proposal above ?**

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| **Company** | **Agree/Disagree** | **Comments/Suggestions** |
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## 2.6 ASN.1 code

Two options are proposed for ASN.1 code of the coarse UE location information

Option 1: “*CoarseEllipsoidPointWithOptionalAltitude*”

CoarseEllipsoidPointWithOptionalAltitude ::= SEQUENCE {

latitudeSign ENUMERATED {north, south},

degreesLatitude INTEGER (0..2047), -- 11 bit field

degreesLongitude CHOICE {

longForLatRange1 INTEGER (-4095..4095), -- For latitudes 0-1364. 13 bit field.

longForLatRange2 INTEGER (-2047..2047), -- For latitudes 1365-1718. 12 bit field.

longForLatRange3 INTEGER (-1023..1023), -- For latitudes 1719-1884. 11 bit field.

longForLatRange4 INTEGER (-511..511), -- For latitudes 1885-1966. 10 bit field.

longForLatRange5 INTEGER (-255..255), -- For latitudes 1967-2006. 9 bit field.

longForLatRange6 INTEGER (-127..127), -- For latitudes 2007-2027. 8 bit field.

longForLatRange7 INTEGER (-63..63), -- For latitudes 2028-2037. 7 bit field.

longForLatRange8 INTEGER (-31..31), -- For latitudes 2038-2043. 6 bit field.

longForLatRange9 INTEGER (-15..15), -- For latitudes 2044-2045. 5 bit field.

longForLatRange10 INTEGER (-7..7), -- For latitude 2046. 4 bit field.

longForLatRange11 INTEGER (-3..3) -- For latitude 2047. 3 bit field.

},

altitudeDirection ENUMERATED {height, depth} OPTIONAL,

altitude INTEGER (0..7) OPTIONAL -- 3 bit field. Step size: 4.096 km.

}

Option 2: ASN.1 code is divided into two IEs:

* one with altitude included (tentatively denoted as “*CoarseEllipsoidPointWithAltitude*”)
* and one without the altitude included (tentatively denoted as “*CoarseEllipsoidPoint*”).

CoarseEllipsoidPointWithAltitude ::= SEQUENCE {

latitudeSign ENUMERATED {north, south},

degreesLatitude INTEGER (0..2047), -- 11 bit field

degreesLongitude CHOICE {

longForLatRange1 INTEGER (-4095..4095), -- For latitudes 0-1364. 13 bit field.

longForLatRange2 INTEGER (-2047..2047), -- For latitudes 1365-1718. 12 bit field.

longForLatRange3 INTEGER (-1023..1023), -- For latitudes 1719-1884. 11 bit field.

longForLatRange4 INTEGER (-511..511), -- For latitudes 1885-1966. 10 bit field.

longForLatRange5 INTEGER (-255..255), -- For latitudes 1967-2006. 9 bit field.

longForLatRange6 INTEGER (-127..127), -- For latitudes 2007-2027. 8 bit field.

longForLatRange7 INTEGER (-63..63), -- For latitudes 2028-2037. 7 bit field.

longForLatRange8 INTEGER (-31..31), -- For latitudes 2038-2043. 6 bit field.

longForLatRange9 INTEGER (-15..15), -- For latitudes 2044-2045. 5 bit field.

longForLatRange10 INTEGER (-7..7), -- For latitude 2046. 4 bit field.

longForLatRange11 INTEGER (-3..3) -- For latitude 2047. 3 bit field.

},

altitudeDirection ENUMERATED {height, depth},

altitude INTEGER (0..7) -- 3 bit field. Step size: 4.096 km.

}

CoarseEllipsoidPoint ::= SEQUENCE {

latitudeSign ENUMERATED {north, south},

degreesLatitude INTEGER (0..2047), -- 11 bit field

degreesLongitude CHOICE {

longForLatRange1 INTEGER (-4095..4095), -- For latitudes 0-1364. 13 bit field.

longForLatRange2 INTEGER (-2047..2047), -- For latitudes 1365-1718. 12 bit field.

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longForLatRange8 INTEGER (-31..31), -- For latitudes 2038-2043. 6 bit field.

longForLatRange9 INTEGER (-15..15), -- For latitudes 2044-2045. 5 bit field.

longForLatRange10 INTEGER (-7..7), -- For latitude 2046. 4 bit field.

longForLatRange11 INTEGER (-3..3) -- For latitude 2047. 3 bit field.

}

}

**Question 4.5.6: Which option (see above) do companies prefer for ASN.1 code of coarse UE location information ?**

**• Option 1: CoarseEllipsoidPointWithOptionalAltitude IE**

**• Option 2: CoarseEllipsoidPointWithAltitude IE + CoarseEllipsoidPoint IE**

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| **Company** | **Option 1 / Option 2** | **Comments/Suggestions** |
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## 2.7 Reporting mechanism

**Question 4.5.7: Which reporting mechanisms do companies prefer**

* **Option 1: After AS security is established, gNB can obtain a GNSS-based location information from the UE using existing signalling method, i.e., by configuring includeCommonLocationInfo in the corresponding reportConfig**
* **Option 2: other**

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| --- | --- | --- |
| **Company** | **Option 1 / Option 2** | **Comments/Suggestions** |
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# 3. Summary and Proposals

# 4. References

1. R2-2205574 Coarse location format Ericsson

# Contact information

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