**3GPP TSG-RAN WG2 Meeting #118 Electronic draft R2-22xxxx**

**09 – 20 May 2022**

**Agenda item: 7.2.2**

**Source: NEC (Rapporteur)**

**Title: Report from [AT118-e][058][IOT NTN] GNSS Validity duration report (NEC)**

**WID: LTE\_NBIOT\_eMTC\_NTN; Release 17**

**Document for: Discussion and Decision**

1 Introduction

This document is the report of the following email discussion:

* [AT118-e][058][IOT NTN] GNSS Validity duration report (NEC)

 Scope: Settle the value range (identify agreement and discussion points if any), settle other stage-3 details if needed (can consider to do an agreeable TP). Pave the way for swift decision.

 Intended outcome: Report

 Deadline: For On-line CB W2 Thursday

2 Contact Points

Respondents to the email discussion are kindly asked to fill in the following table.

|  |  |  |
| --- | --- | --- |
| **Company** | **Name** | **Email Address** |
| NEC (Rapporteur) | Maxime Grau | maxime.grau@emea.nec.com |
| Ericsson | Jonas Sedin | Jonas.sedin@ericsson.com |
| ZTE | Lu Ting | lu.ting@zte.com.cn |
| Lenovo | Min Xu | xumin13@lenovo.com |
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3 Discussion

In this meeting, the following contributions discussed GNSS validity duration:

[1] [**R2-2204593**](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2204593.zip), Discussion on the Open issues for IoT over NTN, Transsion Holdings

[2] [**R2-2204655**](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2204655.zip), Reporting remaining GNSS position validity duration, Qualcomm Incorporated

[3] [**R2-2204727**](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2204727.zip), Discussion on the signaling for reporting remaining GNSS validity duration, OPPO

[4] [**R2-2204752**](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2204752.zip), Discussion on the remaining issue of GNSS Position Validity, Spreadtrum Communications

[5] [**R2-2205031**](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205031.zip), Details on GNSS Validity duration reporting, CMCC

[6] [**R2-2205153**](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205153.zip), FFS on provision of remaining GNSS duration, ZTE Corporation, Sanechips

[7] [**R2-2205399**](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205399.zip), Discussion on the signaling of GNSS validity duration, Xiaomi

[8] [**R2-2205723**](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205723.zip), On discontinuous coverage and GNSS position validity, Nokia, Nokia Shanghai Bell

[9][**R2-2205761**](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205761.zip), Details of GNSS position validity report for NB-IoT, NEC Telecom MODUS Ltd.

[10] [**R2-2205862**](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205862.zip), Other control plane open issues, Ericsson

Furthermore, it was agreed during the online meeting:

* A new parameter for remaining GNSS validity duration is introduced in Msg5, e*.g. RRCConnectionResumeComplete*, *RRCConnectionSetupComplete* and *RRCreestablishmentComplete* messages, and the parameter refers to the time of message transmission.
* Can discuss offline whether to expand the granularity of the value range, but if no convergence will implement the R1 proposal from the LS.
* Reporting of the GNSS validity duration is a mandatory for IoT NTN Ues (assuming the code point infinity can be reported or can be inferred), TBD stage-3 discussion if absence can/shall be interpreted as infinity.

3.1 Validity timer value range

In RAN2 #116bis-e, the LS was received from RAN1 (R1-2112848) stating:

|  |
| --- |
| * The UE autonomously determines its GNSS validity duration X and reports information associated with this valid duration to the network via RRC signalling.
	+ X = {10s, 20s, 30s, 40s, 50s, 60s, 5 min, 10 min, 15 min, 20 min, 25 min, 30 min, 60 min, 90 min, 120 min, infinity}
 |

In the companies’ contributions, [1], [4], [7], [8], [9], [10] proposed to reuse the values in the LS from RAN1. Since these values have already been discussed in RAN1 and sent via an LS, the main argument is to follow RAN1.

Other companies [2], [5] argue that IoT connections are typically short (in the 10s of seconds) and prefer to use a finer granularity with values ranging up to 1min or 10min. This discards most values proposed by RAN1, including infinity.

There seems to be a majority of companies in favour of reusing the values proposed by RAN1. Therefore, let us take the values proposed by RAN1 as a baseline, furthermore, companies are invited to answer the following questions:

**Question 1.1: Do you agree to define a totally new value set with finer granularities?**

Considering the timing, if you answer yes, please provide the value set and your argument for having the new value set different from what RAN1 suggested.

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| **Qualcomm** | **Yes** | **The range values are not suitable for remaining time.****Otherwise we have to agree what RAN1 suggested, i.e., report validity time and also report the start time of the validity duration.****The main reason why RAN2 agreed the remaining validity duration is to avoid to report the start time of the validity duration. The remaining time should deduct the elapsed time since the validity timer was started.** |
| **NEC** | **No** | **UE can round down to the closest validity duration at the time of report.****We cannot have very fine granularity without heavy signalling overhead so RAN1 proposed values are sufficient.** |
| **Ericsson** | No | As suggested, a majority of the contribution suggested the same value range. Furthermore, RAN1 did discuss just this and they then came up with these values.  |
| **ZTE** | **Yes** | We think it’s clear the X in RAN1 LS is the value range for (the whole) validity duration, not the range of remaining time. We agree with Qualcomm that the remaining time should deduct the elapsed time since the validity timer was started.As the length X of a GNSS validity timer is determined by UE itself, if a finite value is selected, the value of remaining time would be any value between 0 and the selected value. The maximum value would be about 120minutes, 7200s. So we understand INTEGER type (with consecutive values) other than ENUMERATED type may be more suitable for this parameter. Previously, we just assume a parameter with 13bits long and range from 0~7200s. As this parameter is provided via Msg5, we feel the overhead issue may be not so critical. But yes, we can understand in any case, it’s important to reduce the air interface signalling overhead. So there are our further suggestions:* We can shrink the range of this parameter by dividing by a factor, e.g., by using a granularity. For example, Actual value of GNSS remaining time = field value \* factor [s], and the factor can be 4s, 8s or 16s etc. We can understand that introducing such factor will break the original value continuity, but it is still better than randomly selecting some enumeration values.
* We have sympathy with another thinking that reporting a very large remaining time may be not so meaningful/useful to network. Then we can give an upper limit less than 7200 seconds. For example, an upper limit with 3600s or even 1800s.That means, even the UE selects a very large X, if the remaining time is larger than 60 minutes or even 30 minutes when triggering report, this parameter can be absent from Msg5 and network can just assume an infinity GNSS remaining time for this UE. The risk of such assumption is very tiny.
* We are not so clear why infinity needs to be explicitly report, we tend to think it can be assumed by network itself when this parameter is absent from Msg5.

With above suggestions, we can give an example as below:gnss-RemainingValidityDuration-r17 INTEGER (1..128)Actual value of GNSS remaining time = field value \* 16 [s]. |
| **Lenovo** | No | Values in RAN1 LS are sufficient. |

**Question 1.2: Do you agree to add more values smaller than 10s in addition to RAN1 suggested value set? if yes what are the additional values?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| **Qualcomm** | **No** | **When reporting in Msg5, less than 10s is probably not needed.** |
| **NEC** | **No** | **Given minimum round trip times and the assumption that the UE should have a valid GNSS duration (at least for the validity of its tranmission), 10s is enough for a lower bound.** |
| **Ericsson** | No | No, it would be very unfortunate for the network if the UE would be connecting so that when msg5 is sent it is less than 10 seconds.  |
| **ZTE** | **Yes** | Even we also cannot understand why X may have a so much small value 10s, we have to admit the case that GNSS remaining time is smaller than 10s would exist. And we also know that, the smaller the value of remaining time, the more useful it is when reporting to the network. With above example definition, it’s easy to include the value range of less than 10s. We can just further assume that only for field value larger than 10s, the factor would be applied. Here is an example:gnss-RemainingValidityDuration-r17 INTEGER (1..128)If the field value is small than 10, Actual value of GNSS remaining time = field value [s], otherwise, Actual value of GNSS remaining time = field value \* 16 [s]. |
| **Lenovo** | No | 10s is sufficient. |

**Question 1.3: Do you agree to delete some bigger values, e.g. 120 min from RAN1 suggested value set?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| **Qualcomm** | **Yes** | **Instead, add more granular values.** |
| **NEC** | **No** | **We think that RAN1 had its reasons to use 120min so we prefer to keep this value.** |
| **Ericsson** | No | We would prefer to keep the value range.  |
| **ZTE** | **Yes or no strong view** | As mentioned above, reporting a very large remaining time may be not so meaningful/useful to network. Even the UE selects a very large X, e.g., 120 minutes, if the remaining time is larger than 60 minutes or even 30 minutes when triggering report, this parameter can be absent from Msg5 and network can just assume an infinity GNSS remaining time for this UE. The risk of such assumption is very tiny. But with above definition, it’s easy to extend the value range from 128 to 512 to cover the case of around 120 minutes GNSS remaining time. |
| **Lenovo** | No | We think it is better to follow RAN1 suggestion, or we have to inform RAN1 about the deleting and provide explanation. |

During the online session, it was also agreed:

* Reporting of the GNSS validity duration is a mandatory for IoT NTN Ues (assuming the code point infinity can be reported or can be inferred), TBD stage-3 discussion if absence can/shall be interpreted as infinity.

The report can therefore be either mandatory (and include the infinity value), or optional with infinity as the default value.

**Question 1.4: Do you agree to use infinity as a default value?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| **Qualcomm** | **Yes** |  |
| **NEC** | **Yes** | **This is especially relevant for low mobility and stationary UEs.** |
| **Ericsson** | No | No. We do not see that much gain in this since we anyways have infinity among the values. Besides, when the network schedules messages like msg5, the network would anyways have to try to schedule it based on the expected size of msg5 and in this case the network does not know if it will be included or not, so it have to slightly overprovision the scheduling, thus we see little gains of this.  |
| **ZTE** | **-** | We don’t see the reason for reporting infinity. We suggest infinity can be assumed when this GNSS remaining time parameter is absent from Msg5. |
| **Lenovo** | **Yes** |  |

3.2 Stage 3 Implementation

It was agreed online that:

|  |
| --- |
| * A new parameter for remaining GNSS validity duration is introduced in Msg5, e*.g. RRCConnectionResumeComplete*, *RRCConnectionSetupComplete* and *RRCreestablishmentComplete* messages, and the parameter refers to the time of message transmission.
 |

Following this agreement:

**Question 2.1: can we confirm that the new parameter for remaining GNSS validity duration is introduced in these Msg5 messages: *RRCConnectionResumeComplete*, *RRCConnectionSetupComplete, RRCreestablishmentComplete RRCConnectionResumeComplete-NB*, *RRCConnectionSetupComplete-NB, RRCreestablishmentComplete-NB*?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| **Qualcomm** | **Yes** |  |
| **NEC** | **Yes** |  |
| **Ericsson** | **yes** |  |
| **ZTE** | **-** | Fine with:***RRCConnectionResumeComplete*, *RRCConnectionSetupComplete, RRCConnectionResumeComplete-NB*, *RRCConnectionSetupComplete-NB***But for RRC re-establishment case (to different eNB), we think it’s also possible (maybe better) to let target eNB acquires the GNSS remaining time of the UE from source eNB during UE context retrieval procedure. For RRC re-establishment to the same eNB, it’s no need of reporting this parameter.In a summary, we suggest to consider ***HandoverPreparationInformation*** message instead of ***RRCreestablishmentComplete*** message. |
| **Lenovo** | Yes |  |

MTC HO case is not discussed, in one hand it is similar to re-establishment case. In the other hand, the complete message for HO procedure is not a MSG5 message. Hence Rapp want to check if this new parameter is also introduced for HO case:

**Question 2.2: do you agree to add this IE also into *RRCConnectionReconfigurationComplete for* MTC HO case?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| **Qualcomm** | **Yes** |  |
| **NEC** | **Yes** |  |
| **Ericsson** | Yes |  |
| **ZTE** | No | With similar reason as for Q2.1, we suggest to consider ***HandoverPreparationInformation*** message instead of ***RRCConnectionReconfigurationComplete*** message. |
| **Lenovo** | Yes |  |

There are two editor’s notes in Section 5.3.3.21 of TS 36.331:

* Editor's Note: FFS release cause 'RRC Connection Failure' or 'other'.
* Editor's Note: FFS whether GNSS is considered as lower layers, upper layers or something else.

In [4] it is proposed that the network can trigger RRC release with release cause “GNSS invalidity” at a certain occasion based on the reported GNSS validity remaining time by UE.

**Question 2.3: Do you agree to add a new RRC release cause “GNSS invalidity” into RRCConnectionRelease and RRCConnectionRelease-NB**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| **Qualcomm** |  | **Not clear on the purpose of the new release cause.** |
| **NEC** | **No** | **We understand that this would clarify to the UE what the RRC Release cause is and not speculate for “other” causes. However, it is not critical and using “other” is sufficient.** |
| **Ericsson** | No | Not clear what is the purpose of this or how the UE shall use it. And the editor’s note is related to what is indicated to NAS, so it is not really related.  |
| **ZTE** | **Yes**  | In our understanding, if the network can know the GNSS remaining time for a connected mode UE, eNB can release its own resources when the UE is unreachable. Or in eNB implementation, eNB also may send “early” release message to UE roughly before outdate of GNSS position. On the other hand, for UE side, if UE can know the RRC connection is released for the reason of “GNSS invalidity” (e.g., not other reasons, for example, network overload), UE can trigger another connection establishment (with no doubt) after re-acquiring valid GNSS. |
| **Lenovo** | No | We see no necessity to provide such information to UE. |

3.3 Other Stage 3 details

**Question 3: Are there any other Stage 3 details that you wish to discuss?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Topic** | **Comments** |
| Ericsson | Configuring the GNSS validity duration reporting | We need to discuss whether it is configurable that the UE reports the GNSS validity duration.  |
| ZTE |  | Fine to discuss Ericsson’s suggestion, e.g., an indication in SIB. |
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3.4 Text Proposal for TS 36.331

In this section, we propose a TP implementation with the following assumptions:

* Value range is FFS, depending on outcome of this email discussion
* Default RAN1 values are assumed in the field description (“Value s10 corresponds to 10 seconds, s20 corresponds to 20 seconds and so on. Value min5 corresponds to 5 minutes, value min10 corresponds to 10 minutes and so on. If the field is absent, the (default) value of infinity shall be applied.”)
* Yes to Q2.1
* No to Q2.2 (can add later depending on outcome of this email discussion)
* No to Q2.3 (we just use ‘Other’)

The concerned IEs are:

* RRCConnectionReestablishmentComplete
* RRCConnectionResumeComplete
* RRCConnectionSetupComplete
* RRCConnectionReestablishmentComplete-NB
* RRCConnectionResumeComplete-NB
* RRCConnectionSetupComplete-NB

Text Proposal:

6.2.2 Message definitions

// Skip unrelated parts//

– RRCConnectionReestablishmentComplete

The *RRCConnectionReestablishmentComplete* message is used to confirm the successful completion of an RRC connection re-establishment.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E‑UTRAN

*RRCConnectionReestablishmentComplete message*

-- ASN1START

RRCConnectionReestablishmentComplete ::= SEQUENCE {

 rrc-TransactionIdentifier RRC-TransactionIdentifier,

 criticalExtensions CHOICE {

 rrcConnectionReestablishmentComplete-r8

 RRCConnectionReestablishmentComplete-r8-IEs,

 criticalExtensionsFuture SEQUENCE {}

 }

}

RRCConnectionReestablishmentComplete-r8-IEs ::= SEQUENCE {

 nonCriticalExtension RRCConnectionReestablishmentComplete-v920-IEs OPTIONAL

}

RRCConnectionReestablishmentComplete-v920-IEs ::= SEQUENCE {

 rlf-InfoAvailable-r9 ENUMERATED {true} OPTIONAL,

 nonCriticalExtension RRCConnectionReestablishmentComplete-v8a0-IEs OPTIONAL

}

RRCConnectionReestablishmentComplete-v8a0-IEs ::= SEQUENCE {

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension RRCConnectionReestablishmentComplete-v1020-IEs OPTIONAL

}

RRCConnectionReestablishmentComplete-v1020-IEs ::= SEQUENCE {

 logMeasAvailable-r10 ENUMERATED {true} OPTIONAL,

 nonCriticalExtension RRCConnectionReestablishmentComplete-v1130-IEs OPTIONAL

}

RRCConnectionReestablishmentComplete-v1130-IEs ::= SEQUENCE {

 connEstFailInfoAvailable-r11 ENUMERATED {true} OPTIONAL,

 nonCriticalExtension RRCConnectionReestablishmentComplete-v1250-IEs OPTIONAL

}

RRCConnectionReestablishmentComplete-v1250-IEs ::= SEQUENCE {

 logMeasAvailableMBSFN-r12 ENUMERATED {true} OPTIONAL,

 nonCriticalExtension RRCConnectionReestablishmentComplete-v1530-IEs OPTIONAL

}

RRCConnectionReestablishmentComplete-v1530-IEs ::= SEQUENCE {

 logMeasAvailableBT-r15 ENUMERATED {true} OPTIONAL,

 logMeasAvailableWLAN-r15 ENUMERATED {true} OPTIONAL,

 flightPathInfoAvailable-r15 ENUMERATED {true} OPTIONAL,

 nonCriticalExtension RRCConnectionReestablishmentComplete-v1700-IEs OPTIONAL

}

RRCConnectionReestablishmentComplete-v1700-IEs::= SEQUENCE {

 gnss-RemainingValidityDuration-r17 ENUMERATED {FFS, infinity} DEFAULT infinity,

 nonCriticalExtension SEQUENCE{} OPTIONAL

}

-- ASN1STOP

| *RRCConnectionReestablishmentComplete* field descriptions |
| --- |
| ***gnss-RemainingValidityDuration***Indicates the remaining GNSS validity duration in the UE. Value s10 corresponds to 10 seconds, s20 corresponds to 20 seconds and so on. Value min5 corresponds to 5 minutes, value min10 corresponds to 10 minutes and so on. If the field is absent, the (default) value of infinity shall be applied. |
| ***rlf-InfoAvailable***This field is used to indicate the availability of radio link failure or handover failure related measurements |

// Skip unrelated parts//

– RRCConnectionResumeComplete

The *RRCConnectionResumeComplete* message is used to confirm the successful completion of an RRC connection resumption.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E‑UTRAN

*RRCConnectionResumeComplete* message

-- ASN1START

RRCConnectionResumeComplete-r13 ::= SEQUENCE {

 rrc-TransactionIdentifier RRC-TransactionIdentifier,

 criticalExtensions CHOICE {

 rrcConnectionResumeComplete-r13 RRCConnectionResumeComplete-r13-IEs,

 criticalExtensionsFuture SEQUENCE {}

 }

}

RRCConnectionResumeComplete-r13-IEs ::= SEQUENCE {

 selectedPLMN-Identity-r13 INTEGER (1..maxPLMN-r11) OPTIONAL,

 dedicatedInfoNAS-r13 DedicatedInfoNAS OPTIONAL,

 rlf-InfoAvailable-r13 ENUMERATED {true} OPTIONAL,

 logMeasAvailable-r13 ENUMERATED {true} OPTIONAL,

 connEstFailInfoAvailable-r13 ENUMERATED {true} OPTIONAL,

 mobilityState-r13 ENUMERATED {normal, medium, high, spare} OPTIONAL,

 mobilityHistoryAvail-r13 ENUMERATED {true} OPTIONAL,

 logMeasAvailableMBSFN-r13 ENUMERATED {true} OPTIONAL,

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension RRCConnectionResumeComplete-v1530-IEs OPTIONAL

}

RRCConnectionResumeComplete-v1530-IEs ::= SEQUENCE {

 logMeasAvailableBT-r15 ENUMERATED {true} OPTIONAL,

 logMeasAvailableWLAN-r15 ENUMERATED {true} OPTIONAL,

 idleMeasAvailable-r15 ENUMERATED {true} OPTIONAL,

 flightPathInfoAvailable-r15 ENUMERATED {true} OPTIONAL,

 nonCriticalExtension RRCConnectionResumeComplete-v1610-IEs OPTIONAL

}

RRCConnectionResumeComplete-v1610-IEs ::= SEQUENCE {

 measResultListIdle-r16 MeasResultListIdle-r15 OPTIONAL,

 measResultListExtIdle-r16 MeasResultListExtIdle-r16 OPTIONAL,

 measResultListIdleNR-r16 MeasResultListIdleNR-r16 OPTIONAL,

 scg-ConfigResponseNR-r16 OCTET STRING OPTIONAL,

 nonCriticalExtension RRCConnectionResumeComplete-v1700-IEs OPTIONAL

}

RRCConnectionResumeComplete-v1700-IEs::= SEQUENCE {

 gnss-RemainingValidityDuration-r17 ENUMERATED {FFS, infinity} DEFAULT infinity,

 nonCriticalExtension SEQUENCE{} OPTIONAL

}

-- ASN1STOP

| *RRCConnectionResumeComplete* field descriptions |
| --- |
| ***gnss-RemainingValidityDuration***Indicates the remaining GNSS validity duration in the UE. Value s10 corresponds to 10 seconds, s20 corresponds to 20 seconds and so on. Value min5 corresponds to 5 minutes, value min10 corresponds to 10 minutes and so on. If the field is absent, the (default) value of infinity shall be applied. |
| ***idleMeasAvailable***Indication that the UE has idle/inactive measurement report available. |
| ***selectedPLMN-Identity***Index of the PLMN selected by the UE from the *plmn-IdentityList* fields included in SIB1. 1 if the 1st PLMN is selected from the 1st *plmn-IdentityList* included in SIB1, 2 if the 2nd PLMN is selected from the same *plmn-IdentityList*, or when no more PLMN are present within the same *plmn-IdentityList,* then the PLMN listed 1st in the subsequent *plmn-IdentityList* within the same SIB1 and so on. The *selectedPLMN-Identity* is referred to the PLMN list for 5GC if the UE is in RRC\_INACTIVE state. |

// Skip unrelated parts//

– RRCConnectionSetupComplete

The *RRCConnectionSetupComplete* message is used to confirm the successful completion of an RRC connection establishment.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E‑UTRAN

*RRCConnectionSetupComplete message*

-- ASN1START

RRCConnectionSetupComplete ::= SEQUENCE {

 rrc-TransactionIdentifier RRC-TransactionIdentifier,

 criticalExtensions CHOICE {

 c1 CHOICE{

 rrcConnectionSetupComplete-r8 RRCConnectionSetupComplete-r8-IEs,

 spare3 NULL, spare2 NULL, spare1 NULL

 },

 criticalExtensionsFuture SEQUENCE {}

 }

}

RRCConnectionSetupComplete-r8-IEs ::= SEQUENCE {

 selectedPLMN-Identity INTEGER (1..maxPLMN-r11),

 registeredMME RegisteredMME OPTIONAL,

 dedicatedInfoNAS DedicatedInfoNAS,

 nonCriticalExtension RRCConnectionSetupComplete-v8a0-IEs OPTIONAL

}

RRCConnectionSetupComplete-v8a0-IEs ::= SEQUENCE {

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension RRCConnectionSetupComplete-v1020-IEs OPTIONAL

}

RRCConnectionSetupComplete-v1020-IEs ::= SEQUENCE {

 gummei-Type-r10 ENUMERATED {native, mapped} OPTIONAL,

 rlf-InfoAvailable-r10 ENUMERATED {true} OPTIONAL,

 logMeasAvailable-r10 ENUMERATED {true} OPTIONAL,

 rn-SubframeConfigReq-r10 ENUMERATED {required, notRequired} OPTIONAL,

 nonCriticalExtension RRCConnectionSetupComplete-v1130-IEs OPTIONAL

}

RRCConnectionSetupComplete-v1130-IEs ::= SEQUENCE {

 connEstFailInfoAvailable-r11 ENUMERATED {true} OPTIONAL,

 nonCriticalExtension RRCConnectionSetupComplete-v1250-IEs OPTIONAL

}

RRCConnectionSetupComplete-v1250-IEs ::= SEQUENCE {

 mobilityState-r12 ENUMERATED {normal, medium, high, spare} OPTIONAL,

 mobilityHistoryAvail-r12 ENUMERATED {true} OPTIONAL,

 logMeasAvailableMBSFN-r12 ENUMERATED {true} OPTIONAL,

 nonCriticalExtension RRCConnectionSetupComplete-v1320-IEs OPTIONAL

}

RRCConnectionSetupComplete-v1320-IEs ::= SEQUENCE {

 ce-ModeB-r13 ENUMERATED {supported} OPTIONAL,

 s-TMSI-r13 S-TMSI OPTIONAL,

 attachWithoutPDN-Connectivity-r13 ENUMERATED {true} OPTIONAL,

 up-CIoT-EPS-Optimisation-r13 ENUMERATED {true} OPTIONAL,

 cp-CIoT-EPS-Optimisation-r13 ENUMERATED {true} OPTIONAL,

 nonCriticalExtension RRCConnectionSetupComplete-v1330-IEs OPTIONAL

}

RRCConnectionSetupComplete-v1330-IEs ::= SEQUENCE {

 ue-CE-NeedULGaps-r13 ENUMERATED {true} OPTIONAL,

 nonCriticalExtension RRCConnectionSetupComplete-v1430-IEs OPTIONAL

}

RRCConnectionSetupComplete-v1430-IEs ::= SEQUENCE {

 dcn-ID-r14 INTEGER (0..65535) OPTIONAL,

 nonCriticalExtension RRCConnectionSetupComplete-v1530-IEs OPTIONAL

}

RRCConnectionSetupComplete-v1530-IEs ::= SEQUENCE {

 logMeasAvailableBT-r15 ENUMERATED {true} OPTIONAL,

 logMeasAvailableWLAN-r15 ENUMERATED {true} OPTIONAL,

 idleMeasAvailable-r15 ENUMERATED {true} OPTIONAL,

 flightPathInfoAvailable-r15 ENUMERATED {true} OPTIONAL,

 connectTo5GC-r15 ENUMERATED {true} OPTIONAL,

 registeredAMF-r15 RegisteredAMF-r15 OPTIONAL,

 s-NSSAI-list-r15 SEQUENCE(SIZE (1..maxNrofS-NSSAI-r15)) OF S-NSSAI-r15 OPTIONAL,

 ng-5G-S-TMSI-Bits-r15 CHOICE {

 ng-5G-S-TMSI-r15 NG-5G-S-TMSI-r15,

 ng-5G-S-TMSI-Part2-r15 BIT STRING (SIZE (8))

 } OPTIONAL,

 nonCriticalExtension RRCConnectionSetupComplete-v1540-IEs OPTIONAL

}

RRCConnectionSetupComplete-v1540-IEs ::= SEQUENCE {

 gummei-Type-v1540 ENUMERATED {mappedFrom5G-v1540} OPTIONAL,

 guami-Type-r15 ENUMERATED {native, mapped} OPTIONAL,

 nonCriticalExtension RRCConnectionSetupComplete-v1610-IEs OPTIONAL

}

RRCConnectionSetupComplete-v1610-IEs ::= SEQUENCE {

 rlos-Request-r16 ENUMERATED {true} OPTIONAL,

 cp-CIoT-5GS-Optimisation-r16 ENUMERATED {true} OPTIONAL,

 up-CIoT-5GS-Optimisation-r16 ENUMERATED {true} OPTIONAL,

 pur-ConfigID-r16 PUR-ConfigID-r16 OPTIONAL,

 lte-M-r16 ENUMERATED {true} OPTIONAL,

 iab-NodeIndication-r16 ENUMERATED {true} OPTIONAL,

 nonCriticalExtension RRCConnectionSetupComplete-v1700-IEs OPTIONAL

}

RRCConnectionSetupComplete-v1700-IEs::= SEQUENCE {

 gnss-RemainingValidityDuration-r17 ENUMERATED {FFS, infinity} DEFAULT infinity,

 nonCriticalExtension SEQUENCE{} OPTIONAL

}

RegisteredMME ::= SEQUENCE {

 plmn-Identity PLMN-Identity OPTIONAL,

 mmegi BIT STRING (SIZE (16)),

 mmec MMEC

}

RegisteredAMF-r15 ::= SEQUENCE {

 plmn-Identity-r15 PLMN-Identity OPTIONAL,

 amf-Identifier-r15 AMF-Identifier-r15

}

-- ASN1STOP

| *RRCConnectionSetupComplete* field descriptions |
| --- |
| ***attachWithoutPDN-Connectivity***This field is used to indicate that the UE performs an Attach without PDN connectivity procedure, as indicated by the upper layers and specified in TS 24.301 [35]. |
| ***cp-CIoT-5GS-Optimisation***This field is included when the UE supports the Control plane CIoT 5GS optimisation, as indicated by the upper layers, see TS 24.501 [95]. |
| ***cp-CIoT-EPS-Optimisation***This field is included when the UE supports the Control plane CIoT EPS Optimisation, as indicated by the upper layers, see TS 24.301 [35]. |
| ***ce-ModeB***Indicates whether the UE supports operation in CE mode B, as specified in TS 36.306 [5]. |
| ***connectTo5GC***This field is not used in the specification. It shall not be sent by the UE. |
| ***dcn-ID***The Dedicated Core Network Identity, see TS 23.401 [41]. |
| ***gnss-RemainingValidityDuration***Indicates the remaining GNSS validity duration in the UE. Value s10 corresponds to 10 seconds, s20 corresponds to 20 seconds and so on. Value min5 corresponds to 5 minutes, value min10 corresponds to 10 minutes and so on. If the field is absent, the (default) value of infinity shall be applied. |
| ***guami-Type***This field is used to indicate whether the GUAMI included is native (derived from native 5G-GUTI) or mapped (from EPS, derived from EPS GUTI) as specified in TS 24.501 [95]. |
| ***gummei-Type***This field is used to indicate whether the GUMMEI included is native (assigned by EPC) or mapped. The value native indicates the GUMMEI is native, mapped indicates the GUMMEI is mapped from 2G/3G identifiers, and mappedFrom5G indicates the GUMMEI is mapped from 5G identifiers. A UE that sets *gummei-Type-v1540* to mappedFrom5G shall also include *gummei-Type-r10* and set it to native. |
| ***iab-NodeIndication***This field is used to indicate that the connection is being established by an IAB-node as specified in TS 38.300 [106]. |
| ***idleMeasAvailable***Indication that the UE has idle/inactive measurement report available. |
| ***lte-M***Indicates the UE is category M. |
| ***mmegi***Provides the Group Identity of the registered MME within the PLMN, as provided by upper layers, see TS 23.003 [27]. |
| ***mobilityState***This field indicates the UE mobility state (as defined in TS 36.304 [4], clause 5.2.4.3) just prior to UE going into RRC\_CONNECTED state. The UE indicates the value of *medium* and *high* when being in Medium-mobility and High-mobility states respectively. Otherwise the UE indicates the value *normal*. |
| ***ng-5G-S-TMSI-Part2***The leftmost 8 bits of 5G-S-TMSI. |
| ***registeredAMF***This field is used to transfer the GUAMI of the AMF where the UE is registered, as provided by upper layers, see TS 23.003 [27]. |
| ***registeredMME***This field is used to transfer the GUMMEI of the MME where the UE is registered, as provided by upper layers. |
| ***rlos-Request***Indicates whether the UE is initiating RLOS as specified in TS 23.401 [41]. |
| ***rn-SubframeConfigReq***If present, this field indicates that the connection establishment is for an RN and whether a subframe configuration is requested or not. |
| ***selectedPLMN-Identity***Index of the PLMN selected by the UE from the *plmn-IdentityList* fields included in SIB1. 1 if the 1st PLMN is selected from the 1st *plmn-IdentityList* included in SIB1, 2 if the 2nd PLMN is selected from the same *plmn-IdentityList*, or when no more PLMN are present within the same *plmn-IdentityList*, then the PLMN listed 1st in the subsequent *plmn-IdentityList* within the same SIB1 and so on. |
| ***s-NSSAI-List***This field is a list of S-NSSAI as indicated by the upper layers. The UE can report up to eight S-NSSAI per NSSAI, see TS 23.003 [27]. |
| ***ue-CE-NeedULGaps***Indicates whether the UE needs uplink gaps during continuous uplink transmission in FDD as specified in TS 36.211 [21] and TS 36.306 [5]. |
| ***up-CIoT-5GS-Optimisation***This field is included when the UE supports the User plane CIoT 5GS optimisation, as indicated by the upper layers, see TS 24.501 [95]. |
| ***up-CIoT-EPS-Optimisation***This field is included when the UE supports the User plane CIoT EPS Optimisation, as indicated by the upper layers, see TS 24.301 [35]. |

// Skip unrelated parts//

6.7.2 NB-IoT Message definitions

// Skip unrelated parts//

– RRCConnectionReestablishmentComplete-NB

The *RRCConnectionReestablishmentComplete-NB* message is used to confirm the successful completion of an RRC connection re-establishment.

Signalling radio bearer: SRB1 or SRB1bis

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E‑UTRAN

*RRCConnectionReestablishmentComplete-NB* message

-- ASN1START

RRCConnectionReestablishmentComplete-NB ::= SEQUENCE {

 rrc-TransactionIdentifier RRC-TransactionIdentifier,

 criticalExtensions CHOICE {

 rrcConnectionReestablishmentComplete-r13 RRCConnectionReestablishmentComplete-NB-r13-IEs,

 criticalExtensionsFuture SEQUENCE {}

 }

}

RRCConnectionReestablishmentComplete-NB-r13-IEs ::= SEQUENCE {

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension RRCConnectionReestablishmentComplete-NB-v1470-IEs OPTIONAL

}

RRCConnectionReestablishmentComplete-NB-v1470-IEs ::= SEQUENCE {

 measResultServCell-r14 MeasResultServCell-NB-r14 OPTIONAL,

 nonCriticalExtension RRCConnectionReestablishmentComplete-NB-v1610-IEs OPTIONAL

}

RRCConnectionReestablishmentComplete-NB-v1610-IEs ::= SEQUENCE {

 rlf-InfoAvailable-r16 ENUMERATED {true} OPTIONAL,

 anr-InfoAvailable-r16 ENUMERATED {true} OPTIONAL,

 nonCriticalExtension RRCConnectionReestablishmentComplete-NB-v1700-IEs OPTIONAL

}

RRCConnectionReestablishmentComplete-NB-v1700-IEs::= SEQUENCE {

 gnss-RemainingValidityDuration-r17 ENUMERATED {FFS, infinity} DEFAULT infinity,

 nonCriticalExtension SEQUENCE{} OPTIONAL

}

-- ASN1STOP

| *RRCConnectionReestablishmentComplete-NB field descriptions* |
| --- |
| ***anr-InfoAvailable***Indicates the availability of ANR measurement information. |
| ***gnss-RemainingValidityDuration***Indicates the remaining GNSS validity duration in the UE. Value s10 corresponds to 10 seconds, s20 corresponds to 20 seconds and so on. Value min5 corresponds to 5 minutes, value min10 corresponds to 10 minutes and so on. If the field is absent, the (default) value of infinity shall be applied. |
| ***measResultServCell***This field refers to the last idle mode measurement results taken of the serving cell. |
| ***rlf-InfoAvailable***Indicates the availability of radio link failure related information. |

// Skip unrelated parts//

– RRCConnectionResumeComplete-NB

The *RRCConnectionResumeComplete-NB* message is used to confirm the successful completion of an RRC connection resumption

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E‑UTRAN

*RRCConnectionResumeComplete-NB* message

-- ASN1START

RRCConnectionResumeComplete-NB ::= SEQUENCE {

 rrc-TransactionIdentifier RRC-TransactionIdentifier,

 criticalExtensions CHOICE {

 rrcConnectionResumeComplete-r13 RRCConnectionResumeComplete-NB-r13-IEs,

 criticalExtensionsFuture SEQUENCE {}

 }

}

RRCConnectionResumeComplete-NB-r13-IEs ::= SEQUENCE {

 selectedPLMN-Identity-r13 INTEGER (1..maxPLMN-r11) OPTIONAL,

 dedicatedInfoNAS-r13 DedicatedInfoNAS OPTIONAL,

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension RRCConnectionResumeComplete-NB-v1470-IEs OPTIONAL

}

RRCConnectionResumeComplete-NB-v1470-IEs ::= SEQUENCE {

 measResultServCell-r14 MeasResultServCell-NB-r14 OPTIONAL,

 nonCriticalExtension RRCConnectionResumeComplete-NB-v1610-IEs OPTIONAL

}

RRCConnectionResumeComplete-NB-v1610-IEs ::= SEQUENCE {

 rlf-InfoAvailable-r16 ENUMERATED {true} OPTIONAL,

 anr-InfoAvailable-r16 ENUMERATED {true} OPTIONAL,

 nonCriticalExtension RRCConnectionResumeComplete-NB-v1700-IEs OPTIONAL

}

RRCConnectionResumeComplete-NB-v1700-IEs::= SEQUENCE {

 gnss-RemainingValidityDuration-r17 ENUMERATED {FFS, infinity} DEFAULT infinity,

 nonCriticalExtension SEQUENCE{} OPTIONAL

}

-- ASN1STOP

| *RRCConnectionResumeComplete-NB* field descriptions |
| --- |
| ***anr-InfoAvailable***Indicates the availability of ANR measurement information. |
| ***gnss-RemainingValidityDuration***Indicates the remaining GNSS validity duration in the UE. Value s10 corresponds to 10 seconds, s20 corresponds to 20 seconds and so on. Value min5 corresponds to 5 minutes, value min10 corresponds to 10 minutes and so on. If the field is absent, the (default) value of infinity shall be applied. |
| ***measResultServCell***This field refers to the last idle mode measurement results taken of the serving cell. |
| ***rlf-InfoAvailable***Indicates the availability of radio link failure related information. |
| ***selectedPLMN-Identity***Index of the PLMN selected by the UE from the *plmn-IdentityList* included in *SystemInformationBlockType1-NB*. 1 if the 1st PLMN is selected from the *plmn-IdentityList* included in SIB1-NB, 2 if the 2nd PLMN is selected from the *plmn-IdentityList* included in SIB1-NB and so on. |

// Skip unrelated parts//

– RRCConnectionSetupComplete-NB

The *RRCConnectionSetupComplete-NB* message is used to confirm the successful completion of an RRC connection establishment.

Signalling radio bearer: SRB1bis

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E‑UTRAN

*RRCConnectionSetupComplete-NB* message

-- ASN1START

RRCConnectionSetupComplete-NB ::= SEQUENCE {

 rrc-TransactionIdentifier RRC-TransactionIdentifier,

 criticalExtensions CHOICE{

 rrcConnectionSetupComplete-r13 RRCConnectionSetupComplete-NB-r13-IEs,

 criticalExtensionsFuture SEQUENCE {}

 }

}

RRCConnectionSetupComplete-NB-r13-IEs ::= SEQUENCE {

 selectedPLMN-Identity-r13 INTEGER (1..maxPLMN-r11),

 s-TMSI-r13 S-TMSI OPTIONAL,

 registeredMME-r13 RegisteredMME OPTIONAL,

 dedicatedInfoNAS-r13 DedicatedInfoNAS,

 attachWithoutPDN-Connectivity-r13 ENUMERATED {true} OPTIONAL,

 up-CIoT-EPS-Optimisation-r13 ENUMERATED {true} OPTIONAL,

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension RRCConnectionSetupComplete-NB-v1430-IEs OPTIONAL

}

RRCConnectionSetupComplete-NB-v1430-IEs ::= SEQUENCE {

 gummei-Type-r14 ENUMERATED { mapped} OPTIONAL,

 dcn-ID-r14 INTEGER (0..65535) OPTIONAL,

 nonCriticalExtension RRCConnectionSetupComplete-NB-v1470-IEs OPTIONAL

}

RRCConnectionSetupComplete-NB-v1470-IEs ::= SEQUENCE {

 measResultServCell-r14 MeasResultServCell-NB-r14 OPTIONAL,

 nonCriticalExtension RRCConnectionSetupComplete-NB-v1610-IEs OPTIONAL

}

RRCConnectionSetupComplete-NB-v1610-IEs ::= SEQUENCE {

 ng-5G-S-TMSI-r16 NG-5G-S-TMSI-r15 OPTIONAL,

 registeredAMF-r16 RegisteredAMF-r15 OPTIONAL,

 gummei-Type-v1610 ENUMERATED {mappedFrom5G} OPTIONAL,

 guami-Type-r16 ENUMERATED {native, mapped} OPTIONAL,

 s-NSSAI-list-r16 SEQUENCE(SIZE (1..maxNrofS-NSSAI-r15)) OF

 S-NSSAI-r15 OPTIONAL,

 ng-U-DataTransfer-r16 ENUMERATED {true} OPTIONAL,

 up-CIoT-5GS-Optimisation-r16 ENUMERATED {true} OPTIONAL,

 rlf-InfoAvailable-r16 ENUMERATED {true} OPTIONAL,

 anr-InfoAvailable-r16 ENUMERATED {true} OPTIONAL,

 pur-ConfigID-r16 PUR-ConfigID-NB-r16 OPTIONAL,

 nonCriticalExtension RRCConnectionSetupComplete-NB-v1700-IEs OPTIONAL

}

RRCConnectionSetupComplete-NB-v1700-IEs::= SEQUENCE {

 gnss-RemainingValidityDuration-r17 ENUMERATED {FFS, infinity} DEFAULT infinity,

 nonCriticalExtension SEQUENCE{} OPTIONAL

}

-- ASN1STOP

| *RRCConnectionSetupComplete-NB* field descriptions |
| --- |
| ***anr-InfoAvailable***This field is used to indicate the availability of ANR measurement information. |
| ***attachWithoutPDN-Connectivity***This field is used to indicate that the UE performs an Attach without PDN connectivity procedure, as indicated by the upper layers, TS 24.301 [35].  |
| ***dcn-ID***The Dedicated Core Network Identity, see TS 23.401 [41]. |
| ***gnss-RemainingValidityDuration***Indicates the remaining GNSS validity duration in the UE. Value s10 corresponds to 10 seconds, s20 corresponds to 20 seconds and so on. Value min5 corresponds to 5 minutes, value min10 corresponds to 10 minutes and so on. If the field is absent, the (default) value of infinity shall be applied. |
| ***guami-Type***This field is used to indicate whether the GUAMI included is native (derived from native 5G-GUTI) or mapped (from EPS, derived from EPS GUTI) as specified in TS 24.501 [95]. |
| ***gummei-Type***This field is used to indicate that the GUMMEI included is mapped (from 2G/3G identifiers or 5G identifiers) as indicated by the upper layers, TS 24.301 [35] and TS 24.501 [95]. The value *mapped* indicates the GUMMEI is mapped from 2G/3G identifiers, and *mappedFrom5G* indicates the GUMMEI is mapped from 5G identifiers. A UE shall not include both *gummei-Type-r14* and *gummei-Type-v1610*. |
| ***measResultServCell***This field refers to the last idle mode measurement results taken of the serving cell. |
| ***ng-U-DataTransfer***This field is included when the UE supports NG-U data transfer, as indicated by the upper layers, see TS 24.501 [95]. |
| ***registeredAMF***This field is used to transfer the GUAMI of the AMF where the UE is registered, as provided by upper layers, see TS 23.003 [27]. |
| ***registeredMME***This field is used to transfer the GUMMEI of the MME where the UE is registered, as provided by upper layers. |
| ***rlf-InfoAvailable***This field is used to indicate the availability of radio link failure related information. |
| ***selectedPLMN-Identity***Index of the PLMN selected by the UE from the *plmn-IdentityList* included in *SystemInformationBlockType1-NB*. 1 if the 1st PLMN is selected from the *plmn-IdentityList* included in SIB1, 2 if the 2nd PLMN is selected from the *plmn-IdentityList* included in SIB1 and so on. |
| ***s-NSSAI-List***This field is a list of S-NSSAI as indicated by the upper layers. The UE can report up to eight S-NSSAI per NSSAI, see TS 23.003 [27]. |
| ***up-CIoT-5GS-Optimisation***This field is included when the UE supports User plane CIoT 5GS Optimisation, as indicated by the upper layers, see TS 24.501 [95]. |
| ***up-CIoT-EPS-Optimisation***This field is included when the UE supports S1-U data transfer or the User plane CIoT EPS Optimisation, as indicated by the upper layers, see TS 24.301 [35]. |

// Skip unrelated parts//

**Question 4: Please give your comments on the text proposal if any**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Qualcomm | We can handle it in CR implementation. What we need is a clear agreement. |
| ZTE | Do we need to mention something about filling this new parameters in the RRC procedure text? E.g., in the following section:***5.3.3.4 Reception of the RRCConnectionSetup by the UE******5.3.3.4a Reception of the RRCConnectionResume by the UE***Can see our examples in [R2-2205153]. |
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4 Conclusion

TBD.