**3GPP TSG-RAN WG3 Meeting #127bis *R3-252427***

Wuhan, China, 7 – 11 April 2025

**Agenda item: 20.2**

**Source: Xiaomi, Ericsson**

**Title: (TP for BL CR TS 38.455) Support of Sample-based measurement for LMF-side model (case 3b)**

**Document for: other**

# 1 Introduction

This TP provides the configuration parameters needed from LMF to gNB to support sample-based measurement as per RAN1 agreements for case 3b

|  |
| --- |
| Agreement **(RAN1#119)**  For Rel-19 AI/ML based positioning, for Case 3b, in addition to path-based measurement that is referring to the measurement in the existing specifications (up to Rel-18), additionally support the following enhancement to the measurement,   * The measurement is composed of Nt’ values of the estimated channel response in time domain. The Nt’ values are selected from a list of Nt consecutive channel response values, which have timing granularity T. * The timing information for the Nt’ values are reported with a timing granularity T, where T=2kxTc. k represents the timing reporting granularity factor. Tc is the basic time unit for NR.   + The associated measurement (e.g., power if reported) corresponds to the measurement for the reported Nt’ values. * The timing information is defined relative to a reference time, same as the path-based measurement. * The Nt’ selected time domain channel measurement values are expected to be those with the highest power. * The starting time of the list of Nt consecutive values is determined as: starting time = first detected path rounded down with timing granularity T. * LMF can signal parameter values of Nt, Nt’, k to gNB via NRPPa. Candidate set values:   + Nt’<=24. FFS: Nt’ values.   + Nt = {32, 64, 128}   + FFS: k   + The gNB/TRP may use different Nt’, Nt and/or k values other than the signalled parameter for measurement reporting. In this case, it’s up to LMF implementation to process the reported measurement * FFS: whether transmit offset from gNB to LMF   Note: measurement by UE is a separate discussion.  Note: the purpose of the time domain channel measurements, such as for Rel-19 AI/ML based positioning, is not specified  Agreement **(RAN1#120)**  For Rel-19 AI/ML based positioning, for Case 3b, “FFS: k” in RAN1#119 agreement is resolved by supporting:   * k = {0…5}   Agreement **(RAN1#120)**  For Rel-19 AI/ML based positioning, for Case 3b, “FFS: Nt’ values” in RAN1#119 agreement is resolved by supporting:   * Nt’ = {8, 16, 24} |

For sample-based measurement configuration from LMF to gNB, we have the following analysis.

|  |  |  |
| --- | --- | --- |
| Configuration Parameters | Existing NRPPa | Analysis |
| ***k*** represents the timing reporting granularity factor. | Timing Reporting Granularity Factor INTEGER (0..5) | **Existing Timing Reporting Granularity Factor ca be reused for value k in sample-based measurement.** |
| ***Nt***represents the window size over which to select channel response values | No existing IE | **New** ***Channel Response Window Size* IE should be introduced** |
| ***Nt’*** represents the number of channel responses are selected from a list of Nt consecutive channel response values | No existing IE | **New *Channel Response* *Number* IE should be introduced** |

**Proposal 1, RAN3 agrees the following enhancements to support sample-based measurement configuration:**

**- introduce new *Channel Response Window Size* IE and *Channel Response Number* IE in TRP Measurement Quantities Item**

# 2 TP to 38.455 (support of case 3b)

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9.1.4.1 MEASUREMENT REQUEST

This message is sent by the LMF to request the NG-RAN node to configure a positioning measurement.

Direction: LMF → NG-RAN node.

| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| --- | --- | --- | --- | --- | --- | --- |
| Message Type | M |  | 9.2.3 |  | YES | reject |
| NRPPa Transaction ID | M |  | 9.2.4 |  | - |  |
| LMF Measurement ID | M |  | INTEGER (1..65536, …) |  | YES | reject |
| **TRP Measurement Request List** |  | *1* |  |  | YES | reject |
| **>TRP Measurement Request Item** |  | *1..<maxnoofMeasTRPs>* |  |  | - |  |
| >>TRP ID | M |  | 9.2.24 |  | - |  |
| >>Search Window Information | O |  | 9.2.26 |  | - |  |
| >>Cell ID | O |  | NR CGI  9.2.9 | The Cell ID of the TRP identified by the *TRP ID* IE. | YES | ignore |
| >>AoA Search Window Information | O |  | UL-AoA Assistance Information 9.2.66 |  | YES | ignore |
| >>Number of TRP Rx TEGs | O |  | ENUMERATED (2, 3, 4, 6, 8, …) |  | YES | ignore |
| >>Number of TRP RxTx TEGs | O |  | ENUMERATED (2, 3, 4, 6, 8, …) |  | YES | ignore |
| Report Characteristics | M |  | ENUMERATED (OnDemand, Periodic, ...) |  | YES | reject |
| Measurement Periodicity | C-ifReportCharacteristicsPeriodic |  | ENUMERATED (120ms, 240ms, 480ms, 640ms, 1024ms, 2048ms, 5120ms, 10240ms, 1min, 6min, 12min, 30min, 60min,…, 20480ms, 40960ms, extended) | The codepoint 120ms, 240ms, 480ms, 1024ms, 2048ms, 1min, 6min, 12min, 30min, and 60min are not applicable | YES | reject |
| **TRP Measurement Quantities** |  | *1* |  |  | YES | reject |
| **>TRP Measurement Quantities Item** |  | *1 .. <maxnoPosMeas>* |  |  | - |  |
| >>TRP Measurement Type | M |  | ENUMERATED (gNB-RxTxTimeDiff, UL-SRS-RSRP, UL-AoA, UL-RTOA,…, Multiple UL-AoA, UL SRS-RSRPP, UL-RSCP, Channel Response(FFS)) | The UL-RSCP measurement is applicable only when the UL-RTOA and/or gNB-RxTxTimeDiff measurement(s) is also requested. | - |  |
| >>Timing Reporting Granularity Factor | O |  | INTEGER (0..5) | Value (0..5) corresponds to (k0..k5)  TS 38.133 [16].  This IE is ignored when the Timing Reporting Granularity Factor Extended IE is included. | - |  |
| >>Timing Reporting Granularity Factor Extended | O |  | INTEGER (-6..-1, …) | Value -6 corresponds to kminus6, value -5 corresponds to kminus5 and so on, see  TS 38.133 [16] | - |  |
| >>Channel Response Window Size | FFS |  | ENUMERATED (32, 64, 128, …) | It represents the window size over which to select channel response values. | Yes | Ignore |
| >>Channel Response Number | FFS |  | ENUMERATED (8, 16, 24, …) | It represents the number of channel responses are selected over the channel response window size. | Yes | Ignore |
| SFN initialisation Time | O |  | Relative Time 1900  9.2.36 | If this IE is not present, the TRP may assume that the value is same as its own SFN initialisation time. | YES | ignore |
| SRS Configuration | O |  | 9.2.28 |  | YES | ignore |
| Measurement Beam Information Request | O |  | ENUMERATED (true,...) | This IE is ignored when the *Measurement Characteristics Request Indicator* IE is included. | YES | ignore |
| System Frame Number | O |  | INTEGER(0..1023) |  | YES | ignore |
| Slot Number | O |  | INTEGER(0..79) |  | YES | ignore |
| Measurement Periodicity Extended | C-ifMeasPerExt |  | ENUMERATED (160ms, 320ms, 1280ms, 2560ms, 61440ms, 81920ms, 368640ms, 737280ms, 1843200ms, …) |  | YES | reject |
| Response Time | O |  | 9.2.68 | This IE is ignored when the *Report Characteristics* IE is set to “periodic”. | YES | ignore |
| Measurement Characteristics Request Indicator | O |  | 9.2.81 |  | YES | ignore |
| Measurement Time Occasion | O |  | ENUMERATED (o1, o4, …) |  | YES | ignore |
| Measurement Amount | O |  | ENUMERATED (0, 1, 2, 4, 8, 16, 32, 64) | This IE is ignored if the *Report Characteristics* IE is set to ‘OnDemand’.  Value 0 represents an infinite number of periodic reporting. | YES | ignore |
| Time Window Information Measurement List | O |  | 9.2.91 |  | YES | ignore |

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### 9.3.5 Information Element definitions

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-- Information Element Definitions

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NRPPA-IEs {

itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)

ngran-access (22) modules (3) nrppa (4) version1 (1) nrppa-IEs (2) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS

id-MeasurementQuantities-Item,

id-CGI-NR,

id-SFNInitialisationTime-NR,

id-GeographicalCoordinates,

id-ResultSS-RSRP,

id-ResultSS-RSRQ,

id-ResultCSI-RSRP,

id-ResultCSI-RSRQ,

id-AngleOfArrivalNR,

id-ResultNR,

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id-SCS-SpecificCarrier,

id-MeasBasedOnAggregatedResources,

id-UEReportingInterval-milliseconds,

id-ChannelResponseWindowSize,

id-ChannelResponseNumber

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CGI-NR ::= SEQUENCE {

pLMN-Identity PLMN-Identity,

nRcellIdentifier NRCellIdentifier,

iE-Extensions ProtocolExtensionContainer { {CGI-NR-ExtIEs} } OPTIONAL,

...

}

CGI-NR-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {

...

}

ChannelResponseWindowSize ::= ENUMERATED { 32, 64, 128, ... }

ChannelResponseNumber ::= ENUMERATED { 8, 16, 24, ... }

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TRPMeasurementQuantities ::= SEQUENCE (SIZE (1..maxnoPosMeas)) OF TRPMeasurementQuantitiesList-Item

TRPMeasurementQuantitiesList-Item ::= SEQUENCE {

tRPMeasurementQuantities-Item TRPMeasurementType,

timingReportingGranularityFactor INTEGER (0..5) OPTIONAL,

iE-Extensions ProtocolExtensionContainer {{ TRPMeasurementQuantitiesList-Item-ExtIEs}} OPTIONAL,

...

}

TRPMeasurementQuantitiesList-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {

{ID id-TimingReportingGranularityFactorExtended CRITICALITY ignore EXTENSION TimingReportingGranularityFactorExtended PRESENCE optional}|

{ID id-ChannelResponseWindowSize CRITICALITY ignore EXTENSION ChannelResponseWindowSize PRESENCE FFS}|

{ID id-ChannelResponseNumber CRITICALITY ignore EXTENSION ChannelResponseNumber PRESENCE FFS},

...

}

TRPMeasurementType::= ENUMERATED {

gNB-RxTxTimeDiff,

uL-SRS-RSRP,

uL-AoA,

uL-RTOA,

...,

multiple-UL-AoA,

uL-SRS-RSRPP,

ul-RSCP,

channel-Response(FFS)

}

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9.3.7 Constant definitions

-- ASN1START

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- Constant definitions

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-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

NRPPA-Constants {

itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)

ngran-access (22) modules (3) nrppa (4) version1 (1) nrppa-Constants (4) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS

ProcedureCode,

ProtocolIE-ID

FROM NRPPA-CommonDataTypes;

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

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-- Elementary Procedures

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-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

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id-PointA ProtocolIE-ID ::= 154

id-NR-PCI ProtocolIE-ID ::= 155

id-SCS-SpecificCarrier ProtocolIE-ID ::= 156

id-MeasBasedOnAggregatedResources ProtocolIE-ID ::= 157

id-UEReportingInterval-milliseconds ProtocolIE-ID ::= 158

id-ChannelResponseWindowSize ProtocolIE-ID ::= XX1

id-ChannelResponseNumber ProtocolIE-ID ::= XX2

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