3GPP TSG-RAN WG3 Meeting #115-e R3-222561

Online, February 21st – March 3rd, 2022

**Agenda item: 21.2**

**Source: Nokia, Nokia Shanghai Bell**

**Title: (TP for NR\_IIOT\_URLLC\_enh BL CR for TS 38.473) Time synchronization: resolution of F1AP open issues**

**Document for: Discussion and Decision**

# 1 Introduction

This TP for NRPPa to capture the following agreement from CB # NRIIOT2\_PDC:

**For RTT-based PDC, PD pre-compensation is performed by the gNB-CU.**

**Introduce a new UE-associated class 1 procedure (CU-initiated) and a new UE-associated class 2 procedure (DU-initiated) to support both RTT-based PDC and TA-based PDC.**

**For RTT-based PDC, gNB-DU reports gNB Rx-Tx time difference to gNB-CU.**

**For TA-based PDC, gNB-DU reports NR Timing Advance (meaning PD pre-compensation is performed by the gNB-CU) to gNB-CU.**

# Text Proposal for TS 38.473

*Start of Text Proposal for TS 38.473*

## 3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply.
An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

5GC 5G Core Network

5QI 5G QoS Identifier

AMF Access and Mobility Management Function

ARP Antenna Reference Point

ARPI Additional RRM Policy Index

BH Backhaul

CAG Closed Access Group

CN Core Network

CG Cell Group

CGI Cell Global Identifier

CHO Conditional Handover

CP Control Plane

CPC Conditional PSCell Change

DAPS Dual Active Protocol Stack

DL Downlink

DL-PRS Downlink Positioning Reference Signal

EN-DC E-UTRA-NR Dual Connectivity

EPC Evolved Packet Core

IAB Integrated Access and Backhaul

IMEISV International Mobile station Equipment Identity and Software Version number

LMF Location Management Function

NID Network Identifier

NPN Non-Public Network

NSSAI Network Slice Selection Assistance Information

PDC Propagation Delay Compensation

posSIB Positioning SIB

PNI-NPN Public Network Integrated NPN

RANAC RAN Area Code

RIM Remote Interference Management

RIM-RS RIM Reference Signal

RRC Radio Resource Control

RSRP Reference Signal Received Power

SNPN Stand-alone Non-Public Network

S-NSSAI Single Network Slice Selection Assistance Information

SUL Supplementary Uplink

TAC Tracking Area Code

TAI Tracking Area Identity

TRP Transmission-Reception Point

UL-AoA Uplink Angle of Arrival

UL-RTOA Uplink Relative Time of Arrival

UL-SRS Uplink Sounding Reference Signal

Z-AoA Zenith Angles of Arrival

*Next Change*

## 8.1 List of F1AP Elementary procedures

In the following tables, all EPs are divided into Class 1 and Class 2 EPs (see subclause 3.1 for explanation of the different classes):

Table 1: Class 1 procedures

|  |  |  |  |
| --- | --- | --- | --- |
| Elementary Procedure | Initiating Message | Successful Outcome | Unsuccessful Outcome |
| Response message | Response message |
| Reset | RESET | RESET ACKNOWLEDGE |  |
| F1 Setup | F1 SETUP REQUEST | F1 SETUP RESPONSE | F1 SETUP FAILURE |
| gNB-DU Configuration Update | GNB-DU CONFIGURATION UPDATE | GNB-DU CONFIGURATION UPDATE ACKNOWLEDGE | GNB-DU CONFIGURATION UPDATE FAILURE |
| gNB-CU Configuration Update | GNB-CU CONFIGURATION UPDATE | GNB-CU CONFIGURATION UPDATE ACKNOWLEDGE | GNB-CU CONFIGURATION UPDATE FAILURE |
| UE Context Setup | UE CONTEXT SETUP REQUEST | UE CONTEXT SETUP RESPONSE | UE CONTEXT SETUP FAILURE |
| UE Context Release (gNB-CU initiated) | UE CONTEXT RELEASE COMMAND | UE CONTEXT RELEASE COMPLETE |  |
| UE Context Modification (gNB-CU initiated) | UE CONTEXT MODIFICATION REQUEST | UE CONTEXT MODIFICATION RESPONSE | UE CONTEXT MODIFICATION FAILURE |
| UE Context Modification Required (gNB-DU initiated) | UE CONTEXT MODIFICATION REQUIRED | UE CONTEXT MODIFICATION CONFIRM | UE CONTEXT MODIFICATION REFUSE |
| Write-Replace Warning  | WRITE-REPLACE WARNING REQUEST | WRITE-REPLACE WARNING RESPONSE |  |
| PWS Cancel | PWS CANCEL REQUEST | PWS CANCEL RESPONSE |  |
| gNB-DU Resource Coordination | GNB-DU RESOURCE COORDINATION REQUEST | GNB-DU RESOURCE COORDINATION RESPONSE |  |
| F1 Removal | F1 REMOVAL REQUEST | F1 REMOVAL RESPONSE | F1 REMOVAL FAILURE |
| BAP Mapping Configuration | BAP MAPPING CONFIGURATION  | BAP MAPPING CONFIGURATION ACKNOWLEDGE | BAP MAPPING CONFIGURATION FAILURE |
| GNB-DU Resource Configuration | GNB-DU RESOURCE CONFIGURATION | GNB-DU RESOURCE CONFIGURATION ACKNOWLEDGE | GNB-DU RESOURCE CONFIGURATION FAILURE |
| IAB TNL Address Allocation | IAB TNL ADDRESS REQUEST | IAB TNL ADDRESS RESPONSE | IAB TNL ADDRESS FAILURE |
| IAB UP Configuration Update | IAB UP CONFIGURATION UPDATE REQUEST | IAB UP CONFIGURATION UPDATE RESPONSE | IAB UP CONFIGURATION UPDATE FAILURE |
| Resource Status Reporting Initiation | RESOURCE STATUS REQUEST | RESOURCE STATUS RESPONSE | RESOURCE STATUS FAILURE |
| Positioning Measurement | POSITIONING MEASUREMENT REQUEST | POSITIONING MEASUREMENT RESPONSE | POSITIONING MEASUREMENT FAILURE |
| Positioning Information Exchange | POSITIONING INFORMATION REQUEST | POSITIONING INFORMATION RESPONSE | POSITIONING INFORMATION FAILURE |
| TRP Information Exchange | TRP INFORMATION REQUEST | TRP INFORMATION RESPONSE | TRP INFORMATION FAILURE |
| Positioning Activation | POSITIONING ACTIVATION REQUEST | POSITIONING ACTIVATION RESPONSE | POSITIONING ACTIVATION FAILURE |
| E-CID Measurement Initiation | E-CID MEASUREMENT INITIATION REQUEST | E-CID MEASUREMENT INITIATION RESPONSE | E-CID MEASUREMENT INITIATION FAILURE |
| PDC Measurement Initiation | PDC MEASUREMENT INITIATION REQUEST | PDC MEASUREMENT INITIATION RESPONSE | PDC MEASUREMENT INITIATION FAILURE |

Table 2: Class 2 procedures

|  |  |
| --- | --- |
| Elementary Procedure | Message |
| Error Indication | ERROR INDICATION |
| UE Context Release Request (gNB-DU initiated) | UE CONTEXT RELEASE REQUEST |
| Initial UL RRC Message Transfer | INITIAL UL RRC MESSAGE TRANSFER |
| DL RRC Message Transfer | DL RRC MESSAGE TRANSFER |
| UL RRC Message Transfer | UL RRC MESSAGE TRANSFER |
| UE Inactivity Notification  | UE INACTIVITY NOTIFICATION |
| System Information Delivery | SYSTEM INFORMATION DELIVERY COMMAND |
| Paging | PAGING |
| Notify | NOTIFY |
| PWS Restart Indication | PWS RESTART INDICATION |
| PWS Failure Indication | PWS FAILURE INDICATION |
| gNB-DU Status Indication | GNB-DU STATUS INDICATION |
| RRC Delivery Report | RRC DELIVERY REPORT |
| Network Access Rate Reduction | NETWORK ACCESS RATE REDUCTION |
| Trace Start | TRACE START |
| Deactivate Trace | DEACTIVATE TRACE |
| DU-CU Radio Information Transfer | DU-CU RADIO INFORMATION TRANSFER |
| CU-DU Radio Information Transfer | CU-DU RADIO INFORMATION TRANSFER |
| Resource Status Reporting | RESOURCE STATUS UPDATE |
| Access And Mobility Indication | ACCESS AND MOBILITY INDICATION |
| Reference Time Information Reporting Control | REFERENCE TIME INFORMATION REPORTING CONTROL |
| Reference Time Information Report | REFERENCE TIME INFORMATION REPORT |
| Access Success | ACCESS SUCCESS |
| Cell Traffic Trace | CELL TRAFFIC TRACE |
| Positioning Assistance Information Control | POSITIONING ASSISTANCE INFORMATION CONTROL |
| Positioning Assistance Information Feedback | POSITIONING ASSISTANCE INFORMATION FEEDBACK |
| Positioning Measurement Report | POSITIONING MEASUREMENT REPORT |
| Positioning Measurement Abort | POSITIONING MEASUREMENT ABORT |
| Positioning Measurement Failure Indication | POSITIONING MEASUREMENT FAILURE INDICATION |
| Positioning Measurement Update | POSITIONING MEASUREMENT UPDATE |
| Positioning Deactivation | POSITIONING DEACTIVATION |
| E-CID Measurement Failure Indication | E-CID MEASUREMENT FAILURE INDICATION |
| E-CID Measurement Report | E-CID MEASUREMENT REPORT |
| E-CID Measurement Termination | E-CID MEASUREMENT TERMINATION COMMAND |
| Positioning Information Update | POSITIONING INFORMATION UPDATE |
| PDC Measurement Report | PDC MEASUREMENT REPORT |

*Next Change*

## 8.x PDC Measurement Reporting procedures

### 8.x.1 PDC Measurement Initiation

#### 8.x.1.1 General

The purpose of the PDC Measurement Initiation procedure is to enable the gNB-CU to request the gNB-DU to report measurements used for propagation delay compensation at the gNB-CU or UE. The procedure uses UE-associated signalling.

#### 8.x.1.2 Successful Operation



Figure 8.12.x.2-1: PDC Measurement Initiation procedure, successful operation

The gNB-CU initiates the procedure by sending a PDC MEASUREMENT INITIATION REQUEST message. If the gNB-DU is able to initiate the requested PDC measurements, it shall reply with the PDC MEASUREMENT INITIATION RESPONSE message.

If the *PDC Report Type* IE is set to "OnDemand", the gNB-DU shall return the result of the measurement in the PDC MEASUREMENT INITIATION RESPONSE message including the *PDC Measurement Result* IE, and the gNB-CU shall consider that the PDC measurements for the UE have been terminated by the gNB-DU.

**Interaction with the PDC Measurement Report procedure:**

If the *PDC Report Type* IE is set to "Periodic", the gNB-DU shall initiate the requested measurements and shall reply with the PDC MEASUREMENT INITIATION RESPONSE message without including the *PDC Measurement Result* IE in this message. The gNB-DU shall then periodically initiate the PDC Measurement Report procedure for the measurements, with the requested reporting periodicity.

#### 8.x.1.3 Unsuccessful Operation



Figure 8.12.x.3-1: PDC Measurement Initiation procedure, unsuccessful operation

If the gNB-DU is not able to initiate at least one of the requested PDC measurements, the gNB-DU shall respond with a PDC MEASUREMENT INITIATION FAILURE message.

### 8.x.2 PDC Measurement Report

#### 8.x.2.1 General

The purpose of the PDC Measurement Report procedure is for the gNB-DU to provide the PDC measurements for the UE to the gNB-CU. The procedure uses UE-associated signalling.

#### 8.x.2.2 Successful Operation



Figure 8.12.y.2-1: PDC Measurement Report procedure, successful operation

The gNB-DU initiates the procedure by sending a PDC MEASUREMENT REPORT message. The PDC MEASUREMENT REPORT message contains the PDC measurement results according to the measurement configuration in the respective PDC MEASUREMENT INITIATION REQUEST message.

#### 8.x.2.3 Unsuccessful Operation

Not applicable.

*Next Change*

### 9.2.x PDC Measurement Reporting messages

#### 9.2.x.1 PDC MEASUREMENT INITIATION REQUEST

This message is sent by gNB-CU to initiate PDC measurements.

Direction: gNB-CU → gNB-DU.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| Message Type | M |  | 9.3.1.1 |  | YES | reject |
| gNB-CU UE F1AP ID | M |  | 9.3.1.4 |  | YES | reject |
| gNB-DU UE F1AP ID | M |  | 9.3.1.5 |  | YES | reject |
| RAN UE PDC Measurement ID | M |  | INTEGER (1..16, …) |  | YES | reject |
| PDC Report Type | M |  | ENUMERATED (OnDemand, Periodic, …) |  | YES | reject |
| PDC Measurement Periodicity | C-ifReportTypePeriodic |  | ENUMERATED (120ms, 240ms, 480ms, 640ms, 1024ms, 2048ms, 5120ms, 10240ms, 20480ms, 40960ms, 1min, 6min, 12min, 30min, …) |  | YES | reject |
| **PDC Measurement Quantities** |  | *1 .. <maxnoMeasPDC>* |  |  | EACH | reject |
| >PDC Measurement Quantities Item | M |  | ENUMERATED (NR PDC TADV, gNB RX-TX, …) |  | - |  |

|  |  |
| --- | --- |
| Range bound | Explanation |
| maxnoMeasPDC | Maximum no. of PDC measured quantities that can be configured and reported with one message. Value is 16. Maximum is 1 in this release. |

|  |  |
| --- | --- |
| Condition | Explanation |
| ifReportTypePeriodic | This IE shall be present if the *PDC Report Type* IE is set to the value "Periodic". |

#### 9.2.x.2 PDC MEASUREMENT INITIATION RESPONSE

This message is sent by gNB-DU to indicate that the requested PDC measurement is successfully initiated.

Direction: gNB-DU → gNB-CU.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| Message Type | M |  | 9.3.1.1 |  | YES | reject |
| gNB-CU UE F1AP ID | M |  | 9.3.1.4 |  | YES | reject |
| gNB-DU UE F1AP ID | M |  | 9.3.1.5 |  | YES | reject |
| RAN UE PDC Measurement ID | M |  | INTEGER (1..16, …) |  | YES | reject |
| PDC Measurement Result | O |  | 9.3.1.y1 |  | YES | ignore |
| Criticality Diagnostics | O |  | 9.3.1.3 |  | YES | ignore |

#### 9.2.x.3 PDC MEASUREMENT INITIATION FAILURE

This message is sent by gNB-DU to indicate that the requested PDC measurement cannot be initiated.

Direction: gNB-DU → gNB-CU.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| Message Type | M |  | 9.3.1.1 |  | YES | reject |
| gNB-CU UE F1AP ID | M |  | 9.3.1.4 |  | YES | reject |
| gNB-DU UE F1AP ID | M |  | 9.3.1.5 |  | YES | reject |
| Cause | M |  | 9.3.1.2 |  | YES | ignore |
| Criticality Diagnostics | O |  | 9.3.1.3 |  | YES | ignore |

#### 9.2.x.4 PDC MEASUREMENT REPORT

This message is sent by gNB-DU to report the results of the requested PDC measurement.

Direction: gNB-DU → gNB-CU.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| Message Type | M |  | 9.3.1.1 |  | YES | ignore |
| gNB-CU UE F1AP ID | M |  | 9.3.1.4 |  | YES | reject |
| gNB-DU UE F1AP ID | M |  | 9.3.1.5 |  | YES | reject |
| RAN UE PDC Measurement ID | M |  | INTEGER (1..16, …) |  | YES | reject |
| PDC Measurement Result | M |  | 9.3.1.y1 |  | YES | ignore |

*Next Change*

#### 9.3.1.y1 PDC Measurement Result

The purpose of this IE is to provide the PDC measurement result.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description |
| **PDC Measured Results List** |  | *1* |  |  |
| **>PDC Measured Results Item** |  | *1 .. <maxnoMeasPDC>* |  |  |
| >>CHOICE *Measured Results Value* | M |  |  |  |
| >>>NR PDC Timing Advance | M |  | INTEGER (0..62500, …) | Value is expressed in unit of [64\*] ns (FFS) |
| >>>gNB Rx-Tx Time Difference | M |  | 9.3.1.170 |  |
|  |  |  |  |  |

|  |  |
| --- | --- |
| Range bound | Explanation |
| maxnoMeasPDC | Maximum no. of measured quantities that can be configured and reported with one message. Value is 16. |

*Next Change*

###

### 9.4.3 Elementary Procedure Definitions

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 E-CIDMeasurementInitiationRequest,

 E-CIDMeasurementInitiationResponse,

 E-CIDMeasurementInitiationFailure,

 E-CIDMeasurementFailureIndication,

 E-CIDMeasurementReport,

 E-CIDMeasurementTerminationCommand,

 PDCMeasurementInitiationRequest,

 PDCMeasurementInitiationResponse,

 PDCMeasurementInitiationFailure,

 PDCMeasurementReport

\*\* unchanged text skipped \*\*

 id-E-CIDMeasurementInitiation,

 id-E-CIDMeasurementFailureIndication,

 id-E-CIDMeasurementReport,

 id-E-CIDMeasurementTermination,

 id-PDCMeasurementInitiationRequest,

 id-PDCMeasurementInitiationResponse,

 id-PDCMeasurementInitiationFailure,

 id-PDCMeasurementReport

\*\* unchanged text skipped \*\*

F1AP-ELEMENTARY-PROCEDURES-CLASS-1 F1AP-ELEMENTARY-PROCEDURE ::= {

 reset |

 f1Setup |

 gNBDUConfigurationUpdate |

 gNBCUConfigurationUpdate |

 uEContextSetup |

 uEContextRelease |

 uEContextModification |

 uEContextModificationRequired |

 writeReplaceWarning |

 pWSCancel |

 gNBDUResourceCoordination |

 f1Removal |

 bAPMappingConfiguration |

 gNBDUResourceConfiguration |

 iABTNLAddressAllocation |

 iABUPConfigurationUpdate |

 resourceStatusReportingInitiation |

 positioningMeasurementExchange |

 tRPInformationExchange |

 positioningInformationExchange |

 positioningActivation |

 e-CIDMeasurementInitiation |

 pDCMeasurementInitiation,

 ...

}

F1AP-ELEMENTARY-PROCEDURES-CLASS-2 F1AP-ELEMENTARY-PROCEDURE ::= {

 errorIndication |

 uEContextReleaseRequest |

 dLRRCMessageTransfer |

 uLRRCMessageTransfer |

 uEInactivityNotification |

 privateMessage |

 initialULRRCMessageTransfer |

 systemInformationDelivery |

 paging |

 notify |

 pWSRestartIndication |

 pWSFailureIndication |

 gNBDUStatusIndication |

 rRCDeliveryReport |

 networkAccessRateReduction |

 traceStart |

 deactivateTrace |

 dUCURadioInformationTransfer |

 cUDURadioInformationTransfer |

 resourceStatusReporting |

 accessAndMobilityIndication |

 referenceTimeInformationReportingControl|

 referenceTimeInformationReport |

 accessSuccess |

 cellTrafficTrace |

 positioningAssistanceInformationControl |

 positioningAssistanceInformationFeedback |

 positioningMeasurementReport |

 positioningMeasurementAbort |

 positioningMeasurementFailureIndication |

 positioningMeasurementUpdate |

 positioningDeactivation |

 e-CIDMeasurementFailureIndication |

 e-CIDMeasurementReport |

 e-CIDMeasurementTermination |

 positioningInformationUpdate |

 pDCMeasurementReport,

 ...

}

\*\* unchanged text skipped \*\*

positioningInformationUpdate F1AP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE PositioningInformationUpdate

 PROCEDURE CODE id-PositioningInformationUpdate

 CRITICALITY ignore

}

pDCMeasurementInitiation F1AP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE PDCMeasurementInitiationRequest

 SUCCESSFUL OUTCOME PDCMeasurementInitiationResponse

 UNSUCCESSFUL OUTCOME PDCMeasurementInitiationFailure

 PROCEDURE CODE id-PDCMeasurementInitiation

 CRITICALITY reject

}

pDCMeasurementReport F1AP-ELEMENTARY-PROCEDURE ::= {

 INITIATING MESSAGE PDCMeasurementReport

 PROCEDURE CODE id-PDCMeasurementReport

 CRITICALITY ignore

}

*Next Change*

### 9.4.4 PDU Definitions

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 SpatialRelationPerSRSResource,

 PDCMeasurementPeriodicity,

 PDCMeasurementQuantities

 PDCMeasurementResult,

 PDCReportType,

 RAN-UE-PDC-MeasID

\*\* unchanged text skipped \*\*

 id-SRSSpatialRelationPerSRSResource,

 id-PDCMeasurementPeriodicity,

 id-PDCMeasurementQuantities,

 id-PDCMeasurementResult,

 id-PDCReportType,

 id-RAN-UE-PDC-MeasID,

 maxCellingNBDU,

\*\* unchanged text skipped \*\*

E-CIDMeasurementTerminationCommand ::= SEQUENCE {

 protocolIEs ProtocolIE-Container {{E-CIDMeasurementTerminationCommand-IEs}},

 ...

}

E-CIDMeasurementTerminationCommand-IEs F1AP-PROTOCOL-IES ::= {

 { ID id-gNB-CU-UE-F1AP-ID CRITICALITY reject TYPE GNB-CU-UE-F1AP-ID PRESENCE mandatory }|

 { ID id-gNB-DU-UE-F1AP-ID CRITICALITY reject TYPE GNB-DU-UE-F1AP-ID PRESENCE mandatory }|

 { ID id-LMF-UE-MeasurementID CRITICALITY reject TYPE LMF-UE-MeasurementID PRESENCE mandatory }|

 { ID id-RAN-UE-MeasurementID CRITICALITY reject TYPE RAN-UE-MeasurementID PRESENCE mandatory },

 ...

}

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

--

-- PDC MEASUREMENT PROCEDURE

--

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

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

--

-- PDC Measurement Initiation Request

--

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

PDCMeasurementInitiationRequest ::= SEQUENCE {

 protocolIEs ProtocolIE-Container {{PDCMeasurementInitiationRequest-IEs}},

 ...

}

PDCMeasurementInitiationRequest-IEs F1AP-PROTOCOL-IES ::= {

 { ID id-gNB-CU-UE-F1AP-ID CRITICALITY reject TYPE GNB-CU-UE-F1AP-ID PRESENCE mandatory }|

 { ID id-gNB-DU-UE-F1AP-ID CRITICALITY reject TYPE GNB-DU-UE-F1AP-ID PRESENCE mandatory }|

 { ID id-RAN-UE-PDC-MeasID CRITICALITY reject TYPE RAN-UE-PDC-MeasID PRESENCE mandatory }|

 { ID id-PDCReportType CRITICALITY reject TYPE PDCReportType PRESENCE mandatory }|

 { ID id-PDCMeasurementPeriodicity CRITICALITY reject TYPE PDCMeasurementPeriodicity PRESENCE conditional }|

-- The above IE shall be present if the PDCReportType IE is set to “periodic” –-

 { ID id-PDCMeasurementQuantities CRITICALITY reject TYPE PDCMeasurementQuantities PRESENCE mandatory },

 ...

}

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

--

-- PDC Measurement Initiation Response

--

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

PDCMeasurementInitiationResponse ::= SEQUENCE {

 protocolIEs ProtocolIE-Container {{PDCMeasurementInitiationResponse-IEs}},

 ...

}

PDCMeasurementInitiationResponse-IEs F1AP-PROTOCOL-IES ::= {

 { ID id-gNB-CU-UE-F1AP-ID CRITICALITY reject TYPE GNB-CU-UE-F1AP-ID PRESENCE mandatory }|

 { ID id-gNB-DU-UE-F1AP-ID CRITICALITY reject TYPE GNB-DU-UE-F1AP-ID PRESENCE mandatory }|

 { ID id-RAN-UE-PDC-MeasID CRITICALITY reject TYPE RAN-UE-PDC-MeasID PRESENCE mandatory }|

 { ID id-PDCMeasurementResult CRITICALITY ignore TYPE PDCMeasurementResult PRESENCE optional }|

 { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },

 ...

}

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

--

-- PDC Measurement Initiation Failure

--

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

PDCMeasurementInitiationFailure ::= SEQUENCE {

 protocolIEs ProtocolIE-Container {{PDCMeasurementInitiationFailure-IEs}},

 ...

}

PDCMeasurementInitiationFailure-IEs F1AP-PROTOCOL-IES ::= {

 { ID id-gNB-CU-UE-F1AP-ID CRITICALITY reject TYPE GNB-CU-UE-F1AP-ID PRESENCE mandatory }|

 { ID id-gNB-DU-UE-F1AP-ID CRITICALITY reject TYPE GNB-DU-UE-F1AP-ID PRESENCE mandatory }|

 { ID id-Cause CRITICALITY ignore TYPE Cause PRESENCE mandatory }|

 { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },

 ...

}

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

--

-- PDC MEASUREMENT REPORT PROCEDURE

--

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

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

--

-- PDC Measurement Report

--

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

PDCMeasurementReport ::= SEQUENCE {

 protocolIEs ProtocolIE-Container {{PDCMeasurementReport-IEs}},

 ...

}

PDCMeasurementReport-IEs F1AP-PROTOCOL-IES ::= {

 { ID id-gNB-CU-UE-F1AP-ID CRITICALITY reject TYPE GNB-CU-UE-F1AP-ID PRESENCE mandatory }|

 { ID id-gNB-DU-UE-F1AP-ID CRITICALITY reject TYPE GNB-DU-UE-F1AP-ID PRESENCE mandatory }|

 { ID id-RAN-UE-PDC-MeasID CRITICALITY reject TYPE RAN-UE-PDC-MeasID PRESENCE mandatory }|

 { ID id-PDCMeasurementResult CRITICALITY ignore TYPE PDCMeasurementResult PRESENCE mandatory },

 ...

}

END

-- ASN1STOP

*Next Change*

### 9.4.5 Information Element Definitions

\*\* unchanged text skipped \*\*

 id-SRSSpatialRelationPerSRSResource,

 id-PDCMeasurementQuantities-Item,

 maxNRARFCN,

 maxnoofErrors,

 maxnoofBPLMNs,

 maxnoofBPLMNsNR,

 maxnoofDLUPTNLInformation,

 maxnoofNrCellBands,

 maxnoofULUPTNLInformation,

 maxnoofQoSFlows,

 maxnoofSliceItems,

 maxnoofSIBTypes,

 maxnoofSITypes,

 maxCellineNB,

 maxnoofExtendedBPLMNs,

 maxnoofAdditionalSIBs,

 maxnoofUACPLMNs,

 maxnoofUACperPLMN,

 maxCellingNBDU,

 maxnoofTLAs,

 maxnoofGTPTLAs,

 maxnoofslots,

 maxnoofNonUPTrafficMappings,

 maxnoofServingCells,

 maxnoofServedCellsIAB,

 maxnoofChildIABNodes,

 maxnoofIABSTCInfo,

 maxnoofSymbols,

 maxnoofDUFSlots,

 maxnoofHSNASlots,

 maxnoofEgressLinks,

 maxnoofMappingEntries,

 maxnoofDSInfo,

 maxnoofQoSParaSets,

 maxnoofPC5QoSFlows,

 maxnoofSSBAreas,

 maxnoofNRSCSs,

 maxnoofPhysicalResourceBlocks,

 maxnoofPhysicalResourceBlocks-1,

 maxnoofPRACHconfigs,

 maxnoofRACHReports,

 maxnoofRLFReports,

 maxnoofAdditionalPDCPDuplicationTNL,

 maxnoofRLCDuplicationState,

 maxnoofCHOcells,

 maxnoofMDTPLMNs,

 maxnoofCAGsupported,

 maxnoofNIDsupported,

 maxnoofExtSliceItems,

 maxnoofPosMeas,

 maxnoofTRPInfoTypes,

 maxnoofSRSTriggerStates,

 maxnoofSpatialRelations,

 maxnoBcastCell,

 maxnoofTRPs,

 maxnoofAngleInfo,

 maxnooflcs-gcs-translation,

 maxnoofPath,

 maxnoofMeasE-CID,

 maxnoofSSBs,

 maxnoSRS-ResourceSets,

 maxnoSRS-ResourcePerSet,

 maxnoSRS-Carriers,

 maxnoSCSs,

 maxnoSRS-Resources,

 maxnoSRS-PosResources,

 maxnoSRS-PosResourceSets,

 maxnoSRS-PosResourcePerSet,

 maxnoofPRS-ResourceSets,

 maxnoofPRS-ResourcesPerSet,

 maxNoOfMeasTRPs,

 maxnoofPRSresourceSets,

 maxnoofPRSresources,

 maxnoofMeasPDC

\*\* unchanged text skipped \*\*

PDCMeasurementPeriodicity ::= ENUMERATED

{ms120, ms240, ms480, ms640, ms1024, ms2048, ms5120, ms10240, ms20480, ms40960, min1, min6, min12, min30, ...}

PDCMeasurementQuantities ::= SEQUENCE (SIZE (1.. maxnoofMeasPDC)) OF ProtocolIE-SingleContainer { {PDCMeasurementQuantities-ItemIEs} }

PDCMeasurementQuantities-ItemIEs F1AP-PROTOCOL-IES ::= {

 { ID id-PDCMeasurementQuantities-Item CRITICALITY reject TYPE PDCMeasurementQuantities-Item PRESENCE mandatory}

}

PDCMeasurementQuantities-Item ::= SEQUENCE {

 PDCmeasurementQuantitiesValue PDCMeasurementQuantitiesValue,

 iE-Extensions ProtocolExtensionContainer { { PDCMeasurementQuantitiesValue-ExtIEs} } OPTIONAL

}

PDCMeasurementQuantitiesValue-ExtIEs F1AP-PROTOCOL-EXTENSION ::= {

 ...

}

PDCMeasurementQuantitiesValue ::= ENUMERATED {

 nr-pdc-tadv,

 gNB-rx-tx,

 ...

}

PDCMeasurementResult ::= SEQUENCE {

 pDCMeasuredResultsList PDCMeasuredResultsList,

 iE-Extensions ProtocolExtensionContainer { { PDCMeasurementResult-ExtIEs} } OPTIONAL

}

PDCMeasurementResult-ExtIEs F1AP-PROTOCOL-EXTENSION ::= {

 ...

}

PDCMeasuredResultsList ::= SEQUENCE (SIZE(1..maxnoofMeasPDC)) OF PDCMeasuredResults-Item

PDCMeasuredResults-Item ::= SEQUENCE {

 PDCMeasuredResults-Value PDCMeasuredResults-Value,

 iE-Extensions ProtocolExtensionContainer {{ PDCMeasuredResults-Item-ExtIEs }} OPTIONAL

}

PDCMeasuredResults-Item-ExtIEs F1AP-PROTOCOL-EXTENSION ::= {

 ...

}

PDCMeasuredResults-Value ::= CHOICE {

 pDC-TADV-NR PDC-TADV-NR,

 rxTxTimeDiff GNBRxTxTimeDiffMeas,

 choice-extension ProtocolIE-SingleContainer { { PDCMeasuredResults-Value-ExtIEs} }

}

PDCMeasuredResults-Value-ExtIEs F1AP-PROTOCOL-IES ::= {

 ...

}

PDCReportType ::= ENUMERATED {

 onDemand,

 periodic,

 ...

}

PDC-TADV-NR ::= INTEGER (0..62500, ...)

\*\* unchanged text skipped \*\*

RAN-UE-MeasurementID ::= INTEGER (1.. 256, ...)

RAN-UE-PDC-MeasID ::= INTEGER (1..16, ...)

*Next Change*

### 9.4.7 Constant Definitions

\*\* unchanged text skipped \*\*

id-ReferenceTimeInformationReportingControl ProcedureCode ::= 58

id-PDCMeasurementInitiation ProcedureCode ::= x1

id-PDCMeasurementReport ProcedureCode ::= x2

\*\* unchanged text skipped \*\*

maxnoofPRSresources INTEGER ::= 64

maxnoofMeasPDC INTEGER ::= 16

\*\* unchanged text skipped \*\*

id-SRSSpatialRelationPerSRSResource ProtocolIE-ID ::= 435

id-PDCMeasurementPeriodicity ProtocolIE-ID ::= xx1

id-PDCMeasurementQuantities ProtocolIE-ID ::= xx2

id-PDCMeasurementQuantities-Item ProtocolIE-ID ::= xx3

id-PDCMeasurementResult ProtocolIE-ID ::= xx4

id-PDCReportType ProtocolIE-ID ::= xx5

id-RAN-UE-PDC-MeasID ProtocolIE-ID ::= xx6

*End of Text Proposal for TS 38.473*