**3GPP TSG-SA5 Meeting #158 *S5-247173***

**Orlando, United States, 18th Nov 2024 - 22nd Nov 2024**

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **28.312** | **CR** | **0256** | **rev** | **1** | **Current version:** | **18.5.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **X** | Core Network |  |

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| ***Title:*** | Rel-19 CR TS 28.312 Enhance the use case and solution to support RAN energy saving scenario | | | | | | | | | |
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| ***Source to WG:*** | Huawei, Deutsche Telekom | | | | | | | | | |
| ***Source to TSG:*** | S5 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | DUMMY | | | | |  | ***Date:*** | | | 2024-11-04 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-19 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
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| ***Reason for change:*** | | The use case, requirements and solutions for Enhancement of radio network expectation to support RAN energy saving was studied in TR 28.914 and recommended for normative work. So, it proposes to enhance the use case and solution for RAN energy saving. | | | | | | | | |
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| ***Summary of change:*** | | 1. Enhance the use case for Intent containing an expectation for RAN energy saving to support different RAN UE throughput performance for different frequencies or RATs in the same area when perform energy saving activities  2. Enhance the RadioNetworkExpectation and generic TargetFulfilmentResult<<dataType>> to support the above use case enhancement. | | | | | | | | |
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| ***Consequences if not approved:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.1.7.1, 6.2.1.3.8.1, 6.2.2.2, D.5, D.8 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | | Forge MR link: <https://forge.3gpp.org/rep/sa5/MnS/-/merge_requests/1444> at commit a60a1192b2769f2b14b00019c624f2d380dd38dc | | | | | | | | |
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| ***This CR's revision history:*** | | S5-247173 is the revision of S5-246367 | | | | | | | | |

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| **1st Change** |

### 5.1.7 Intent containing an expectation for RAN energy saving

#### 5.1.7.1 Introduction

Operators are aiming at decreasing power consumption in 5G networks to lower their operational expense with energy saving management solutions. Energy saving is achieved by executing the energy saving actions with suitable parameter configurations, e.g. energy saving state switch, start time and end time, the energy saving thresholds. However, the various combinations of energy saving actions can lead to conflicts. For example, different energy saving actions may be contradictory, or the energy saving actions may conflict with other activities (e.g. network optimization actions). Moreover, it is not straightforward to evaluate the influence on service experience (e.g. UL/DL RAN UE throughput, latency) of energy saving actions beforehand, which makes it difficult to balance the energy saving effect and service experience, for example the energy saving actions may deteriorate the service experience. To avoid affecting the service experience, MnS consumer may express energy saving target with the maximum value of RAN energy consumption in intent expectation, and MnS producer is able to choose an optimal value of RAN energy consumption to save energy as much as possible in the context to satisfy the service experience.

As clause 4.1.1 described, an intent focuses more on describing the "What" needs to be achieved but less on "How" that outcomes should be achieved, which not only relieves the burden of the consumer knowing implementation details but also leaves room to allow the producer to explore alternative options and find optimal solutions. So, introducing the intent approach for energy saving, which can enable the 3GPP management system to analyse and select the optimal balance between the energy saving effect and service experience by utilizing some intelligence mechanisms. In intent driven approach, a MnS consumer expresses intent expectation for RAN energy saving in the specified area (e.g. geographical area) to a MnS producer, which may include the RAN energy saving target (e.g. the maximum value of target RAN energy consumption, reduction radio of energy consumption) and service experience (e.g. RAN UE throughput, latency), as well as the frequencies and RATs to be considered for energy saving. Some contexts for RAN energy saving (e.g. RAN energy saving allowed time (e.g., 1:00 am-5:00 am), RAN energy saving trigger event (e.g. PRB load ratio < 50%)) also can be specified by MnS consumer to provide the conditions to allow corresponding energy saving actions to be triggered to satisfy the energy saving targets. MnS producer analyses and determines the optimal RAN energy saving solution (i.e. a set of energy saving actions) to satisfy MnS consumer's intent expectation for RAN energy saving. MnS producer continuously monitors the RAN energy saving performance (e.g. RAN energy consumption, RAN energy efficiency) and service experience performance (e.g. target average UL/DL RAN UE throughput, target) for the specified area, and decides whether RAN energy saving target is satisfied.

The MnS consumer may want to assure different RAN UE throughput performance for different contexts (including frequencies or rATs) in the same area when perform energy saving activities (e.g., same targets for RAN energy saving). The MnS consumer also needs to receive the target fulfilment result for different RAN UE throughput targets for different contexts (including frequencies or RATs).

MnS producer may report the intent fulfilment information and achieved value for RAN energy saving targets (e.g. RAN energy consumption, RAN energy efficiency) for the specified area to MnS consumer which enables MnS consumer to monitor the intent containing an expectation for RAN energy saving.

#### 5.1.7.2 Requirements

**REQ-IDMS\_ RadioNetworkIntent-CON-9:** The intent driven MnS producer for radio network shall have capabilities enabling MnS consumer to express intent containing an expectation for RAN energy saving for the specified area.

**REQ-IDMS\_RadioNetworkIntent-CON -10:** The intent driven MnS producer for radio network shall have capabilities enabling MnS consumer to obtain intent report information (i.e. fulfilment information, achieved value for corresponding targets) of the intent containing an expectation for RAN energy saving.

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| **2nd Change** |

##### 6.2.1.3.8 TargetFulfilmentResult<<dataType>>

###### 6.2.1.3.8.1 Definition

TargetFulfilmentResult <<dataType>> includes targetFulfilmentInfo and targetAchievedValue for each ExpectationTarget. The targetFulfilmentInfo describes status of fulfilment of an expectationTarget and the related reasons for the infeasible status. The targetAchievedValue describes current performance value for the ExpectationTarget. Different instances of TargetFulfilmentResult can be instantiated for the same targetName but with different targetContexts. For examples, different TargetFulfilmentResult instance for aveDLRANUEThptTarget with different dlFrequencyContexts.

###### 6.2.1.3.8.2 Attributes

The TargetFulfilmentResult includes the following attributes.

Table 6.2.1.3.8.2-1

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| --- | --- | --- | --- | --- | --- |
| Attribute Name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| targetName | M | T | F | F | T |
| targetFulfilmentInfo | M | T | F | F | T |
| targetAchievedValue | O | T | F | F | T |
| targetContexts | O | T | F | F | T |

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| **3rd Change** |

#### 6.2.2.2 Attribute definition

Table 6.2.2.2-1

| **Attribute Name** | **Documentation and Allowed Values** | **Properties** |
| --- | --- | --- |
| coverageAreaPolygonContext | It describes the coverage areas for the RAN SubNetwork that the intent expectation is applied in the form of polygon.  CoverageAreaPolygonContext is a Context including attributes: contextAttribute, contextCondition and contextValueRange.  Following are the allowed values:  - contextAttribute: "coverageAreaPolygon"  - contextCondition: "IS\_ALL\_OF"  - contextValueRange: a list of GeoArea defined in 3GPP TS 28. 622 [6] | type: Context  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| coverageTACContext | It describes the coverage areas for the RAN SubNetwork that the intent expectation is applied in the form of TAC.  CoverageTACContext is a Context including attributes: contextAttribute, contextCondition and contextValueRange.  Following are the allowed values:  - contextAttribute: "coverageTAC"  - contextCondition: "IS\_ALL\_OF"  - contextValueRange: a list of TAC defined in 3GPP TS 28. 622 [6] | type: Context  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| dlFrequencyContext | It describes the downlink frequency information (RF reference frequencies and/or the frequency operating band) supported by the RAN SubNetwork that the intent expectation is applied.  dLFrequencyContext is a Context including attributes: contextAtrribute, contextCondition and contextValueRange.  Following are the allowed values:  - contextAttribute: "dLFrequency"  - contextCondition: "IS\_ALL\_OF"  - contextValueRange: a list of Frequency defined in clause 6.2.1.3.13 | type: Context  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| ulFrequencyContext | It describes the uplink frequency information (RF reference frequencies and/ or the frequency operating band) supported by the RAN SubNetwork that the intent expectation is applied.  uLFrequencyContext is a Context including attributes: contextAtrribute, contextCondition and contextValueRange.  Following are the allowed values:  - contextAttribute: uLFrequency"  - contextCondition: "IS\_ALL\_OF"  - contextValueRange: a list of Frequency defined in clause 6.2.1.3.13 | type: Context  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| rATContext | It describes the RAT supported by the RAN SubNetwork that the intent expectation is applied.  RATContext is a Context including attributes: contextAttribute, contextCondition and contextValueRange.  Following are the allowed values:  - contextAttribute: "rAT"  - contextCondition: "IS\_ALL\_OF"  - contextValueRange: a list of ENUM with allowed value: UTRAN, EUTRAN and NR | type: Context  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| uEGroupContext | It describes the UE Groups (represented by specific 5QI, specific S-NSSAI, or specific combination of S-NSSAI and 5QI) that the intent expectation is applied.  UEGroupContext is a Context including attributes: contextAttribute, contextCondition and contextValueRange.  Following are the allowed values:  - contextAttribute: "UEGroup"  - contextCondition: "IS\_ALL\_OF"  - contextValueRange: a list of UEGroup <<dataType>> | type: Context  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| targetAssuranceTimeContext | It describes the timeWindows (including startTime, endTime) when the targets in the Intent Expectation need to be assured.  - contextAttribute: "targetAssuranceTime"  - contextCondition: "IS\_EQUAL\_TO"  - contextValueRange: a list of TimeWindow(s) defined in TS 28.622 [6]. | type: Context  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: True |
| weakRSRPRatioTarget | It describes the downlink weak coverage ratio target for the RAN SubNetwork that the intent expectation is applied. The numerator is the number of the cells with downlink weak RSRP, and the denominator is the total number of cells of the RAN Subnetwork in the specified area.  WeakRSRPRatioTarget is an ExpectationTarget including attributes: targetName, targetCondition, targetValueRange and targetContext.  Following are the allowed values:  - targetName: "weakRSRPRatio"  - targetCondition: "IS\_LESS\_THAN"  - targetValueRange: integer with allowed value [0,100] %  - targetContext: WeakRSRPContext | type: ExpectationTarget  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| weakRSRPRatioTarget.weakRSRPContext | It describes the threshold for downlink weak RSRP of the cells (see RSRP measurements in TS 28.552 [6]) of the RAN SubNetwork that the intent expectation is applied.  WeakRSRPContext is a Context including attributes: contextAtrribute, contextCondition and contextValueRange.  Following are the allowed values:  - contextAttribute: "weakRSRPThreshold"  - contextCondition: "IS\_LESS\_THAN"  - contextValueRange: Float | type: Context  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| lowSINRRatioTarget | It describes the low SINR ratio target for the RAN SubNetwork that the intent expectation is applied. The numerator is the number of the cells with low SINR, and the denominator is the total number of cells of the RAN Subnetwork in the specified area.  LowSINRRatioTarget is an ExpectationTarget including attributes: targetName, targetCondition, targetValueRange and targetContxt.  Following are the allowed values:  - targetName: "lowSINRRatio"  - targetCondition: "IS\_LESS\_THAN"  - targetValueRange: integer with allowed value [0,100]  - targetContext: LowSINRContext | type:ExpectationTarget  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| lowSINRRatioTarget.lowSINRContext | It describes the threshold for low SINR of the cells (see SINR measurements in TS 28.552 [6]) of the RAN SubNetwork that the intent expectation is applied.  LowSINRContext is a Context including attributes: contextAttribute, contextCondition and contextValueRange.  Following are the allowed values:  - contextAttribute: "lowSINRThreshold"  - contextCondition: "IS\_LESS\_THAN"  - contextValueRange: integer | type: Context  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| aveULRANUEThptTarget | It describes the average UL RAN UE throughput target for RAN SubNetwork (see UL RAN UE throughput for a sub-network in TS 28.554[11]) that the intent expectation is applied.  AveULRANUEThptTarget is an ExpectationTarget including attributes: targetName, targetCondition and targetValueRange.  Following are the allowed values:  - targetName: "aveULRANUEThpt"  - targetCondition: "IS\_GREATER\_THAN"  - targetValueRange: integer  - targetContext: ulFrequencyContext or rATContext | type: ExpectationTarget  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| aveDLRANUEThptTarget | It describes the average DL RAN UE throughput target for RAN SubNetwork (see DL RAN UE throughput for a sub-network in TS 28.554[11]) that the intent expectation is applied.  AveDLRANUEThptTarget is an ExpectationTarget including attributes: targetName, targetCondition and targetValueRange.  Following are the allowed values:  - targetName: "aveDLRANUEThpt"  - targetCondition: "IS\_GREATER\_THAN"  - targetValueRange: integer  - targetContext: dlFrequencyContext or rATContext | type: ExpectationTarget  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| lowULRANUEThptRatioTarget | It describes the low UL RAN UE throughput ratio target for the RAN SubNetwork that the intent expectation is applied. The numerator is the number of the cells with low UL RAN UE throughput, and the denominator is the total number of cells of the RAN Subnetwork in the specified area.  LowULRANUEThptRatioTarget is an ExpectationTarget including attributes: targetName, targetCondition, targetValueRange and targetContext.  Following are the allowed values:  - targetName: "lowULRANUEThptRatio"  - targetCondition: "IS\_LESS\_THAN"  - targetValueRange: integer with allowed value [0,100] %  - targetContext: LowULRANUEThptContext | type: ExpectationTarget  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| lowULRANUEThptRatioTarget.lowULRANUEThptContext | It describes the threshold for the low UL RAN UE throughput cells (see average UL RAN UE throughput in gNB and distribution of UL UE throughput in gNB in TS 28.552[6]) of the RAN SubNetwork that the intent expectation is applied  LowULRANUEThptContext is a Context including attributes: contextAttribute, contextCondition and contextValueRange.  Following are the allowed values:  - contextAttribute: "lowULRANUEThptThreshold"  - contextCondition: "IS\_LESS\_THAN"  - contextValueRange: Float | type: Context  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| lowDLRANUEThptRatioTarget | It describes the low DL RAN UE throughput ratio target for the RAN SubNetwork that the intent expectation is applied. The numerator is the number of the cells with low DL RAN UE throughput, and the denominator is the total number of cells of the RAN Subnetwork in the specified area.  LowDLRANUEThptRatioTarget is an ExpectationTarget including attributes: targetName, targetCondition, targetValueRange and targetContext.  Following are the allowed values:  - targetName: "lowDLRANUEThptRatio"  - targetCondition: "IS\_LESS\_THAN "  - targetValueRange: integer with allowed value [0,100]  - targetContext: LowDLRANUEThptContext | type: ExpectationTarget  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| lowDLRANUEThptRatioTarget.lowDLRANUEThptContext | It describes the threshold for the low DL RAN UE throughput cells (see average DL RAN UE throughput in gNB and distribution of DL UE throughput in gNB in TS 28.552[6]) of the RAN SubNetwork that the intent expectation is applied.  LowDLRANUEThptContext is a Context including attributes: contextAttribute, contextCondition and contextValueRange.  Following are the allowed values:  - contextAttribute: "lowDLRANUEThptThreshold"  - contextCondition: "IS\_LESS\_THAN"  - contextValueRange: Float | type: Context  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| nfTypeContext | It identifies the types of NF supported by the 5GC SubNetwork that the intent expectation is applied.  nfTypeContext is a Context including attributes: contextAtrribute, contextCondition and contextValueRange.  Following are the allowed values:  - contextAttribute: " nfType "  - contextCondition:" IS\_ALL\_OF "  - contextValueRange: a list of ENUM with allowed value:  Enumeration NFType in 3GPP TS 29.510[13] | type: Context  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| nfInstanceLocationContext | It describes the location of NF instance supported by the 5GC SubNetwork that the intent expectation is applied.  nfInstancelocationContext is a Context including attributes: contextAtrribute, contextCondition and contextValueRange.  Following are the allowed values:  - contextAttribute: " nfInstanceLocation "  - contextCondition:” IS\_ALL\_OF "  - contextValueRange: a list of string.  See Locality in TS 29.510 [13] | type: Context  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| taiContext | It describes the tracking area Identifiers supported by the 5GC SubNetwork that the intent expectation is applied.  taiContext is a Context including attributes: contextAtrribute, contextCondition and contextValueRange.  Following are the allowed values:  - contextAttribute: "tai"  - contextCondition:" IS\_ALL\_OF "  - contextValueRange: a list of tai defined in TS 28.622 [6] | type: Context  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| maxNumberofPDUsessionsTarget | It describes the maximum number of PDU sessions for 5GC SubNetwork supporting that the intent expectation is applied. For details, see maxNumberofPDUsessions in clause 5.3.1.2 in TS 28.552 [12]  maxNumberofPDUsessionsTarget is an ExpectationTarget including attributes: targetName, targetCondition and targetValueRange.  Following are the allowed values:  - targetName: "maxNumberofPDUsessions"  - targetCondition: " IS\_LESS\_THAN"  - targetValueRange: integer  - targetContext: 5GSessionContext. | type: ExpectationTarget  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| maxNumberofPDUsessionsTarget.5GSessionContext | It describes the maximum supported 5G PDU session of the 5GC SubNetwork related to the intent expectation.  5GSessionContext is a Context including attributes: contextAttribute, contextCondition and contextValueRange.  Following are the allowed values:  - contextAttribute: "5GSession"  - contextCondition: "IS\_ LESS\_THAN"  - contextValueRange: integer | type: Context  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| maxNumberofRegisteredsubscribersTarget | It describes the maximum number of Registered subscribers for 5GC SubNetwork supporting that the intent expectation is applied. For details, see maxNumberofRegisteredsubscribers in clause 5.6.2 in TS 28.552 [12]  maxNumberofRegisteredsubscribersTarget is an ExpectationTarget including attributes: targetName, targetCondition and targetValueRange.  Following are the allowed values:  - targetName: "maxNumberofRegisteredsubscribers"  - targetCondition: " IS\_LESS\_THAN"  - targetValueRange: Integer | type: ExpectationTarget  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| highUlPrbLoadRatioTarget | It describes the high UL PRB load ratio target (as percentage) for the RAN SubNetwork that the intent expectation is applied. The numerator is the number of the cells with high UL PRB load, and the denominator is the total number of cells of the RAN Subnetwork in the specified area.  HighUlPrbLoadRatioTarget is an ExpectationTarget including attributes: targetName, targetCondition,targetValueRange and targetContext.  Following are the allowed values:  - targetName: "highUlPrbLoadRatio"  - targetCondition: "IS\_LESS\_THAN "  - targetValueRange: integer with allowed value [0,100] %  - targetContext: HighUlPrbLoadContext | type: ExpectationTarget  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| highUlPrbLoadRatioTarget.HighUlPrbLoadContext | It describes the threshold for high uplink PRB load (i.e. UL Total PRB Usage in TS 28.552 [12] to represent the percentage of UL PRBs used) of the cells of the RAN SubNetwork in the specified area that the intent expectation is applied.  HighUlPrbLoadContext is a Context including attributes: contextAttribute, contextCondition and contextValueRange.  Following are the allowed values:  - contextAttribute: "HighUlPrbLoad"  - contextCondition: "IS\_GREATER\_THAN"  - contextValueRange: integer with allowed value [0,100] % | type: Context  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| highDlPrbLoadRatioTarget | It describes the high DL PRB load ratio target (as percentage) for the RAN SubNetwork that the intent expectation is applied. The numerator is the number of the cells with high DL PRB load, and the denominator is the total number of cells of the RAN Subnetwork in the specified area.  HighDlPrbLoadRatioTarget is an ExpectationTarget including attributes: targetName, targetCondition, targetValueRange and targetContext.  Following are the allowed values:  - targetName: "highDlPrbLoadRatio"  - targetCondition: "IS\_LESS\_THAN "  - targetValueRange: integer with allowed value [0,100] %  - targetContext: HighDlPrbLoadContext | type: ExpectationTarget  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| highDlPrbLoadRatioTarget.HighDlPrbLoadContext | It describes the threshold for high downlink PRB load (i.e. DL Total PRB Usage in TS 28.552 [12] to represent the percentage of DL PRBs used) of the cells of the RAN SubNetwork in the specified area that the intent expectation is applied.    HighDlPrbLoadContext is a Context including attributes: contextAttribute, contextCondition and contextValueRange.  Following are the allowed values:  - contextAttribute: "HighDlPrbLoad"  - contextCondition: "IS\_GREATER\_THAN"  - contextValueRange: integer with allowed value [0,100] % | type: Context  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| aveUlPrbLoadTarget | It describes the average uplink PRB load target (i.e. UL Total PRB Usage in TS 28.552 [12] to represent the percentage of UL PRBs used) of the cells of the RAN SubNetwork that the intent expectation is applied.  AveULPrbLoadTarget is an ExpectationTarget including attributes: targetName, targetCondition and targetValueRange.  Following are the allowed values:  - targetName: "aveULPrbLoad"  - targetCondition: "IS\_LESS\_THAN"  - targetValueRange: integer with allowed value [0,100] % | type: ExpectationTarget  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| aveDlPrbLoadTarget | It describes the average dowlink PRB load (i.e. DL Total PRB Usage in TS 28.552 [12] to represent the percentage of DL PRBs used) target for RAN SubNetwork that the intent expectation is applied.  AveDLPrbLoadTarget is an ExpectationTarget including attributes: targetName, targetCondition and targetValueRange.  Following are the allowed values:  - targetName: "aveDLPrbLoad"  - targetCondition: "IS\_LESS\_THAN"  - targetValueRange: integer with allowed value [0,100] % | type: ExpectationTarget  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| rANEnergyConsumptionTarget | It describes the RAN energy consumption target for RAN SubNetwork that the intent expectation is applied. The definition for RAN energy consumption see ECNG-RAN in clause 6.7.3.4.1 in TS 28.554 [11].  RANEnergyConsumptionTarget is an ExpectationTarget including attributes: targetName, targetCondition and targetValueRange.  Following are the allowed values:  - targetName: "rANEnergyConsumption"  - targetCondition: "IS\_LESS\_THAN"  - targetValueRange: Integer | type: ExpectationTarget  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| rANEnergyEfficiencyTarget | It describes the RAN energy efficiency target for RAN SubNetwork that the intent expectation is applied. The unit of this target is bit/J. The definition for RAN energy efficiency target for RAN SubNetwork see EEMN,DV in clause 6.7.1.1 in TS 28.554 [11]  RANEnergyEfficiencyTarget is an ExpectationTarget including attributes: targetName, targetCondition and targetValueRange.  Following are the allowed values:  - targetName: " rANEnergyEfficiency "  - targetCondition: " IS\_GREATER\_THAN"  - targetValueRange: Integer | type: ExpectationTarget  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| serviceStartTimeContext | This describes the start time at which the service shall be available. This contributes to the selection of the appropriate edge data network to be used for service deployment.  Following are the allowed values:  - contextAttribute: "serviceStartTime"  - contextCondition: "IS\_EQUAL\_TO"  - contextValueRange: DateTime | type: Context  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| serviceEndTimeContext | This describes the end time after which the service shall not be available. This contributes to the selection of the appropriate edge data network to be used for service deployment.  Following are the allowed values:  - contextAttribute: "serviceEndTime"  - contextCondition: "IS\_EQUAL\_TO"  - contextValueRange: DateTime | type:Context  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| edgeIdentificationIdContext | This identifies the edge network where the service needs to be deployed. For details see EDNidentifier defined in TS 28.538 [9]. This should be used when the edge identification is known to the consumer  Following are the allowed values:  - contextAttribute: "edgeIdentificationId"  - contextCondition: "IS\_EQUAL\_TO"  - contextValueRange: String | type: Context  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| edgeIdentificationLocContext | This identifies the location where the service needs to be deployed. This should be used when the edge identification is not known to the consumer  Following are the allowed values:  - contextAttribute: "edgeIdentificationLoc"  - contextCondition: "IS\_EQUAL\_TO"  - contextValueRange: GeoCoordinate dfined in TS 28.622 [6]. | type: Context  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| coverageAreaTAContext | It describes Tracking Coverage Areas for service supporting that the intent expectation is applied.  coverageAreaTAContext is a Context including attributes: contextAttribute, contextCondition and contextValueRange.  Following are the allowed values:  - contextAttribute: "coverageAreaTA"  - contextCondition: "IS\_ALL\_OF"  - contextValueRange: a list of TAC defined in 3GPP TS 28.622 [6] | type: Context  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| EdgeServiceSupport Expectation. dlThptPerUETarget | It describes the DL throughput target by the per UE for the edge service Supporting that the intent expectation is applied. For details see dlThptPerUE defined in clause 6.3.1 of TS 28.541 [5].  DLThptperUETarget is an ExpectationTarget including attributes: targetName, targetCondition and targetValueRange:  - targetName: "DLThptperUE"  - targetCondition: "IS\_GREATER\_THAN"  - targetValueRange: Integer. | type: ExpectationTarget  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| EdgeServiceSupport Expectation. ulThptPerUETarget | It describes the UL throughput target by the per UE for the edge service Supporting that the intent expectation is applied. For details see ulThptPerUE defined in clause 6.3.1 of TS 28.541 [5].  ULThptperUETarget is an ExpectationTarget including attributes: targetName, targetCondition and targetValueRange.  - targetName: "ulThptperUE"  - targetCondition: "IS\_GREATER\_THAN"  - targetValueRange: Integer. | type: ExpectationTarget  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| EdgeServiceSupport Expectation. dLLatencyTarget | It describes the DL latency target for the edge service Supporting that the intent expectation is applied.  DLLatencyTarget is an ExpectationTarget including attributes: targetName, targetCondition and targetValueRange. For details see attribute dlLatency defined in clause 6.3.1 of TS 28.541 [5].  - targetName: "dLLatency"  - targetCondition: "IS\_LESS\_THAN"  - targetValueRange: Integer. | type: ExpectationTarget  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| EdgeServiceSupport Expectation. uLLatencyTarget | It describes the UL latency target for the edge service Supporting that the intent expectation is applied. For details see attribute ulLatency defined in clause 6.3.1 of TS 28.541 [5].  uLLatencyTarget is an ExpectationTarget including attributes: targetName, targetCondition and targetValueRange.  - targetName: "uLLatency"  - targetCondition: "IS\_LESS\_THAN"  - targetValueRange: Integer. | type: ExpectationTarget  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| EdgeServiceSupport Expectation. maxNumberofUEsTarget | It describes the the number of UEs for edge service supporting that the intent expectation is applied. For details see attribute maxNumberofUE defined in clause 6.3.1 of of TS 28.541 [5].  maxNumberofUEsContext is an ExpectationTarget including attributes: targetName, targetCondition and targetValueRange.  Following are the allowed values:  - targetName: "maxNumberofUEs"  - targetCondition: " IS\_LESS\_THAN"  - targetValueRange: Integer. | type: ExpectationTarget  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| EdgeServiceSupport Expectation. activityFactorTarget | It describes the percentage value of the amount of simultaneous active UEs to the total number of UEs where active means the UEs are exchanging data with the network for service supporting that the intent expectation is applied. For details see activityFactor in clause 6.3.1 in TS 28.541 [5.]  activityFactorTarget is an ExpectationTarget including attributes: targetName, targetCondition and targetValueRange.  Following are the allowed values:  - targetName: " activityFactor "  - targetCondition: " IS\_EQUAL\_TO"  - targetValueRange: Integer | type: ExpectationTarget  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| EdgeServiceSupport Expectation. uESpeedTarget | It describes the speed (in km/hour) supported  for edge service supporting that the intent expectation is applied. For details see uESpeed in clause 6.3.1 in TS 28.541[5].  uESpeedTarget is an ExpectationTarget including attributes: targetName, targetCondition and targetValueRange.  Following are the allowed values:  - targetName: "uESpeed"  - targetCondition: " IS\_LESS\_THAN"  - targetValueRange: Integer | type: ExpectationTarget  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| EdgeServiceSupport Expectation. uEMobilityLevelContext | It describes the mobility level of UE for edge service supporting that the intent expectation is applied. For details see uEMobilityLevel in clause 6.3.1 in TS 28.541 [5.]  uEMobilityLevelContext is a Context including attributes: contextAttribute, contextCondition and contextValueRange.  Following are the allowed values:  - contextAttribute: " uEMobilityLevel "  - contextCondition: "IS\_EQUAL\_TO"  - contextValueRange: ENUM. | type: Context  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| EdgeServiceSupport Expectation. resourceSharingLevelContext | It describes the resource sharing level for which the intent expectation is applied. For details see resourceSharinglevel in clause 6.3.1 in TS 28.541 [5].  resourceSharingLevelContext is a Context including attributes: contextAttribute, contextCondition and contextValueRange.  Following are the allowed values:  - contextAttribute: "resourceSharingLevel"  - contextCondition: "IS\_EQUAL\_TO"  - contextValueRange: ENUM | type: Context  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| RadioServiceExpectation.coverageAreaPolygonContext | It describes the coverage areas for the Radio Service that the intent expectation is applied in the form of polygon.  CoverageAreaPolygonContext is a Context including attributes: contextAttribute, contextCondition and contextValueRange.  Following are the allowed values:  - contextAttribute: "coverageAreaPolygon"  - contextCondition: "IS\_ALL\_OF"  - contextValueRange: a list of CoverageArea defined in 3GPP TS 28.541 [5]. | type: Context  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| RadioServiceExpectation.serviceTypeContext | It describes the service type for the Radio Service that the intent expectation is applied. For details see sST in clause 6.4.1 in TS 28.541 [5].  ServiceTypeContext is a Context including attributes: contextAttribute, contextCondition and contextValueRange.  Following are the allowed values:  - contextAttribute: "serviceType"  - contextCondition: "IS\_EQUAL\_TO"  - contextValueRange: string | type: Context  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| RadioServiceExpectation.dlThptPerUETarget | It describes the DL throughput target per UE for the Radio Service that the intent expectation is applied. For details see dlThptPerUE defined in clause 6.3.1 of TS 28.541 [5].  DLThptperUETarget is an ExpectationTarget including attributes: targetName, targetCondition and targetValueRange:  - targetName: "DLThptperUE"  - targetCondition: "IS\_GREATER\_THAN"  - targetValueRange: Integer. | type: ExpectationTarget  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| RadioServiceExpectation.ulThptPerUETarget | It describes the UL throughput target per UE for the Radio Service that the intent expectation is applied. For details see ulThptPerUE defined in clause 6.3.1 of TS 28.541 [5].  ULThptperUETarget is an ExpectationTarget including attributes: targetName, targetCondition and targetValueRange.  - targetName: "ulThptperUE"  - targetCondition: "IS\_GREATER\_THAN"  - targetValueRange: Integer. | type: ExpectationTarget  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| RadioServiceExpectation.dLLatencyTarget | It describes the DL latency target for the Radio Service that the intent expectation is applied.  DLLatencyTarget is an ExpectationTarget including attributes: targetName, targetCondition and targetValueRange. For details see attribute dlLatency defined in clause 6.3.1 of TS 28.541 [5].  - targetName: "dLLatency"  - targetCondition: "IS\_LESS\_THAN"  - targetValueRange: Integer. | type: ExpectationTarget  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| RadioService. ExpectationuLLatencyTarget | It describes the UL latency target for the Radio Service that the intent expectation is applied. For details see attribute ulLatency defined in clause 6.3.1 of TS 28.541 [5].  uLLatencyTarget is an ExpectationTarget including attributes: targetName, targetCondition and targetValueRange.  - targetName: "uLLatency"  - targetCondition: "IS\_LESS\_THAN"  - targetValueRange: Integer. | type: ExpectationTarget  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| servingScopeContext | It describes the served area(s) of the 5GC NF instance supported by the 5GC SubNetwork that the intent expectation is applied. For detail, see servingScope in TS 29.510[13].  servingScopeContext is a Context including attributes: contextAtrribute, contextCondition and contextValueRange.  Following are the allowed values:  - contextAttribute: " servingScope "  - contextCondition:” IS\_ALL\_OF "  - contextValueRange: a list of string. | type: Context  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| dnnContext | It describes the DNN of the 5GC NF instance supported by the 5GC SubNetwork that the intent expectation is applied.  dnnContext is a Context including attributes: contextAtrribute, contextCondition and contextValueRange.  Following are the allowed values:  - contextAttribute: " dnn "  - contextCondition:” IS\_ALL\_OF "  - contextValueRange: a list of string as specified in 3GPP TS 23.003 [15] | type: Context  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| incomingDataTarget | It describes the maximum incoming data packets for 5GC SubNetwork related to the intent expectation. For details, see N6 incoming link usage measurement in clause 5.4.2.1 in TS 28.552 [12]  incomingDataTarget is an ExpectationTarget including attributes: targetName, targetCondition and targetValueRange.  Following are the allowed values:  - targetName: "incomingData"  - targetCondition: " IS\_LESS\_THAN"  - targetValueRange: integer | type: ExpectationTarget  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| outgoingDataTarget | It describes the maximum outgoing data packets for 5GC SubNetwork related to the intent expectation. For details, see N6 outgoing link usage measurement in clause 5.4.2.2 in TS 28.552 [12]  outgoingDataTarget is an ExpectationTarget including attributes: targetName, targetCondition and targetValueRange.  Following are the allowed values:  - targetName: "outgoingData"  - targetCondition: " IS\_LESS\_THAN"  - targetValueRange: integer | type: ExpectationTarget  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| startTimeContext | This describes the start time at which the expected result of the expectation shall be available.  Following are the allowed values:  - contextAttribute: "startTime"  - contextCondition: "IS\_EQUAL\_TO"  - contextValueRange: DateTime | type: Context  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |

|  |
| --- |
| **4th Change** |

# D.5 YAML document example for Intent containing an expectation on RAN energy saving

Intent:

Id: 'Intent\_5'

userLabel: 'RAN\_Energy\_Saving'

intentExpectation:

- expectationId: '1'

expectationVerb: 'Ensure'

expectationObjects:

- objectInstance: 'SubNetwork\_1'

objectContexts:

- contextAttribute: 'CoverageAreaPolygon'

contextCondition: 'IS\_ALL\_OF'

contextValueRange:

- convexGeoPolygon:

- latitude: '31.2696'

longitude: '121.6322'

- latitude: '31.2668'

longitude: '121.6323'

- latitude: '31.2669'

longitude: '121.6412'

- latitude: '31.2696'

longitude: '121.6410'

- contextAttribute: 'PLMN'

contextCondition: 'IS\_ALL\_OF'

contextValueRange:

- '46000'

- contextAttribute: 'DlFrequency'

contextCondition: 'IS\_ALL\_OF'

contextValueRange:

- arfcn: '384000'

- contextAttribute: 'RAT'

contextCondition: 'IS\_ALL\_OF'

contextValueRange:

- 'NR'

- 'EUTRAN'

- contextAttribute: 'TargetAssuranceTime'

contextCondition: 'IS\_EQUAL\_TO'

contextValueRange:

- startTime: '2023-10-27-22-00-00'

- endTime: '2023-10-28-06-00-00'

expectationTargets:

- targetName: 'RANEnergyConsumption'

targetCondition: 'IS\_LESS\_THAN'

targetValueRange: '1000'

- targetName: 'RANEnergyEfficiency'

targetCondition: 'IS\_GREATER\_THAN'

targetValueRange: '400000'

- targetName: 'AveULRANUEThpt'

targetCondition: 'IS\_GREATER\_THAN'

targetValueRange: '100' - targetName: 'AveDLRANUEThpt'

targetCondition: 'IS\_GREATER\_THAN'

targetValueRange: '300'

targetContexts:

- contextAttribute: 'rAT'

contextCondition: 'IS\_ALL\_OF'

contextValueRange:

- NR

- targetName: 'AveDLRANUEThpt'

targetCondition: 'IS\_GREATER\_THAN'

targetValueRange: '100'

targetContexts:

- contextAttribute: 'rAT'

contextCondition: 'IS\_ALL\_OF'

contextValueRange:

- EUTRAN

intentPriority: '6'

observationPeriod: '60'

intentReportReference: 'IntentReport\_5'

|  |
| --- |
| **5th Change** |

# D.8 YAML document example for Intent report instance

IntentReport:

id: 'RAN\_Energy\_Saving\_Report'

intentFulfilmentReport:

intentFulfilmentInfo:

fulfilmentStatus: 'NOTFULFILLED'

notFulfilledState: 'SUSPENDED'

notFulfilledReasons:

- 'Target\_conflict\_detected'

expectationFulfilmentResults:

- expectationId: '1'

expectationFulfilmentInfo:

fulfilmentStatus: 'NOTFULFILLED'

targetFulfilmentResults:

- targetName: 'RANEnergyConsumption'

targetFulfilmentInfo:

fulfilmentStatus: 'FULFILLED'

targetAchievedValue: '900'

- targetName: 'RANEnergyEfficiencyTarget'

targetFulfilmentInfo:

fulfilmentStatus: 'FULFILLED'

targetAchievedValue: '410000'

- targetName: 'AveULRANUEThpt'

targetFulfilmentInfo:

fulfilmentStatus: 'FULFILLED'

targetAchievedValue: '100'

- targetName: 'AveDLRANUEThpt'

targetFulfilmentInfo:

fulfilmentStatus: 'NOTFULFILLED'

targetAchievedValue: '200'

targetContexts:

- contextAttribute: 'rAT'

contextCondition: 'IS\_ALL\_OF'

contextValueRange:

- NR

- targetName: 'AveDLRANUEThpt'

targetFulfilmentInfo:

fulfilmentStatus: 'FULFILLED'

targetAchievedValue: '200'

targetContexts:

- contextAttribute: 'rAT'

contextCondition: 'IS\_ALL\_OF'

contextValueRange:

- EUTRAN

intentConflictReports:

- conflictType: 'TARGET\_CONFLICT'

conflictingTarget: 'RANEnergyConsumption'

recommendedSolutions: 'MODIFY'

- conflictType: 'TARGET\_CONFLICT'

conflictingTarget: 'AveDLRANUEThpt'

recommendedSolutions: 'MODIFY'

intentFeasibilityCheckReport:

feasibilityCheckResult: 'FEASIBLE'

lastUpdatedTime: '2023-09-15-14-37-50'

intentReference: 'RAN\_Energy\_Saving'

|  |
| --- |
| **6th Change** |

Forge MR link: <https://forge.3gpp.org/rep/sa5/MnS/-/merge_requests/1444> at commit a60a1192b2769f2b14b00019c624f2d380dd38dc

\*\*\* START OF CHANGE 1 \*\*\*

\*\*\* OpenAPI/TS28312\_IntentExpectations.yaml \*\*\*

<CODE BEGINS>

openapi: 3.0.1

info:

title: Scenario specific Intent Expectations

version: 18.4.0

description: >-

OAS 3.0.1 definition of scenario specific Intent Expectations

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externalDocs:

description: 3GPP TS 28.312; Intent driven management services for mobile networks

url: http://www.3gpp.org/ftp/Specs/archive/28\_series/28.312/

paths: {}

components:

schemas:

#-------Definition of the Scenario specific IntentExpectation dataType ----------#

RadioNetworkExpectation:

description: >-

This data type is the "IntentExpectation" data type with specialisations to represent MnS consumer's expectations for radio network delivering and performance assurance

type: object

properties:

expectationId:

type: string

expectationVerb:

$ref: "TS28312\_IntentNrm.yaml#/components/schemas/ExpectationVerb"

expectationObject:

$ref: "#/components/schemas/RadioNetworkExpectationObject"

expectationTargets:

type: array

uniqueItems: true

items:

type: object

oneOf:

- $ref: '#/components/schemas/WeakRSRPRatioTarget'

- $ref: '#/components/schemas/LowSINRRatioTarget'

- $ref: '#/components/schemas/AveULRANUEThptTarget'

- $ref: '#/components/schemas/AveDLRANUEThptTarget'

- $ref: '#/components/schemas/LowULRANUEThptRatioTarget'

- $ref: '#/components/schemas/LowDLRANUEThptRatioTarget'

- $ref: '#/components/schemas/HighULPrbLoadRatioTarget'

- $ref: '#/components/schemas/HighDLPrbLoadRatioTarget'

- $ref: '#/components/schemas/AveULPrbLoadTarget'

- $ref: '#/components/schemas/AveDLPrbLoadTarget'

- $ref: "#/components/schemas/RANEnergyConsumptionTarget"

- $ref: "#/components/schemas/RANEnergyEfficiencyTarget"

- $ref: 'TS28312\_IntentNrm.yaml#/components/schemas/ExpectationTarget'

expectationContexts:

type: array

uniqueItems: true

items:

type: object

oneOf:

- $ref: '#/components/schemas/TargetAssuranceTimeContext'

- $ref: 'TS28312\_IntentNrm.yaml#/components/schemas/Context'

required:

- expectationId

RadioServiceExpectation:

description: >-

This data type is the "IntentExpectation" data type with specialisations to represent MnS consumer's expectations for radio service delivering

type: object

properties:

expectationId:

type: string

expectationVerb:

$ref: "TS28312\_IntentNrm.yaml#/components/schemas/ExpectationVerb"

expectationObject:

$ref: "#/components/schemas/RadioServiceExpectationObject"

expectationTargets:

type: array

uniqueItems: true

items:

type: object

oneOf:

- $ref: '#/components/schemas/DLLatencyTarget'

- $ref: '#/components/schemas/ULLatencyTarget'

- $ref: '#/components/schemas/DLThptPerUETarget'

- $ref: '#/components/schemas/ULThptPerUETarget'

- $ref: 'TS28312\_IntentNrm.yaml#/components/schemas/ExpectationTarget'

expectationContexts:

type: array

uniqueItems: true

items:

$ref: 'TS28312\_IntentNrm.yaml#/components/schemas/Context'

required:

- expectationId

EdgeServiceSupportExpectation:

description: >-

This data type is the "IntentExpectation" data type with specialisations to represent MnS consumer's expectations for service deployment

type: object

properties:

expectationId:

type: string

expectationVerb:

$ref: 'TS28312\_IntentNrm.yaml#/components/schemas/ExpectationVerb'

expectationObject:

$ref: '#/components/schemas/EdgeServiceSupportExpectationObject'

expectationTargets:

type: array

uniqueItems: true

items:

type: object

oneOf:

- $ref: '#/components/schemas/DLThptPerUETarget'

- $ref: '#/components/schemas/ULThptPerUETarget'

- $ref: '#/components/schemas/DLLatencyTarget'

- $ref: '#/components/schemas/ULLatencyTarget'

- $ref: '#/components/schemas/MaxNumberofUEsTarget'

- $ref: '#/components/schemas/ActivityFactorTarget'

- $ref: '#/components/schemas/UESpeedTarget'

- $ref: 'TS28312\_IntentNrm.yaml#/components/schemas/ExpectationTarget'

expectationContexts:

type: array

uniqueItems: true

items:

type: object

oneOf:

- $ref: '#/components/schemas/ServiceStartTimeContext'

- $ref: '#/components/schemas/ServiceEndTimeContext'

- $ref: '#/components/schemas/UEMobilityLevelContext'

- $ref: '#/components/schemas/ResourceSharingLevelContext'

- $ref: 'TS28312\_IntentNrm.yaml#/components/schemas/Context'

required:

- expectationId

5GCNetworkExpectation:

description: >-

This data type is the "IntentExpectation" data type with specialisations to represent MnS consumer's expectations for 5GC network delivering

type: object

properties:

expectationId:

type: string

expectationVerb:

$ref: "TS28312\_IntentNrm.yaml#/components/schemas/ExpectationVerb"

expectationObjects:

type: array

uniqueItems: true

items:

$ref: "#/components/schemas/5GCNetworkExpectationObject"

expectationTargets:

type: array

uniqueItems: true

items:

type: object

oneOf:

- $ref: "#/components/schemas/MaxNumberofPDUsessionsTarget"

- $ref: "#/components/schemas/MaxNumberofRegisteredsubscribersTarget"

- $ref: "#/components/schemas/IncomingDataTarget"

- $ref: "#/components/schemas/OutgoingDataTarget"

- $ref: "TS28312\_IntentNrm.yaml#/components/schemas/ExpectationTarget"

expectationContexts:

type: array

uniqueItems: true

items:

type: object

oneOf:

- $ref: '#/components/schemas/StartTimeContext'

- $ref: '#/components/schemas/ResourceSharingLevelContext'

- $ref: "TS28312\_IntentNrm.yaml#/components/schemas/Context"

required:

- expectationId

#-------Definition of the IntentExpectation dataType ----------#

#-------Definition of the scenario specific ExpectationObject dataType ----------#

RadioNetworkExpectationObject:

description: >-

This data type is the "ExpectationObject" data type with specialisations for RadioNetworkExpectation

type: object

properties:

objectType:

type: string

enum:

- RAN\_SubNetwork

objectInstance:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/Dn'

objectContexts:

type: array

uniqueItems: true

items:

type: object

oneOf:

- $ref: '#/components/schemas/CoverageAreaPolygonContext'

- $ref: '#/components/schemas/CoverageTACContext'

- $ref: '#/components/schemas/PLMNContext'

- $ref: '#/components/schemas/DlFrequencyContext'

- $ref: '#/components/schemas/UlFrequencyContext'

- $ref: '#/components/schemas/RATContext'

- $ref: "#/components/schemas/UEGroupContext"

- $ref: 'TS28312\_IntentNrm.yaml#/components/schemas/Context'

RadioServiceExpectationObject:

description: >-

This data type is the "ExpectationObject" data type with specialisations for RadioServicekExpectation

type: object

properties:

objectType:

type: string

enum:

- Radio\_Service

objectInstance:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/Dn'

objectContexts:

type: array

uniqueItems: true

items:

type: object

oneOf:

- $ref: '#/components/schemas/CoverageAreaPolygonContext'

- $ref: '#/components/schemas/ServiceTypeContext'

- $ref: 'TS28312\_IntentNrm.yaml#/components/schemas/Context'

EdgeServiceSupportExpectationObject:

description: >-

This data type is the "ExpectationObject" data type with specialisations for EdgeServiceSupportExpectation

type: object

properties:

objectType:

type: string

enum:

- EdgeService\_Support #value for Edge Service Support Expectation--#

objectInstance:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/Dn'

objectContexts:

type: array

uniqueItems: true

items:

type: object

oneOf:

- $ref: '#/components/schemas/EdgeIdentificationIdContext'

- $ref: '#/components/schemas/EdgeIdentificationLocContext'

- $ref: '#/components/schemas/CoverageAreaTAContext'

- $ref: 'TS28312\_IntentNrm.yaml#/components/schemas/Context'

5GCNetworkExpectationObject:

description: >-

This data type is the "ExpectationObject" data type with specialisations for 5GCNetworkExpectation

type: object

properties:

objectType:

type: string

enum:

- 5GC\_SubNetwork #value for 5GC Network Expectation--#

objectInstance:

$ref: "TS28623\_ComDefs.yaml#/components/schemas/Dn"

objectContexts:

type: array

uniqueItems: true

items:

type: object

oneOf:

- $ref: "#/components/schemas/NfTypeContext"

- $ref: "#/components/schemas/NfInstanceLocationContext"

- $ref: "#/components/schemas/PLMNContext"

- $ref: "#/components/schemas/TaiContext"

- $ref: "#/components/schemas/ServingScopeContext"

- $ref: "#/components/schemas/DnnContext"

- $ref: "TS28312\_IntentNrm.yaml#/components/schemas/Context"

#-------Definition of the ExpectationObject dataType ----------#

#-------Definition of the Scenario specific ExpectationTarget dataType----------#

WeakRSRPRatioTarget:

description: >-

This data type is the "ExpectationTarget" data type with specialisations for WeakRSRPRatioTarget. It describes

the downlink weak coverage ratio target for the RAN SubNetwork that the intent expectation is applied.

The numerator is the number of the cells with downlink weak RSRP, and the denominator is the total number

of cells of the RAN Subnetwork in the specified area.

type: object

properties:

targetName:

type: string

enum:

- WeakRSRPRatio

targetCondition:

type: string

enum:

- IS\_LESS\_THAN

targetValueRange:

type: integer

minimum: 0

maximum: 100

targetContexts:

$ref: '#/components/schemas/WeakRSRPContext'

WeakRSRPContext:

description: >-

This data type is the "TargetContext" data type with specialisations for WeakRSRPContext. It describes the threshold

for downlink weak RSRP of the cells (see RSRP measurements in TS 28.552 [6]) of the RAN SubNetwork that the intent

expectation is applied.

type: object

properties:

contextAttribute:

type: string

enum:

- WeakRSRPThreshold

contextCondition:

type: string

enum:

- IS\_LESS\_THAN

contextValueRange:

type: number

LowSINRRatioTarget:

description: >-

This data type is the "ExpectationTarget" data type with specialisations for LowSINRatioTarget.It describes the low SINR

ratio target for the RAN SubNetwork that the intent expectation is applied. The numerator is the number of the cells with

low SINR, and the denominator is the total number of cells of the RAN Subnetwork in the specified area.

type: object

properties:

targetName:

type: string

enum:

- LowSINRRatio

targetCondition:

type: string

enum:

- IS\_LESS\_THAN

targetValueRange:

type: integer

minimum: 0

maximum: 100

targetContexts:

$ref: '#/components/schemas/LowSINRContext'

LowSINRContext:

description: >-

This data type is the "TargetContext" data type with specialisations for LowSINRContext.It describes the threshold for

low SINR of the cells (see SINR measurements in TS 28.552 [6]) of the RAN SubNetwork that the intent expectation is applied.

type: object

properties:

contextAttribute:

type: string

enum:

- LowSINRThreshold

contextCondition:

type: string

enum:

- IS\_LESS\_THAN

contextValueRange:

type: integer

AveULRANUEThptTarget:

description: >-

This data type is the "ExpectationTarget" data type with specialisations for AveULRANUEThptTarget.It describes the average

UL RAN UE throughput target for RAN SubNetwork (see UL RAN UE throughput for a sub-network in TS 28.554[11]) that the intent

expectation is applied.

type: object

properties:

targetName:

type: string

enum:

- AveULRANUEThpt

targetCondition:

type: string

enum:

- IS\_GREATER\_THAN

targetValueRange:

type: integer

targetContexts:

type: array

items:

type: object

oneOf:

- $ref: '#/components/schemas/UlFrequencyContext'

- $ref: '#/components/schemas/RATContext'

AveDLRANUEThptTarget:

description: >-

This data type is the "ExpectationTarget" data type with specialisations for AveDLRANUEThptTarget.It describes the average

DL RAN UE throughput target for RAN SubNetwork (see DL RAN UE throughput for a sub-network in TS 28.554[11]) that the intent

expectation is applied.

type: object

properties:

targetName:

type: string

enum:

- AveDLRANUEThpt

targetCondition:

type: string

enum:

- IS\_GREATER\_THAN

targetValueRange:

type: integer

targetContexts:

type: array

items:

type: object

oneOf:

- $ref: '#/components/schemas/DlFrequencyContext'

- $ref: '#/components/schemas/RATContext'

LowULRANUEThptRatioTarget:

description: >-

This data type is the "ExpectationTarget" data type with specialisations for LowULRANUEThptRatioTarget.It describes the low

UL RAN UE throughput ratio target for the RAN SubNetwork that the intent expectation is applied. The numerator is the number

of the cells with low UL RAN UE throughput, and the denominator is the total number of cells of the RAN Subnetwork in the

specified area.

type: object

properties:

targetName:

type: string

enum:

- LowULRANUEThptRatio

targetCondition:

type: string

enum:

- IS\_LESS\_THAN

targetValueRange:

type: integer

minimum: 0

maximum: 100

targetContexts:

$ref: '#/components/schemas/LowULRANUEThptContext'

LowULRANUEThptContext:

description: >-

This data type is the "TargetContext" data type with specialisations for LowULRANUEThptContext.It describes the threshold

for the low UL RAN UE throughput cells (see average UL RAN UE throughput in gNB and distribution of UL UE throughput in gNB

in TS 28.552[6]) of the RAN SubNetwork that the intent expectation is applied.

type: object

properties:

contextAttribute:

type: string

enum:

- LowULRANUEThptThreshold

contextCondition:

type: string

enum:

- Is\_less\_than

contextValueRange:

type: number

LowDLRANUEThptRatioTarget:

description: >-

This data type is the "ExpectationTarget" data type with specialisations for LowDLRANUEThptRatioTarget. It describes

the low DL RAN UE throughput ratio target for the RAN SubNetwork that the intent expectation is applied.The numerator

is the number of the cells with low DL RAN UE throughput, and the denominator is the total number of cells of the

RAN Subnetwork in the specified area.

type: object

properties:

targetName:

type: string

enum:

- LowDLRANUEThptRatio

targetCondition:

type: string

enum:

- IS\_LESS\_THAN

targetValueRange:

type: integer

minimum: 0

maximum: 100

targetContexts:

$ref: '#/components/schemas/LowDLRANUEThptContext'

LowDLRANUEThptContext:

description: >-

This data type is the "TargetContext" data type with specialisations for LowDLRANUEThptContext.It describes the threshold

for the low DL RAN UE throughput cells ((see average DL RAN UE throughput in gNB and distribution of DL UE throughput in gNB

in TS 28.552[6]) ) of the RAN SubNetwork that the intent expectation is applied.

type: object

properties:

contextAttribute:

type: string

enum:

- LowDLRANUEThptThreshold

contextCondition:

type: string

enum:

- IS\_LESS\_THAN

contextValueRange:

type: number

HighULPrbLoadRatioTarget:

description: >-

This data type is the "ExpectationTarget" data type with specialisations for HighULPrbLoadRatioTarget. It describes the high UL

PRB load ratio target (as percentage) for the RAN SubNetwork that the intent expectation is applied. The numerator is the number

of the cells with high UL PRB load, and the denominator is the total number of cells of the RAN Subnetwork in the specified area.

type: object

properties:

targetName:

type: string

enum:

- HighULPrbLoadRatio

targetCondition:

type: string

enum:

- IS\_LESS\_THAN

targetValueRange:

type: integer

minimum: 0

maximum: 100

targetContexts:

$ref: '#/components/schemas/HighULPrbLoadContext'

HighULPrbLoadContext:

description: >-

This data type is the "TargetContext" data type with specialisations for HighULPrbLoadContext.It describes the threshold for high

uplink PRB load (i.e. UL Total PRB Usage in TS 28.552 [12] to represent the percentage of UL PRBs used) of the cells of the RAN

SubNetwork in the specified area that the intent expectation is applied.

type: object

properties:

contextAttribute:

type: string

enum:

- HighULPrbLoadThreshold

contextCondition:

type: string

enum:

- IS\_LESS\_THAN

contextValueRange:

type: integer

minimum: 0

maximum: 100

HighDLPrbLoadRatioTarget:

description: >-

This data type is the "ExpectationTarget" data type with specialisations for HighDLPrbLoadRatioTarget.It describes the high DL PRB

load ratio target (as percentage) for the RAN SubNetwork that the intent expectation is applied. The numerator is the number of the

cells with high DL PRB load, and the denominator is the total number of cells of the RAN Subnetwork in the specified area.

type: object

properties:

targetName:

type: string

enum:

- HighDLPrbLoadRatio

targetCondition:

type: string

enum:

- IS\_LESS\_THAN

targetValueRange:

type: integer

minimum: 0

maximum: 100

targetContexts:

$ref: '#/components/schemas/HighDLPrbLoadContext'

HighDLPrbLoadContext:

description: >-

This data type is the "TargetContext" data type with specialisations for HighDLPrbLoadContext.It describes the threshold for high downlink

PRB load (i.e. DL Total PRB Usage in TS 28.552 [12] to represent the percentage of DL PRBs used) of the cells of the RAN SubNetwork in the

specified area that the intent expectation is applied.

type: object

properties:

contextAttribute:

type: string

enum:

- HighDLPrbLoadThreshold

contextCondition:

type: string

enum:

- IS\_LESS\_THAN

contextValueRange:

type: integer

minimum: 0

maximum: 100

AveULPrbLoadTarget:

description: >-

This data type is the "ExpectationTarget" data type with specialisations for AveULPrbLoadTarget.It describes the average uplink PRB load target

(i.e. UL Total PRB Usage in TS 28.552 [12] to represent the percentage of UL PRBs used) of the cells of the RAN SubNetwork that the intent

expectation is applied.

type: object

properties:

targetName:

type: string

enum:

- AveULPrbLoad

targetCondition:

type: string

enum:

- IS\_LESS\_THAN

targetValueRange:

type: integer

minimum: 0

maximum: 100

AveDLPrbLoadTarget:

description: >-

This data type is the "ExpectationTarget" data type with specialisations for AveDLPrbLoadTarget.It describes the average dowlink PRB load

(i.e. DL Total PRB Usage in TS 28.552 [12] to represent the percentage of DL PRBs used) target for RAN SubNetwork that the intent expectation

is applied.

type: object

properties:

targetName:

type: string

enum:

- AveDLPrbLoad

targetCondition:

type: string

enum:

- IS\_LESS\_THAN

targetValueRange:

type: integer

minimum: 0

maximum: 100

RANEnergyConsumptionTarget:

description: >-

This data type is the "ExpectationTarget" data type with specialisations for RANEnergyConsumptionTarget.It describes the RAN energy consumption

target for RAN SubNetwork that the intent expectation is applied. The definition for RAN energy consumption see ECNG-RAN in clause 6.7.3.4.1 in

TS 28.554 [11].

type: object

properties:

targetName:

type: string

enum:

- RANEnergyConsumption

targetCondition:

type: string

enum:

- IS\_LESS\_THAN

targetValueRange:

type: integer

RANEnergyEfficiencyTarget:

description: >-

This data type is the "ExpectationTarget" data type with specialisations for RANEnergyEfficiencyTarget.It describes the RAN energy efficiency target

for RAN SubNetwork that the intent expectation is applied. The unit of this target is bit/J. The definition for RAN energy efficiency target for RAN

SubNetwork see EEMN,DV in clause 6.7.1.1 in TS 28.554 [11].

type: object

properties:

targetName:

type: string

enum:

- RANEnergyEfficiency

targetCondition:

type: string

enum:

- IS\_GREATER\_THAN

targetValueRange:

type: integer

DLThptPerUETarget:

description: >-

This data type is the "ExpectationTarget" data type with specialisations for DLThptPerUETarget. It describes the DL throughput target by the per UE for the

edge service supporting or radio servicde that the intent expectation is applied. For details see dlThptPerUE defined in clause 6.3.1 of TS 28.541 [5].

type: object

properties:

targetName:

type: string

enum:

- DlThptPerUE

targetCondition:

type: string

enum:

- IS\_GREATER\_THAN

targetValueRange:

$ref: 'TS28541\_SliceNrm.yaml#/components/schemas/XLThpt'

ULThptPerUETarget:

description: >-

This data type is the "ExpectationTarget" data type with specialisations for ULThptPerUETarget.It describes the UL throughput target by the per UE for the edge

service supporting or radio service that the intent expectation is applied. For details see ulThptPerUE defined in clause 6.3.1 of TS 28.541 [5].

type: object

properties:

targetName:

type: string

enum:

- UlThptPerUE

targetCondition:

type: string

enum:

- IS\_GREATER\_THAN

targetValueRange:

$ref: 'TS28541\_SliceNrm.yaml#/components/schemas/XLThpt'

DLLatencyTarget:

description: >-

This data type is the "ExpectationTarget" data type with specialisations for DLLatencyTarget.It describes the DL latency target for the edge service supporting or radio service

that the intent expectation is applied

type: object

properties:

targetName:

type: string

enum:

- DlLatency

targetCondition:

type: string

enum:

- IS\_LESS\_THAN

targetValueRange:

type: integer

ULLatencyTarget:

description: >-

This data type is the "ExpectationTarget" data type with specialisations for ULLatencyTarget. It describes the UL latency target for the edge service supporting or radioService

that the intent expectation is applied. For details see attribute ulLatency defined in clause 6.3.1 of TS 28.541 [5]

type: object

properties:

targetName:

type: string

enum:

- UlLatency

targetCondition:

type: string

enum:

- IS\_LESS\_THAN

targetValueRange:

type: integer

MaxNumberofUEsTarget:

description: >-

This data type is the "ExpectationTarget" data type with specialisations for MaxNumberofUEsTarget.It describes the the number of UEs for edge service supporting

that the intent expectation is applied. For details see attribute maxNumberofUE defined in clause 6.3.1 of of TS 28.541 [5]

type: object

properties:

targetName:

type: string

enum:

- maxNumberofUEs

targetCondition:

type: string

enum:

- IS\_LESS\_THAN

targetValueRange:

type: integer

ActivityFactorTarget:

description: >-

This data type is the "ExpectationTarget" data type with specialisations for ActivityFactorTarget.It describes the percentage value of the amount of simultaneous

active UEs to the total number of UEs where active means the UEs are exchanging data with the edge service supporting that the intent expectation is applied.

For details see activityFactor in clause 6.3.1 in TS 28.541 [5].

type: object

properties:

targetName:

type: string

enum:

- activityFactor

targetCondition:

type: string

enum:

- IS\_EQUAL\_TO

targetValueRange:

type: integer

UESpeedTarget:

description: >-

This data type is the "ExpectationTarget" data type with specialisations for UESpeedTarget.It describes the speed (in km/hour) supported for edge service supporting

that the intent expectation is applied. For details see uESpeed in clause 6.3.1 in TS 28.541[5].

type: object

properties:

targetName:

type: string

enum:

- uESpeed

targetCondition:

type: string

enum:

- IS\_LESS\_THAN

targetValueRange:

type: integer

MaxNumberofPDUsessionsTarget:

description: >-

This data type is the "ExpectationTarget" data type with specialisations for MaxNumberofPDUsessionsTarget.It describes the maximum number of PDU sessions for 5GC

SubNetwork supporting that the intent expectation is applied. For details, see maxNumberofPDUsessions in clause 5.3.1.2 in TS 28.552 [12].

type: object

properties:

targetName:

type: string

enum:

- MaxNumberofPDUsessions

targetCondition:

type: string

enum:

- IS\_LESS\_THAN

targetValueRange:

type: integer

targetContexts:

$ref: '#/components/schemas/5GSessionContext'

5GSessionContext:

description: >-

This data type is the "TargetContext" data type with specialisations for 5GSessionContext.It describes the maximum supported 5G PDU session of the 5GC SubNetwork

related to the intent expectation.

type: object

properties:

contextAttribute:

type: string

enum:

- 5GSession

contextCondition:

type: string

enum:

- IS\_less\_THAN

contextValueRange:

type: integer

MaxNumberofRegisteredsubscribersTarget:

description: >-

This data type is the "ExpectationTarget" data type with specialisations for MaxNumberofRegisteredsubscribersTarget.It describes the maximum number of Registered

subscribers for 5GC SubNetwork supporting that the intent expectation is applied. For details, see maxNumberofRegisteredsubscribers in clause 5.6.2 in TS 28.552 [12].

type: object

properties:

targetName:

type: string

enum:

- MaxNumberofRegisteredsubscribers

targetCondition:

type: string

enum:

- IS\_LESS\_THAN

targetValueRange:

type: integer

IncomingDataTarget:

description: >-

This data type is the "ExpectationTarget" data type with specialisations for IncomingDataTarget.It describes the maximum incoming data packets for 5GC SubNetwork

related to the intent expectation. For details, see N6 incoming link usage measurement in clause 5.4.2.1 in TS 28.552 [12].

type: object

properties:

targetName:

type: string

enum:

- IncomingData

targetCondition:

type: string

enum:

- IS\_LESS\_THAN

targetValueRange:

type: integer

OutgoingDataTarget:

description: >-

This data type is the "ExpectationTarget" data type with specialisations for OutgoingDataTarget.It describes the maximum outgoing data packets for 5GC SubNetwork

related to the intent expectation. For details, see N6 outgoing link usage measurement in clause 5.4.2.2 in TS 28.552 [12].

type: object

properties:

targetName:

type: string

enum:

- OutgoingData

targetCondition:

type: string

enum:

- IS\_LESS\_THAN

targetValueRange:

type: integer

#-------Definition of the concrete ExpectationTarget dataType----------#

#-------Definition of the concrete ObjectTarget dataType----------------#

CoverageAreaPolygonContext:

description: >-

This data type is the "ObjectContext" data type with specialisations for CoverageAreaPolygonContext.It describes the coverage areas for the RAN SubNetwork that the

intent expectation is applied in the form of polygon.

type: object

properties:

contextAttribute:

type: string

enum:

- CoverageAreaPolygon

contextCondition:

type: string

enum:

- IS\_ALL\_OF

contextValueRange:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/GeoArea'

CoverageTACContext:

description: >-

This data type is the "ObjectContext" data type with specialisations for CoverageTACContext.It describes the coverage areas for the RAN SubNetwork that the intent

expectation is applied in the form of TAC.

type: object

properties:

contextAttribute:

type: string

enum:

- CoverageAreaTac

contextCondition:

type: string

enum:

- IS\_ALL\_OF

contextValueRange:

type: array

uniqueItems: true

items:

$ref: "TS28623\_ComDefs.yaml#/components/schemas/Tac"

PLMNContext:

description: >-

This data type is the "ObjectContext" data type with specialisations for PLMNContext

type: object

properties:

contextAttribute:

type: string

enum:

- PLMN

contextCondition:

type: string

enum:

- IS\_ALL\_OF

contextValueRange:

type: array

uniqueItems: true

items:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/PlmnId'

DlFrequencyContext:

description: >-

This data type is the "Context" data type with specialisations for Object context "DLFrequencyContext". It describes the downlink frequency information (RF reference

frequencies and/ or the frequency operating band) supported by the RAN SubNetwork that the intent expectation is applied.

type: object

properties:

contextAttribute:

type: string

enum:

- DlFrequency

contextCondition:

type: string

enum:

- IS\_ALL\_OF

contextValueRange:

type: array

uniqueItems: true

items:

$ref: 'TS28312\_IntentNrm.yaml#/components/schemas/Frequency'

UlFrequencyContext:

description: >-

This data type is the "Context" data type with specialisations for Object context "ULFrequencyContext".It describes the uplink frequency information (RF reference

frequencies and/ or the frequency operating band) supported by the RAN SubNetwork that the intent expectation is applied.

type: object

properties:

contextAttribute:

type: string

enum:

- UlFrequency

contextCondition:

type: string

enum:

- IS\_ALL\_OF

contextValueRange:

type: array

uniqueItems: true

items:

$ref: 'TS28312\_IntentNrm.yaml#/components/schemas/Frequency'

RATContext:

description: >-

This data type is the "ObjectContext" data type with specialisations for RATContext.It describes the RAT supported by the RAN SubNetwork that the intent expectation

is applied.

type: object

properties:

contextAttribute:

type: string

enum:

- RAT

contextCondition:

type: string

enum:

- IS\_ALL\_OF

contextValueRange:

type: array

uniqueItems: true

items:

type: string

enum:

- UTRAN

- EUTRAN

- NR

UEGroupContext:

description: >-

This data type is the "ObjectContext" data type with specialisations for UEGroup([5QI, SNSSAI])

type: object

properties:

contextAttribute:

type: string

enum:

- UEGroup

contextCondition:

type: string

enum:

- IS\_ALL\_OF

contextValueRange:

type: array

uniqueItems: true

items:

$ref: "TS28312\_IntentNrm.yaml#/components/schemas/UEGroup"

EdgeIdentificationIdContext:

description: >-

This data type is the "ObjectContext" data type with specialisations for EdgeIdentificationIdContext

type: object

properties:

contextAttribute:

type: string

enum:

- edgeIdentificationId

contextCondition:

type: string

enum:

- IS\_EQUAL\_TO

contextValueRange:

type: string

EdgeIdentificationLocContext:

description: >-

This data type is the "ObjectContext" data type with specialisations for EdgeIdentificationLocContext

type: object

properties:

contextAttribute:

type: string

enum:

- edgeIdentificationTarget

contextCondition:

type: string

enum:

- IS\_EQUAL\_TO

contextValueRange:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/GeoCoordinate'

CoverageAreaTAContext:

description: >-

This data type is the "ObjectContext" data type with specialisations for CoverageAreaTAContext

type: object

properties:

contextAttribute:

type: string

enum:

- coverageAreaTA

contextCondition:

type: string

enum:

- IS\_ALL\_OF

contextValueRange:

type: array

uniqueItems: true

items:

$ref: "TS28623\_ComDefs.yaml#/components/schemas/Tac"

NfTypeContext:

description: >-

This data type is the "ObjectContext" data type with specialisations for NfTypeContext

type: object

properties:

contextAttribute:

type: string

enum:

- NfType

contextCondition:

type: string

enum:

- IS\_ALL\_OF

contextValueRange:

type: array

uniqueItems: true

items:

$ref: "TS28541\_5GcNrm.yaml#/components/schemas/NFType"

NfInstanceLocationContext:

description: >-

This data type is the "ObjectContext" data type with specialisations for NfInstanceLocationContext

type: object

properties:

contextAttribute:

type: string

enum:

- NfInstanceLocation

contextCondition:

type: string

enum:

- IS\_ALL\_OF

contextValueRange:

type: array

uniqueItems: true

items:

type: string

TaiContext:

description: >-

This data type is the "ObjectContext" data type with specialisations for TaiContext

type: object

properties:

contextAttribute:

type: string

enum:

- Tai

contextCondition:

type: string

enum:

- IS\_ALL\_OF

contextValueRange:

type: array

uniqueItems: true

items:

$ref: "TS28623\_GenericNrm.yaml#/components/schemas/Tai"

ServingScopeContext:

description: >-

This data type is the "ObjectContext" data type with specialisations for ServingScopeContext

type: object

properties:

contextAttribute:

type: string

enum:

- ServingScope

contextCondition:

type: string

enum:

- IS\_ALL\_OF

contextValueRange:

type: array

uniqueItems: true

items:

type: string

DnnContext:

description: >-

This data type is the "ObjectContext" data type with specialisations for DnnContext

type: object

properties:

contextAttribute:

type: string

enum:

- Dnn

contextCondition:

type: string

enum:

- IS\_ALL\_OF

contextValueRange:

type: array

uniqueItems: true

items:

type: string

#-------Definition of the scenario specific ObjectTarget dataType----------------#

#-------Definition of the concrete ExpectationContext dataType----------------#

TargetAssuranceTimeContext:

description: >-

This data type is the "Expectation Context" data type with specialisations for TargetAssuranceTimeContext.It describes the timeWindows

(including startTime, endTime) when the targets in the Intent Expectation need to be assured.

type: object

properties:

contextAttribute:

type: string

enum:

- TargetAssuranceTime

contextCondition:

type: string

enum:

- IS\_EQUAL\_TO

contextValueRange:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/TimeWindow'

ServiceStartTimeContext:

description: >-

This data type is the "ExpectationContext" data type with specialisations for ServiceStartTimeContext

type: object

properties:

contextAttribute:

type: string

enum:

- ServiceStartTime

contextCondition:

type: string

enum:

- IS\_EQUAL\_TO

contextValueRange:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/DateTime'

ServiceEndTimeContext:

description: >-

This data type is the "ExpectationContext" data type with specialisations for ServiceEndTimeContext

type: object

properties:

contextAttribute:

type: string

enum:

- ServiceEndTime

contextCondition:

type: string

enum:

- IS\_EQUAL\_TO

contextValueRange:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/DateTime'

UEMobilityLevelContext:

description: >-

This data type is the "ExpectationContext" data type with specialisations for UEMobilityLevelContext

type: object

properties:

contextAttribute:

type: string

enum:

- UEMobilityLevel

contextCondition:

type: string

enum:

- IS\_EQUAL\_TO

contextValueRange:

$ref: "TS28541\_SliceNrm.yaml#/components/schemas/MobilityLevel"

ResourceSharingLevelContext:

description: >-

This data type is the "ExpectationContext" data type with specialisations for ResourceSharingLevelContext

type: object

properties:

contextAttribute:

type: string

enum:

- ResourceSharingLevel

contextCondition:

type: string

enum:

- IS\_EQUAL\_TO

contextValueRange:

$ref: "TS28541\_SliceNrm.yaml#/components/schemas/SharingLevel"

ServiceTypeContext:

description: >-

This data type is the "ExpectationContext" data type with specialisations for ServiceTypeContext.It describes

the service type for the Radio Service that the intent expectation is applied. For details see sST in clause 6.4.1 in TS 28.541 [5]

type: object

properties:

contextAttribute:

type: string

enum:

- ServiceType

contextCondition:

type: string

enum:

- IS\_EQUAL\_TO

contextValueRange:

$ref: "TS28541\_NrNrm.yaml#/components/schemas/Sst"

StartTimeContext:

description: >-

This data type is the "ExpectationContext" data type with specialisations for StartTimeContext

type: object

properties:

contextAttribute:

type: string

enum:

- StartTime

contextCondition:

type: string

enum:

- IS\_EQUAL\_TO

contextValueRange:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/DateTime'

#-------Definition of the concrete ExpectionContext dataType----------------#

<CODE ENDS>

\*\*\* END OF CHANGE 1 \*\*\*

\*\*\* START OF CHANGE 2 \*\*\*

\*\*\* OpenAPI/TS28312\_IntentNrm.yaml \*\*\*

<CODE BEGINS>

openapi: 3.0.1

info:

title: Intent NRM

version: 18.5.0

description: >-

OAS 3.0.1 definition of the Intent NRM

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externalDocs:

description: 3GPP TS 28.312; Intent driven management services for mobile networks

url: http://www.3gpp.org/ftp/Specs/archive/28\_series/28.312/

paths: {}

components:

schemas:

#-------- Definition of types for name-containments ------

SubNetwork-ncO-IntentNrm:

type: object

properties:

IntentHandlingFunction:

$ref: '#/components/schemas/IntentHandlingFunction-Multiple'

#-------Definition of generic IOCs ----------#

Intent-Single:

description: >-

This IOC represents the properties of an Intent driven management information between MnS consumer and MnS producer.

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

userLabel:

type: string

intentExpectations:

type: array

uniqueItems: true

items:

type: object

oneOf:

- $ref: "#/components/schemas/IntentExpectation"

- $ref: "TS28312\_IntentExpectations.yaml#/components/schemas/RadioNetworkExpectation"

- $ref: "TS28312\_IntentExpectations.yaml#/components/schemas/EdgeServiceSupportExpectation"

- $ref: "TS28312\_IntentExpectations.yaml#/components/schemas/5GCNetworkExpectation"

- $ref: "TS28312\_IntentExpectations.yaml#/components/schemas/RadioServiceExpectation"

contextSelectivity:

$ref: "#/components/schemas/Selectivity"

intentContexts:

type: array

uniqueItems: true

items:

$ref: '#/components/schemas/Context'

description: >-

It describes the list of Context(s) which represents the constraints and conditions that should apply

for the entire intent even if there may be specific contexts defined for specific parts of the intent

intentAdminState:

type: string

enum:

- ACTIVATED

- DEACTIVATED

description: >-

It describes the intent administrative state.

This attribute is used when MnS consumer-suspension mechanism is supported

intentPriority:

type: integer

minimum: 1

maximum: 100

description: It expresses the priority of the stated intent within a MnS consumer.

intentPreemptionCapability:

type: boolean

observationPeriod:

type: integer

description: >-

It represents the observation period of the fulfilmentInfo for corresponding

ExpectationTargets, IntentExpectations and Intent.

intentReportReference:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnRo'

IntentReport-Single:

description: It represents intent report information from MnS producer to MnS consumer.

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

intentFulfilmentReport:

$ref: '#/components/schemas/IntentFulfilmentReport'

intentConflictReports:

type: array

uniqueItems: true

items:

$ref: '#/components/schemas/IntentConflictReport'

intentFeasibilityCheckReport:

$ref: '#/components/schemas/IntentFeasibilityCheckReport'

lastUpdatedTime:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/DateTimeRo'

intentReference:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnRo'

IntentHandlingFunction-Single:

description: >-

It represents the intent handling capabilities can be supported by a specific intent

handling function of MnS producer.

allOf:

- $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

- type: object

properties:

intentHandlingCapabilityList:

type: array

uniqueItems: true

items:

$ref: '#/components/schemas/IntentHandlingCapability'

Intent:

$ref: '#/components/schemas/Intent-Multiple'

IntentReport:

$ref: '#/components/schemas/IntentReport-Multiple'

#-------Definition of generic IOCs ----------#

#-------Definition of the generic IntentExpectation dataType ----------#

IntentExpectation:

description: >-

This data type is the "IntentExpectation" data type without specialisations

It represents MnS consumer's requirements, goals and contexts given to a 3GPP system

type: object

properties:

expectationId:

type: string

description: A unique identifier of the intentExpectation within the intent.

expectationVerb:

$ref: "#/components/schemas/ExpectationVerb"

expectationObject:

$ref: "#/components/schemas/ExpectationObject"

expectationTargets:

type: array

uniqueItems: true

items:

$ref: '#/components/schemas/ExpectationTarget'

contextSelectivity:

$ref: "#/components/schemas/Selectivity"

expectationContexts:

type: array

uniqueItems: true

items:

$ref: '#/components/schemas/Context'

required:

- expectationId

#-------Definition of the generic IntentExpectation dataType ----------#

#-------Definition of the generic ExpectationObject dataType ----------#

ExpectationObject:

description: >-

It represents the Object to which the IntentExpectation should apply.

This data type is the "ExpectationObject" data type without specialisations

type: object

properties:

objectType:

type: string

enum:

- RAN\_SUBNETWORK #value for Radio Network Expectation--#

- EDGE\_SERVICE\_SUPPORT #value for Edge Service Support Expectation--#

- 5GC\_SUBNETWORK #value for 5GC Network Expectation--#

- Radio\_Service #value for Radio Service Expectation--#

objectInstance:

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/Dn'

objectContexts:

type: array

uniqueItems: true

items:

$ref: '#/components/schemas/Context'

description: >-

It describes the list of Context(s) which represents the constraints and conditions to be

used as filter information to identify the object(s) to which a given intentExpectation should apply.

#-------Definition of the generic ExpectationObject dataType ----------#

#-------Definition of the generic dataType --------------#

Condition:

type: string

enum:

- IS\_EQUAL\_TO

- IS\_LESS\_THAN

- IS\_GREATER\_THAN

- IS\_WITHIN\_RANGE

- IS\_OUTSIDE\_RANGE

- IS\_ONE\_OF

- IS\_NOT\_ONE\_OF

- IS\_EQUAL\_TO\_OR\_LESS\_THAN

- IS\_EQUAL\_TO\_OR\_GREATER\_THAN

- IS\_ALL\_OF

Selectivity:

type: string

enum:

- ALL\_OF

- ONE\_OF

- ANY\_OF

FulfilmentStatus:

type: string

readOnly: true

enum:

- FULFILLED

- NOT\_FULFILLED

default: NOT\_FULFILLED

description: It describes the current status of the intent fulfilment result.

NotFulfilledState:

type: string

readOnly: true

enum:

- ACKNOWLEDGED

- COMPLIANT

- DEGRADED

- SUSPENDED

- TERMINATED

- FULFILMENTFAILED

default: ACKNOWLEDGED

description: It describes the current progress of or the reason for not achieving fulfilment

for the intent, intentExpectation or expectationTarget.

An attribute which is used when FulfilmentInfo is implemented for IntentFulfilmentInfo

FulfilmentInfo:

description: >-

This dataType represents the properties of a specific fulfilment information for an aspect of

the intent (i.e. either an expectation, a target or the whole intent).

type: object

properties:

fulfilmentStatus:

$ref: '#/components/schemas/FulfilmentStatus'

notFullfilledState:

$ref: "#/components/schemas/NotFulfilledState"

notFulfilledReasons:

type: array

uniqueItems: true

items:

type: string

readOnly: true

description: An attribute which is used when FulfilmentInfo is implemented for IntentFulfilmentInfo

ExpectationVerb:

type: string

enum:

- DELIVER

- ENSURE

description: It describes the characteristic of the intentExpectation and is the property that describes the types of intentExpectations. Vendor extensions are allowed

Frequency:

description: >-

It desribes the RF reference frequency (i.e. Absolute Radio Frequency Channel Number)

and/or the frequency operating band used for a given direction (UL or DL) in FDD or

for both UL and DL directions in TDD.

type: object

properties:

arfcn:

type: integer

description: >-

This attribute shall be supported, when the frequency information represent RF reference frequency.

The allowed values for NR see TS 38.104 subclause 5.4.2.1; The allowed values for EUTRAN see TS 36.104 [X] subclause 5.7.3;

freqband:

type: string

description: >-

This attribute shall be supported, when the frequency information represent frequency operating band.

The allowed values for NR see TS 38.104 subclause 5.4.2.3; The allowed value for EUTRAN see TS 36.104 subclause 5.7.3

ValueRangeType:

oneOf:

- type: number

- type: string

- type: boolean

- type: integer

- $ref: 'TS28623\_ComDefs.yaml#/components/schemas/TimeWindow'

- $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DateTime'

- $ref: 'TS28623\_ComDefs.yaml#/components/schemas/GeoArea'

- $ref: 'TS28623\_ComDefs.yaml#/components/schemas/PlmnId'

- $ref: 'TS28623\_ComDefs.yaml#/components/schemas/GeoCoordinate'

- $ref: '#/components/schemas/UEGroup'

- $ref: '#/components/schemas/Frequency'

UEGroup:

description: >-

It describes the UE Group, which is

represented by specific 5QI, specific S-NSSAI, or a specific combination

of S-NSSAI and 5QI

type: object

properties:

fiveQI:

type: integer

minimum: 0

maximum: 255

sNssai:

$ref: 'TS28541\_NrNrm.yaml#/components/schemas/Snssai'

#-------Definition of the generic dataType --------------#

#-------Definition of the generic ExpectationTarget dataType----------#

ExpectationTarget:

description: >-

This data type represents the target of the IntentExpectation that are required to be achieved.

This data type is the "ExpectationTarget" data type without specialisations

type: object

properties:

targetName:

type: string

targetCondition:

$ref: '#/components/schemas/Condition'

targetValueRange:

oneOf:

- type: array

uniqueItems: true

items:

$ref: "#/components/schemas/ValueRangeType"

- $ref: "#/components/schemas/ValueRangeType"

contextSelectivity:

$ref: "#/components/schemas/Selectivity"

targetContexts:

type: array

uniqueItems: true

items:

$ref: '#/components/schemas/Context'

description: It describes the list of constraints and conditions that should apply for a specific expectationTarget.

#-------Definition of the generic ExpectationTarget dataType----------#

#-------Definition of the generic Context dataType----------------#

Context:

description: >-

This data type is the "Context" data type without specialisations

type: object

properties:

contextAttribute:

type: string

contextCondition:

$ref: '#/components/schemas/Condition'

contextValueRange:

oneOf:

- type: array

uniqueItems: true

items:

$ref: "#/components/schemas/ValueRangeType"

- $ref: "#/components/schemas/ValueRangeType"

#-------Definition of the generic Context dataType----------------#

#-------Definition of the generic IntentFulfilmentReport dataType----------------#

IntentFulfilmentReport:

description: >-

It includes the intentFulfilmentInfo and expectationFulfilmetResult.

This attribute shall be supported when intent fulfilment information is supported by IntentReport

type: object

properties:

intentFulfilmentInfo:

$ref: '#/components/schemas/FulfilmentInfo'

expectationFulfilmentResult:

type: array

uniqueItems: true

items:

$ref: '#/components/schemas/ExpectationFulfilmentResult'

#-------Definition of the concrete IntentFulfilmentReport dataType----------------#

#-------Definition of the generic ExpectationFulfilmentResult dataType----------------#

ExpectationFulfilmentResult:

description: >-

It includes the expectationFulfilmentInfo and targetFulfilmentResults for each IntentExpectation.

type: object

properties:

expectaitonId:

type: string

readOnly: true

expectationFulfilmentInfo:

$ref: '#/components/schemas/FulfilmentInfo'

targetFulfilmentResult:

type: array

uniqueItems: true

items:

$ref: '#/components/schemas/TargetFulfilmentResult'

#-------Definition of the concrete ExpectationFulfilmentResult dataType----------------#

#-------Definition of the generic TargetFulfilmentResult dataType----------------#

TargetFulfilmentResult:

description: >-

This data type includes targetFulfilmentInfo and targetAchievedValue for each ExpectationTarget.

type: object

properties:

targetName:

type: string

readOnly: true

targetFulfilmentInfo:

$ref: '#/components/schemas/FulfilmentInfo'

targetAchievedValue:

type: number

description: >-

It describes the value that has been achieved for the expectation target at the time at which

the report is generated.

readOnly: true

targetContexts:

type: array

uniqueItems: true

items:

$ref: '#/components/schemas/Context'

#-------Definition of the concrete TargetFulfilmentResult dataType----------------#

#-------Definition of the generic IntentConflictReport dataType----------------#

IntentConflictReport:

description: >-

It represents the conflict information for the detected conflict

This attribute shall be supported when intent conflict information is supported by IntentReport

type: object

properties:

conflictId:

type: string

readOnly: true

conflictType:

type: string

readOnly: true

enum:

- INTENT\_CONFLICT

- EXPECTATION\_CONFLICT

- TARGET\_CONFLICT

conflictingIntent:

description: >-

This will be present if the value of conflictType is INTENT\_CONFLICT. It describes the DN of the conflicting intent

$ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnRo'

conflictingExpectation:

description: >-

This will be present if the value of conflictType is EXPECTATION\_CONFLICT. It describes the expectationId of the conflicting IntentExpectation with an Intent

type: string

readOnly: true

conflictingTarget:

description: >-

This will be present if the value of conflictType is TARGET\_CONFLICT. It describes the targetName of the conflicting ExpectationTarget with an IntentExpectation

type: string

readOnly: true

recommendedSolutions:

type: string

readOnly: true

enum:

- MODIFY

- DELETE

#-------Definition of the concrete IntentConflictReport dataType----------------#

#-------Definition of the generic IntentFeasibilityCheckReport dataType----------------#

IntentFeasibilityCheckReport:

description: >-

It represents the intent feasibility check information

This attribute shall be supported when intent feasibility check information information is supported by IntentReport

type: object

properties:

feasibilityCheckResult:

type: string

readOnly: true

enum:

- FEASIBLE

- INFEASIBLE

infeasibilityReason:

type: string

readOnly: true

description: An attribute which is used when feasibilityCheckResult is INFEASIBLE

#-------Definition of the concrete IntentFeasibilityCheckReport dataType----------------#

#-------Definition of the generic IntentHandlingCapability dataType----------------#

IntentHandlingCapability:

description: >-

It represents expectation object information and expectation target information

which can be supported by a specific intent handling function of MnS producer.

type: object

properties:

intentHandlingCapabilityId:

type: string

readOnly: true

supportedExpectationObjectType:

type: string

enum:

- RAN\_SUBNETWORK

- EDGE\_SERVICE\_SUPPORT

- 5GC\_SUBNETWORK

- Radio\_Service

readOnly: true

description: It describes the expectation object type which can be supported by a specific intent handling function of MnS producer.

supportedExpectationTargetNames:

type: array

uniqueItems: true

items:

type: string

readOnly: true

description: It describes the supported expectation targets for the supported expectation object type.

#-------Definition of the concrete IntentHandlingCapability dataType----------------#

#------Definition of JSON arrays for name-contained IOCs ---------------#

Intent-Multiple:

type: array

items:

$ref: '#/components/schemas/Intent-Single'

IntentReport-Multiple:

type: array

items:

$ref: '#/components/schemas/IntentReport-Single'

IntentHandlingFunction-Multiple:

type: array

items:

$ref: '#/components/schemas/IntentHandlingFunction-Single'

#------Definition of JSON arrays for name-contained IOCs ---------------#

#----- Definitions in TS 28.312 for TS 28.532 --------------------------#

resources-intentNrm:

oneOf:

- $ref: '#/components/schemas/IntentHandlingFunction-Single'

- $ref: '#/components/schemas/Intent-Single'

- $ref: '#/components/schemas/IntentReport-Single'

#----- Definitions in TS 28.312 for TS 28.532 --------------------------#

<CODE ENDS>

\*\*\* END OF CHANGE 2 \*\*\*

|  |
| --- |
| **End of Changes** |