**3GPP TSG- Meeting #**

**Orlando, , -**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
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|  |  | **CR** |  | **rev** |  | **Current version:** |  |  |
|  |
| *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 | **X** |

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|  |
| ***Title:***  | Rel-19 CR TS 28.312 Update use case, requirements and solution for intent feasibility check  |
|  |  |
| ***Source to WG:*** | , Deutsche Telekom |
| ***Source to TSG:*** | S5 |
|  |  |
| ***Work item code:*** |  |  | ***Date:*** |  |
|  |  |  |  |  |
| ***Category:*** |  |  | ***Release:*** |  |
|  | *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 canbe 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 and requirements for intent feasibility check is documented in TR 28.904 and recommended for normative work. It proposes to update the use case and requirements for intent fulfilment feasibility check in TS 28.312. |
|  |  |
| ***Summary of change:*** | Update the use case and requirements for intent fulfilment feasibility check in TS 28.312 based on clause 5.14 in TR 28.914. |
|  |  |
| ***Consequences if not approved:*** |  |
|  |  |
| ***Clauses affected:*** | 5.3.3.1, 5.3.3.2, 6.2.1.2.1.2, 6.2.1.3.10.2, 6.2.1.3.X(new), 6.2.1.4, TS28312\_IntentNrm.yaml |
|  |  |
|  | **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/1476> at commit 924c42d39a4453943fff09e8a57baeb3ac362c98 |
|  |  |
| ***This CR's revision history:*** |  |

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| **1st Change** |

### 5.3.3 Intent fulfilment feasibility check

#### 5.3.3.1 Introduction

The Intent fulfilment feasibility check can be performed in the following scenarios:

* Before MnS consumer expresses the intent expectations to MnS producer, MnS consumer may want to verify or check the feasibility whether the proposed intent expectation is possible for an MnS producer. Such feasibility check capability during intent pre-evaluation phase can be used to assist MnS consumer to generate the suitable intent information for intent driven MnS producer. For example, when the operator receives the service booking request for a video live broadcast service from vertical customer for a time window, the operator (as MnS consumer) may need to check with the MnS producer (e.g. RAN management system) the feasibility of the requested radio service.
* When intent driven MnS producer receives the intent instance creation or modification request from MnS consumer, the intent driven MnS producer may automatically perform feasibity check.

MnS producer performs the feasibility check activities to determine whether the submitted intent instance is feasible (including check the satisfaction of intent fulfilment and potential conflicts between one or more intent instances), and notify MnS consumer the result of feasibility check. If the result of intent fulfillment feasibility check is feasible, the MnS producer performs the service or network management tasks to satisfy the intent instance based on MnS consumer’s intent fulfilment request. In case the result of intent fulfillment feasibility check is infeasible, MnS producer notifies the MnS consumer the reason of infeasibility and corresponding recommendations, then the MnS consumer decides how to handle the issue that intent is infeasible, e.g. update the intent, suspend the intent, delete the intent, etc. The information indicating which intent expectations and targets are infeasible also included in the intent feasibility check result. This information is important for the MnS consumer to generate a feasible intent for an intent reported infeasible.

#### 5.3.3.2 Requirements

**REQ-IDMS\_IntentFeasibilityCheck-CON-1:** The intent-driven MnS producer should have capability to report the authorized MnS consumer the output of automatic feasibility check when receive the intent creation and modification request.

**REQ-IDMS\_IntentFeasibilityCheck-CON-2:** The intent-driven MnS producer shall have capability to inform the authorized MnS consumer about the result of intent fulfilment feasibility check, including feasible or infeasible.

**REQ-IDMS\_IntentFeasibilityCheck-CON-3:** The intent-driven MnS producer shall have capability to inform the authorized MnS consumer about the infeasible reason and corresponding recommendations if the result of intent fulfilment feasibility check is infeasible.

**REQ-IDMS\_IntentFeasibilityCheck-CON-4:** The intent-driven MnS producer shall have the capability to allow an authorized MnS consumer to request a feasibility check of a given intent.

**REQ-IDMS\_IntentFeasibilityCheck-CON-5:** The intent driven MnS producer should have the capability to provide the intent feasibility check result including the list of infeasible expectations and targets to the authorized MnS consumer.

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| **2nd Change** |

##### 6.2.1.2.1 Intent <<InformationObjectClass>>

###### 6.2.1.2.1.1 Definition

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

The Intent IOC contains one or multiple IntentExpectation(s) which includes MnS consumer's requirements, goals and contexts given to a 3GPP system*.*

The Intent IOC also contains intentAdminState to support intent suspension mechanism. In case MnS consumer wants to suspend an intent, MnS consumer can request MnS producer to configure attribute intentAdminState with the value "DEACTIVATED". A suspended intent means this intent is not considered for fulfillment. In case MnS consumer wants to resume an intent on the MnS producer side when the intent is suspended, MnS consumer can request MnS producer to configure attribute intentAdminState with the value "ACTIVATED".

The attribute "observationPeriod" indicates the time period for which the fulfilment process is observed and at the end of which the fulfilmentInfo for corresponding ExpectationTargets, IntentExpectations and Intent is updated. The observation period can be set by the MnS consumer or by the MnS producer if the MnS consumer does not provide a value.

The Intent IOC includes the attribute objectClass and objectInstance from the TOP IOC. The value of attribute objectClass is "Intent" and the value of attribute objectInstance is the DN of the instance of Intent IOC.

The Intent IOC includes contextSelectivity respectively used to define how to select among the stated intentContexts

###### 6.2.1.2.1.2 Attributes

The Intent IOC includes attributes inherited fromTop IOC (defined in 3GPP TS 28.622 [6]) and the following attributes.

Table 6.2.1.2.1.2-1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute Name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| intentExpectations | M | T | T | F | F |
| userLabel | M | T | T | F | F |
| intentMgmtPurpose | M | T | T | F | F |
| contextSelectivity | O | T | T | F | F |
| intentContexts | O | T | T | F | F |
| observationPeriod | O | T | T | F | F |
| intentPriority  | O | T | T | F | T |
| intentAdminState | CM | T | T | F | F |
| intentPreemptionCapability | CM | T | T | F | F |
| **Attribute related roles** |
| intentReportReference | M | T | F | F | F |

###### 6.2.1.2.1.3 Attribute constraints

|  |  |
| --- | --- |
| Name | Definition |
| intentAdminStateSupport Qualifier | Condition: MnS consumer-suspension mechanism is supported. |
| intentPreemptionCapabilitySupport Qualifier | Condition: The preemption mechanism is supported. |

###### 6.2.1.2.1.4 Notifications

The common notifications defined in clause 6.2.1.5 are valid for this IOC. In addition, the following set of notifications is also valid.

| Name | S | Notes |
| --- | --- | --- |
| notifyMOIChanges | M | -- |

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| **3rd Change** |

##### 6.2.1.3.10 IntentFeasibilityCheckReport <<dataType>>

###### 6.2.1.3.10.1 Definition

The IntentFeasibilityCheckReport <<dataType>> represents the intent feasibility check information. Intent feasibility check information is provided after MnS producer automatically performs feasibility check when the MnS producer received the intent creation or modification request from the MnS consumer. In case the feasibility check result is 'INFEASIBLE' the MnS producer will notify the MnS consumer.

###### 6.2.1.3.10.2 Attributes

The FeasibilityCheckReport includes the following attributes.

Table 6.2.1.3.10.2-1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute Name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| feasibilityCheckResult | M | T | F | F | T |
| inFeasibleExpectationInfos | O | T | F | F | T |
| infeasibilityReasons | M | T | F | F | T |

###### 6.2.1.3.10.3 Attribute constraints

Void.

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| **4th Change** |

##### 6.2.1.3.X InFeasibleExpectationInfo <<dataType>>

###### 6.2.1.3.X.1 Definition

This <<dataType>> describe a list of InFeasibleExpectationInfo for all infeasible IntentExpectations in the intent. Each InFeasibleExpectationInfo includes the list of TargetNames for the InFeasibleTargets.

###### 6.2.1.3.X.2 Attributes

Table 6.2.1.3.X.2-1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute Name | Support Qualifier | isReadable  | isWritable | isInvariant | isNotifyable |
| expectationId | M | T | F | F | F |
| inFeasibleTargets | M | T | F | F | F |

###### 6.2.1.3.X.3 Attribute constrains

None

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| **5th Change** |

#### 6.2.1.4 Attribute definition

Table 6.2.1.4-1

| Attribute Name | Documentation and Allowed Values | Properties |
| --- | --- | --- |
| userLabel | A user-friendly (and user assignable) name of the intent.allowedValues: Not Applicable | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| intentExpectations | It describes the expectations including requirements, goals and contexts (including constraints and filter information) given to a 3GPP system. It states the list of specific outcomes desired to be realized for expectation object(s).The intentExpectations are arranged in an ordered list such that the most important intentExpectations are on the top of the list.allowedValues: Not Applicable | type: IntentExpectationmultiplicity: 1..\*isOrdered: TrueisUnique: TruedefaultValue: NoneisNullable: False  |
| intentFulfilmentInfo | It describes status of fulfilment of an intent and the related reasons for that status. allowedValues: Not Applicable | type: FulfilmentInfomultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| expectationFulfilmentInfo | It describes status of fulfilment of an intentExpectation and the related reasons for that status.allowedValues: Not Applicable | type: FulfilmentInfomultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| targetFulfilmentInfo | It describes status of fulfilment of an expectationTarget and the related reasons for that status. allowedValues: Not Applicable | type: FulfilmentInfomultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| fulfilmentStatus | It describes the current status of the fulfilment result for intent, intentExpectation or expectationTarget, which is configured by MnS producer and can be read by MnS consumer.allowedValues: "FULFILLED", "NOT\_FULFILLED" | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: "NOT\_FULFILLED"isNullable: False |
| notFulfilledState | It describes the current state for not achieving fulfilment for the intent, intentExpectation or expectationTarget. It is configured/written by MnS producer and can be read by MnS consumer.allowedValues: "ACKNOWLEDGED", "COMPLIANT", "DEGRADED", "SUSPENDED", "TERMINATED" "FULFILMENTFAILED" | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: "ACKNOWLEDGED"isNullable: False |
| notFulfilledReasons | It describes the reasons/observations related to the specific notFulfilledStateallowedValues: Not Applicable | type: Stringmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| intentContexts | It describes the list of IntentContext(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.allowedValues: triple of (attribute, condition, value range) | type: Contextmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| expectationId | A unique identifier of the intentExpectation within the intent.allowedValues: Not Applicable | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| expectationVerb | It describes the characteristic of the intentExpectation and is the property that describes the types of intentExpectations. Examples of verbs and their related types of expectation are Deliver: DeliveryIntentExpectation, e.g. Deliver a RAN network, Service, Slice, functionEnsure: AssuranceintentExpectation, e.g. Ensure the target performance value.allowedValues: DELIVER, ENSUREVendor extensions are allowed | type: Stringmultiplicity: 1isOrdered:N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| expectationObject | It describes the expectation objects to which the IntentExpectation should apply.allowedValues: Not Applicable | type: ExpectationObjectmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| objectType | It describes the type of expectation object of the IntentExpectation that is required to be applied to. It can be class name of the managed object.allowedValues: see scenario specific IntentExpectation | type: Enummultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| objectInstance | It describes a specific object instance (e.g. instance of managed object) to which the intentExpectation should apply.allowedValues: Not Applicable | type: DNmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| objectContexts | It describes the list of ObjectContext(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. Note there may be other constraints and conditions defined either for the entire intent, for the specific intentExpectation or for the expectationTarget of the considered intentExpectation.The concrete ObjectContext depends on the ExpectationObject, which is defined in clause 6.2.2. All the concrete ObjectContexts follow the common structure of ObjectContext. | type: Contextmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| expectationTargets | It describes the list of ExpectationTarget(s) which represent specific outcomes on the metrics that characterize the performance of the object(s) or some abstract index that expresses the behavior of the object(s) that are desired to be realized for a given intentExpectation.The concrete ExpectationTarget depends on the ExpectationObject, which is defined in clause 6.2.2. All the concrete ExpectationTargets follow the common structure of ExpectationTarget.The expectionTargets are arranged in an ordered list such that the most important expectionTargets are on the top of the list. | type: ExpectationTargetmultiplicity: 1..\*isOrdered: TrueisUnique: TruedefaultValue: NoneisNullable: False |
| expectationContexts | It describes the list of context(s) which represents the constraints and conditions that should apply for a specific intentExpectation.Note there may be other constraints and conditions defined for the entire intent or for specific parts of the intentExpectation.allowedValues: depends on Expectation Object in the IntentExpectation | type: Contextmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| targetName | It describes the name of the expectation target which represents specific outcomes on the metrics that characterize the performance of the object(s) or some abstract index that expresses the behavior of the object(s) that are desired to be realized for a given intentExpectation.allowedValues: depends on ExpectationObject in the IntentExpectation | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: True |
| targetCondition | It expresses the limits within which the targetName is allowed/supposed to be. allowedValues: "IS\_EQUAL\_TO", "IS\_LESS\_THAN", "IS\_GREATER\_THAN", "IS\_WITHIN\_RANGE", "IS\_OUTSIDE\_RANGE", "IS\_ONE\_OF", " IS\_EQUAL\_TO\_OR\_LESS\_THAN”, "IS\_EQUAL\_TO\_OR\_GREATER\_THAN", "IS\_NOT\_ONE\_OF", "IS\_ALL\_OF" | type: Enummultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: "IS\_EQUAL\_TO"isNullable: False |
| targetValueRange | It describes the range of values that applicable to the targetName and the targetCondition.allowedValues: depends on the targetCondition.The value will be a single value when the targetCondition is either "IS\_EQUAL\_TO", "IS\_LESS\_THAN", "IS\_GREATER\_THAN", "IS EQUAL TO OR LESS THAN", "IS EQUAL TO OR GREATER THAN” The value will be a pair of values when the targetCondition is either "IS\_WITHIN\_RANGE", "IS\_OUTSIDE\_RANGE"The value will be a list when the targetCondition is "IS\_ONE\_OF", "IS\_NOT\_ONE\_OF","IS\_ALL\_OF". See NOTE 1.  | type: ValueRangeTypemultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: True |
| targetContexts | It describes the list of constraints and conditions that should apply for a specific expectationTarget. Note there may be other constraints and conditions defined for the entire intent or the intentExpectation.allowedValues: Not Applicable | type: Contextmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| contextAttribute | It describes a specific attribute of or related to the object or to characteristics thereof (e.g. its control parameter, gauge, counter, KPI, weighted metric, etc) to which the expectation should apply or an attribute related to the operating conditions of the object (such as weather conditions, load conditions, etc). | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: True |
| contextCondition | It expresses the limits within which the ContextAttribute is allowed/supposed to be allowedValues: "IS\_EQUAL\_TO", "IS\_LESS\_THAN", "IS\_GREATER\_THAN", "IS\_WITHIN\_RANGE", "IS\_OUTSIDE\_RANGE, "IS\_ONE\_OF", "IS\_EQUAL\_TO\_OR LESS\_THAN", "IS\_EQUAL\_TO\_OR\_GREATER\_THAN", "IS\_NOT\_ONE\_OF", "IS\_ALL\_OF" | type: Enummultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: "IS\_EQUAL\_TO"isNullable: False |
| contextValueRange | It describes the range of values that applicable to the ContextAttribute and the ContextCondition.AllowedValue: depends on the contextConditionThe value will be a single value when the contextCondition is either "IS\_EQUAL\_TO", "IS\_LESS\_THAN", "IS\_GREATER\_THAN", "IS\_EQUAL\_TO\_OR\_LESS\_THAN", "IS\_EQUAL\_TO\_OR\_GREATER\_THAN". The value will be a pair of values when the contextCondition is either "IS\_WITHIN\_RANGE", "IS\_OUTSIDE\_RANGE"The value will be a list when the contextCondition is "IS\_ONE\_OF", "IS\_NOT\_ONE\_OF","IS\_ALL\_OF".See NOTE 1. | type: ValueRangeTypemultiplicity: 1..\*isOrdered: False isUnique: TruedefaultValue: NoneisNullable: True |
| intentPriority | It expresses the priority of the stated intent within an MnS consumer. AllowedValue: values in the range [1-100] where 1 indicates the highest priority and 100 indicates the lowest priority.NOTE: The handing of the priorities across MnS consumers is left to implementation  | type: integermultiplicity: 1isOrdered: FalseisUnique: TruedefaultValue: 1isNullable: False |
| geoArea | It describes a geographical area defined in 3GPP TS 28.622[6].AllowedValue: As defined by the data type | type: GeoAreamultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: True |
| pLMNId | It describes the information of a PLMN identification defined in 3GPP 28.658[10]AllowedValue: As defined by the data type | type: PLMNIdmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: True |
| dateTime | It describes the information of a date time defined in 3GPP TS 28.622[6].AllowedValue: As defined by the data type | type: DateTimemultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: True |
| timeWindow | It describes the information of a time window (including startTime, endTime) defined in 3GPP TS 28.622[6].AllowedValue: As defined by the data type | type: TimeWindowmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: True |
| geoCoordinate | It describes the information of a geoCoordinate defined in 3GPP TS 28.622[6].AllowedValue: As defined by the data type | type: GeoCoordinatemultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: True |
| frequency | 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.AllowedValue: As defined by the data type | type: Frequencymultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: True |
| arfcn | It desribes the RF reference frequency (i.e. Absolute Radio Frequency Channel Number).Allowed Value:For NR, see TS 38.104 [8] clause 5.4.2.1.For EUTRAN, see TS 36.104 [14] clause 5.7.3. | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: True |
| freqband | It desribes the the frequency operating band.Allowed Value:For NR, see TS 38.104 [8] clause 5.4.2.3.For EUTRAN, see TS 36.104 [14] clause 5.7.3. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: True |
| uEGroup | It describes the information of a UE Group (represented by specific 5QI, specific S-NSSAI, or a specific combination of S-NSSAI and 5QI).AllowedValue: As defined by the data type | type: UEGroupmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: True |
| fiveQI | It describes the information of a 5QI defined in 3GPP TS 28.541[5].AllowedValue: 0 - 255 | type: integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: True |
| sNSSAI | It describes the information of a S-NSSAI defined in 3GPP TS 28.541[5].AllowedValue: As defined by the data type | type: S-NSSAImultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: True |
| intentAdminState | It describes the intent administrative state, which enables the MnS consumer to suspend an intent or cancel the suspension for a suspended intent. A suspended intent means this intent is not considered for fulfilmentallowedValues: "ACTIVATED", "DEACTIVATED" | type: Enummultiplicity: 1isOrdered: N/A isUnique: N/AdefaultValue: "ACTIVATED"isNullable: False |
| intentReference | It indicates the associated intent instanceallowedValues: Not Applicable | type: DNmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| intentReportReference | It indicates the associated intent report instance(s)allowedValues: Not Applicable | type: DNmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| observationPeriod | It represents the observation period of the fulfilmentInfo for corresponding ExpectationTargets, IntentExpectations and Intent. At the end of the observation period, the corresponding fulfilment info is updated in the intent report. The observation period can be assigned by MnS consumer through requesting the MnS producer to set attribute "observationPeriod". MnS producer also can assign the observation period if MnS consumer didn’t assign it.The observation time is expressed in seconds.allowedValues: Not Applicable | type: Integermultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| intentFulfilmentReport | It describes the fulfillment information which is reported for the associated intent instance.allowedValues: Not Applicable | type: IntentFulfilmentReportmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| intentConflictReports | It describes the conflict information which is reported for associated intent instance if needed.allowedValues: Not Applicable | type: IntentConflictReportmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| conflictId | It is used to identify the detected conflict within an IntentReport instance.allowedValues: Not Applicable | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| conflictType | It describes the type of intent conflict.allowedValues: INTENT\_CONFLICT, EXPECTATION\_CONFLICT, TARGET\_CONFLICT | type: Enummultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| conflictingIntent | It describes the DN of the conflicting intentallowedValues: Not Applicable | type: DNmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| conflictingExpectation | It describes the expectationId of the conflicting IntentExpectation within an Intent.allowedValues: Not Applicable | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| conflictingTarget | It describes the targetName of the conflicting ExpectationTarget within an IntentExpectation.allowedValues: Not Applicable | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| recommendedSolutions | It describes the action recommended by the MnS producer to be undertaken by the MnS consumer to resolve intent conflict. The recommended solution applies only for the specific intent whose intent report contains this attribute.allowedValues: "MODIFY", "DELETE" | type: ENUMmultiplicity: 1isOrdered: FalseisUnique: TruedefaultValue: None isNullable: False |
| expectationFulfilmentResults | It includes the expectationFulfilmentInfo and targetFulfilmentResults for each IntentExpectation. The expectationFulfilmentInfo describes status of fulfilment of an intentExpectation and the related reasons for infeasible status.allowedValues: Not Applicable | type: ExpectationFulfilmentResultmultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| targetFulfilmentResults | It includes targetFulfilmentInfo and targetAchievedValue for each ExpectationTarget. The targetFulfilmentInfo describes status of fulfilment of an expectationTarget and the related reasons for infeasible status. The targetAchieveValue describes current performance value for the ExpectationTarget.allowedValues: Not Applicable | type: TargetFulfilmentResultmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| targetAchievedValue | It describes the value that has been achieved for the expectation target at the time at which the report is generated.allowedValues: Not Applicable | type: Numbermultiplicity: 0..1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| intentFeasibilityCheckReport | It describes the intent feasibility check information which is reported if needed.allowedValues: Not Applicable | type: IntentFeasibilityCheckReportmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| feasibilityCheckResult | It describes the result of intent fulfilment feasibility checkallowedValues: FEASIBLE, INFEASIBLE | type: Enummultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| infeasibilityReasons | It describes the reason (e.g. invalid intent expression, the intent conflict) of the result of intent fulfilment feasibility check is INFEASIBLENOTE: The ENUM value for infeasibilityReason is not specified in present document. | type: ENUMmultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: None isNullable: False |
| intentHandlingCapabilityList | It describes the list of expectation object information and expectation target information which can be supported by intent handling function.allowedValues: Not Applicable | type: IntentHandlingCapabilitymultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: None isNullable: False |
| intentHandlingCapabilityId | A unique identifier of property of intent handling capability should be supported by the intent handling function of MnS producer.allowedValues: Not Applicable | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| supportedExpectationObjectType | It describes the expectation object type which can be supported by a specific intent handling function of MnS producer.allowedValues: objectType defined in clause 6.2.1.3.2. | type: Enummultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| supportedExpectationTargetNames | It describes the supported expectation targets for the supported expectation object type.allowedValues: targetName defined in clause 6.2.1.3.3 | type: Stringmultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: None isNullable: False |
| lastUpdatedTime | It describes the time for the latest update of the IntentReport Instance. | type: DateTimemultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| ContextSelectivity | It expresses the may in which all or a subset of the expectationTargets may be applied.AllowedValue: "ALL\_OF", "ONE\_OF", "ANY\_OF" | type: Enummultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: "ALL\_OF"isNullable: False |
| intentPreemptionCapability | It describes the pre-emption capability. The attribute is used by MnS producer to decide the target of intent deletion or intent modificationallowedValue: TRUE, FALSE | type: Booleanmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: "FALSE"isNullable: False |
| intentMgmtPurpose | It describes the MnS consumer requirements for the management purpose (required procedures) of the created or modified intent instance.allowedValue: FEASIBILITYCHECK, FULFILMENT | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: "FULFILMENT"isNullable: False |
| inFeasibleExpectationInfos | It describes the list of InFeasibleExpectationInfo for all infeasible IntentExpectations in the intent. | type: InFeasibleExpectationInfomultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| inFeasibleTargets | It describes the list of TargetNames for the InFeasibleTargets | type: Stringmultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| NOTE: For "IS\_ALL\_OF", the value shall be a match of the entire list. |

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

Forge MR link: <https://forge.3gpp.org/rep/sa5/MnS/-/merge_requests/1476> at commit 924c42d39a4453943fff09e8a57baeb3ac362c98

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

\*\*\* 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"

 intentMgmtPurpose:

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

 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

 IntentMgmtPurpose:

 description: >-

 It describes the MnS consumer requirements for the management purpose (required procedures)

 of the created or modified intent instance

 type: string

 enum:

 - FEASIBILITYCHECK

 - FULFILMENT

 default: FULFILMENT

 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

 #-------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

 inFeasibleExpectationInfos:

 type: array

 items:

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

 InFeasibleExpectationInfo:

 description: >-

 It describes the list of InFeasibleExpectationInfo for all infeasible IntentExpectations

 in the intent

 type: object

 properties:

 expectationId:

 type: string

 readOnly: true

 inFeasibleTargets:

 type: array

 items:

 type: string

 readOnly: true

 description: It describes the list of TargetNames for the InFeasibleTargets

 #-------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 1 \*\*\*

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