**3GPP TSG-SA5 Meeting #158 *S5-246439***

Orlando, US, 18 - 22 November 2024

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  |  | **CR** |  | **rev** | 01 | **Current version:** | **18.5.0** |  |
|  | | | | | | | | |
| *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 Negotiation on intent fulfilment** | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Nokia | | | | | | | | | |
| ***Source to TSG:*** | SA5 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | DUMMY | | | | |  | ***Date:*** | | | 2024-11-07 |
|  |  | | | |  | |  | | |  |
| ***Category:*** |  |  | | | | | ***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)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Intent negotiation is a capability that enables the intent handler and an intent MnS consumer to collaboratively agree on the best way to fulfil an intent. TR28.914 has studied intent negotiation during intent fulfilment with a recommendation to normatively specific the use case, its requirements and solutions. This CR adds that use case, requirements and solution. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | New use case, requirements and solutions on interactions for intent negotiation during intent fulfilment is added. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Interactions for intent negotiation will not be supported | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.3, 6.2.1.2, 6.2.1.3, 6.2.1.4  5.3.X, 6.2.1.3:X, (new clauses added) | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

***Start of First change***

### 5.3.X Negotiation on fulfilment of intents

#### 5.3.X.1 Introduction

For a given intent, an MnS Consumer may express a feasible intent, but the producer may have multiple ways to fulfil it. One of these solutions might be better in one aspect and another solution might be better in another aspect. Although this intent is feasible, the producer may not have the knowledge and capability to determine which solution is appropriate.

Example, the MnS Consumer may express intent for energy saving but only specify the target for energy consumption reduction without more constraints, e.g. reduce 20 % energy consumption. There will be numerous solutions to fulfil the energy consumption target with various impacts, e.g. one solution may reduce the coverage and one may reduce the number of users.

The MnS consumer may have concerns on the possible impact of the selected solution by the Producer, which means that negotiation with the MnS Consumer is necessary. In such cases, the MnS consumer and Mns producer may negotiate on the best way to fulfil the intent.

Intent negotiation is a set of procedures which can be applicable throughout the life cycle of an intent. Several negotiations are possible for a feasible intent, many employing interactions that are similar.

NOTE: Some of these negotiations may also be applicable during the feasibility check process.

#### 5.3.X.2 Checking for fulfillable outcomes

The MnS consumer wants to know possible fulfillable outcomes for a given intent. The MnS consumer creates an intent that should be evaluated by the MnS producer to see options which the MnS producer can deliver.



Figure 5.3.X.2-1: MnS consumer requests and receives a list of fulfillable outcomes on an intent.

Many dynamic factors can impact possible outcomes. As a result, it is unrealistic to expect all potential outcomes to be reported. The list of possible outcomes an MnS Producer may provide is left to implementation.

Subsequently, the MnS producer provides a report indicating what is fulfillable for each intent aspect (intentExpectation and expectationTarget) within that intent. Since different fulfillable outcomes may have different impacts, the report should include the relative impacts of each outcome.

NOTE: the mechanism by which MnS Consumer can indicate a preference for a specific possible outcome is TBD.

#### 5.3.X.3 Checking for best possible outcome on an intent, intent expectation, or expectation target

The MnS consumer wants to know the best possible outcome for a given intent or intent expectation or expectation target. This could be prior to or during fulfilment.



Figure 5.3.X.3-1: Checking for best possible outcome on intent or  
intent expectation or expectation target

The MnS consumer creates an intent that should be evaluated by the MnS producer with a request to provide the best possible outcome. Subsequently, the MnS producer provides a report indicating that best possible outcome. The best possible outcome is defined as follows:

- The request is to evaluate specific expectation target(s) in an intent with multiple expectation targets (e.g. multiple expectations or one expectation with multiple expectation targets): The best possible outcome is the best value on specificexpectation target(s) that maintains the other expectation targets to within the ranges specified in the intent.

- The request is to evaluate all expectation targets in an intent with multiple expectation targets (e.g. multiple expectations or one expectation with multiple expectation targets): The best possible outcome is the best value on each expectation target that maintains the other expectation targets to within the ranges specified in the intent.

The MnS producer should support an fulfillable outcomes report that lists the fulfillable outcomes for any of the three scenarios, the report including the related impact on other targets in the intent or on other metrics and contexts.

#### 5.3.X.4 MnS producer to provide information about possible fulfillment of the intent

The MnS consumer wants and requests to know for a specific property what the MnS producer recommends what could be applied for particular intent characteristics. The MnS producer has attempted to fulfil the intent and indicated that it cannot be fulfilled, so the MnS consumer asks the MnS producer to recommend what changes could be made to their intent or another of their intents to make the intent fulfillable. Treceive



Figure 5.3.X.4-1: Enabling the MnS consumer to request and receive a recommendation on  
the possible fulfillable intent properties prior to or in case of failure of fulfilment.

Subsequently, the MnS producer provides a report indicating the information about possible fulfilment of the intent. The MnS producer should support a recommended-changes report that lists different information about possible fulfilment of intent, e.g., candidate changes to unfulfillable targets within an unfulfillable expectation.

#### 5.3.X.5 MnS consumer advises on preferred alternatives

The MnS consumer wants an intent fulfilled. The intent is feasible, but the MnS producer has multiple alternatives related to fulfilling the intent. The MnS producer wants the MnS consumer to advise on their (the MnS consumer's) preference among these alternatives.

NOTE 1: An alternative is the combination a set of expectation target values that the MnS producer can achieve together with their (expected) impacts on the network (objects). E.g. for an expectation target on energy consumption, the impact may include coverage area as a result of the energy consumption.



Figure 5.3.X.5-1: MnS consumer advises the MnS producer  
on the preferences among alternatives at the MnS producer

After the MnS consumer creates an intent to be fulfilled, the MnS producer determines that there are multiple alternatives, so the MnS producer and provides a report to the MnS consumer so that the MnS consumer may help chose the best alternative.

The report to the MnS consumer may include:

- The list of available/fulfillable expectation target values that the MnS producer is able to apply/achieve.

- The expected relative impacts of the different alternatives - on aspects of the submitted intent or their intents and intent expectations.

- A request to the MnS consumer to select one among the alternatives.

Given the alternatives, the MnS consumer takes any combination of these actions:

- Chooses and indicates the preferred alternative.

- Defines the relative importance of their expectation Targets (in the form of a utility function) so that the MnS producer may consider these in deciding upon the solution/ solution approach/ closed loops/ action/ outcome to be applied/deployed/achieved.

- Provides the relative satisfaction level that each of the alternatives achieves. The satisfaction level is the computation of the utility achieved by each alternative according to the MnS consumer’s utility function. It is an integer in the range  [0,100] . The highest possible value indicates that the solution provided by the MnS producer achieves the best possible outcomes that the MnS consumer expected, e.g., that it achieves the highest range of a target whose desired values were defining as falling in a range. Correspondingly, the values lower than 100 indicate how far from the maximum satisfaction the outcome is.

#### 5.3.X.6 Requirements

**REQ-Intent\_Negotiation \_01:** The intent-driven MnS producer should have the capability to provide possible outcomes to the MnS Consumer.

**REQ-Intent\_Negotiation\_02:**The intent-driven MnS producer should have the capability enabling MnS Consumer to decide appropriate outcome for fulfilment based on possible outcomes.

NOTE 1: The definition for outcome is For Further Study.

**REQ\_INT\_NEGOT-1:** The intent driver MnS producer should support a capability enabling an MnS consumer to provide an intent with a request for the MnS producer to provide information on the alternative fulfillable outcomes for an intent.

NOTE 2: An alternative is the combination of a set of expectation target values that the MnS producer can achieve together with their (expected) impacts.

NOTE 3: The impacts refer to information about the changes and outcomes on the expectation objects of the intent and on other related intents from the same intent MnS consumer. The impact refers to outcomes of the contexts and targets that MnS consumers have not explicitly pointed out. The exact characterization of what is reported is For Further Study. E.g. for an expectation target on energy consumption, the impact may include which cells could be deactivated, or which other of their intents (e.g. coverage related intents) could be applied to make the intent fulfillable.

NOTE 4: Example changes could include: omitting certain intentExpectations and/or expectationTarget(s) or changing the properties of intentExpectations and/or expectationTarget(s).

**REQ\_INT\_NEGOT-2:** The intent driven MnS producer should support a capability to provide to an MnS consumer an intent report indicating the alternatives that the MnS producer can support for the provided intent, intent expectations, or expectation Targets and the expected relative impacts of the different alternatives.

**REQ\_INT\_NEGOT-3:** The intent driven MnS producer should support a capability to request an MnS consumer to indicate its preference among a set of alternatives that the MnS producer can support for the provided intent, intent expectations, or expectation Targets.

**REQ\_INT\_NEGOT-4:** The intent driven MnS producer should support a capability enabling an MnS consumer to provide to the MnS producer information indicating the MnS consumer's preference among alternatives that the MnS producer can support for the provided intent, intent expectations, or expectation Targets.

**REQ\_INT\_NEGOT-5:** The intent driven MnS producer should support a capability enabling an authorized MnS consumer to provide information on a policy that should be used by the be used by the MnS producer to select among the alternatives available at the MnS producer.

NOTE 5: The policy may be provided in the form of a utility function.

**REQ\_INT\_NEGOT-6:** The intent driven MnS producer should support a capability to request the MS consumer to provide an evaluation of the MnS producer's alternatives based on the expected relative impacts of the different alternatives.

**REQ\_INT\_NEGOT-7:** The intent driven MnS producer should support a capability enabling an MnS consumer to provide an evaluation of the MnS producer's alternatives to then be used to select among the alternatives.

**REQ\_INT\_NEGOT-8:** The intent driven MnS producer should support a capability to inform an authorized MnS consumer that an alternative among multiple alternatives has been selected and (will be/has been) applied for the submitted intent.

**REQ\_INT\_NEGOT-9:** The intent driven MnS producer should support a capability to inform an authorized MnS consumer that since no more improvement to intent fulfillment shall be possible the MnS consumer should evaluate the extent to which the applied alternative satisfies the MnS consumer's objectives or provide extra information which can help improve satisfaction.

**REQ\_INT\_NEGOT-10:** The intent driven MnS producer should support a capability enabling an authorized consumer to inform the producer that the alternative selected by the MnS producer was not satisfactory and another alternative should be applied.

**REQ\_INT\_NEGOT-11:** The intent driven MnS producer should support a capability enabling an authorized MnS consumer to provide information on the level of fulfillment which the MnS producer can use to differently attempt the fulfillment.

**REQ\_INT\_NEGOT-12 (already supported):** The intent driven MnS producer should support a capability enabling an authorized MnS consumer to revise the properties of an intent as the means to improve the chances of the intent being fulfillable.

**INT\_NEGOT\_REQ 13:** The MnS producer should support a capability to provide an intent report including information on what is achievable for each intent aspect (intentExpectation and expectationTarget) within that intent and the relative cost/impact of achieving that outcome.

**INT\_NEGOT\_REQ 14:** The MnS producer should support a capability enabling an MnS consumer to provide an intent with a request for the MnS producer to provide the best possible outcome on an intent or intent expectation or expectation target.

**INT\_NEGOT\_REQ 15:** The MnS producer should support a capability to provide an intent report including information on the best possible outcome on intent or intent expectation or expectation target.

NOTE 6: This requirement may be combined with REQ-13.

**INT\_NEGOT\_REQ-16:** The MnS producer should support a capability enabling an MnS consumer to provide an intent with a request for the MnS producer to provide information on what changes could be made to the intent properties or to properties of other of their intents to make the intent fulfillable.

NOTE 7: Further discussion is needed for this requirement.

**INT\_NEGOT\_REQ-17:** The MnS producer may support a capability to provide a report indicating the changes, which if applied to the intent, would make the intent fulfillable

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| **Next Change** |

## 6.2 Information model definition for Intent (MnS component typeB)

### 6.2.1 Generic Information model definition

#### 6.2.1.0 Imported information entities and local labels

|  |  |
| --- | --- |
| 3GPP TS 28.622 [6], DataType, DateTime | DateTime |
| 3GPP TS 28.622 [6], DataType, GeoArea | GeoArea |
| 3GPP TS 28.658 [10], DataType, PLMNId | PLMNId |
| 3GPP TS 28.622 [6], DataType, TimeWindow | TimeWindow |
| 3GPP TS 28.622 [6], DataType, GeoCoordinate | GeoCoordinate |

#### 6.2.1.1 Class diagram

##### 6.2.1.1.1 Relationship



NOTE: Void

Figure 6.2.1.1.1-1: Relationship UML diagram for intent driven management

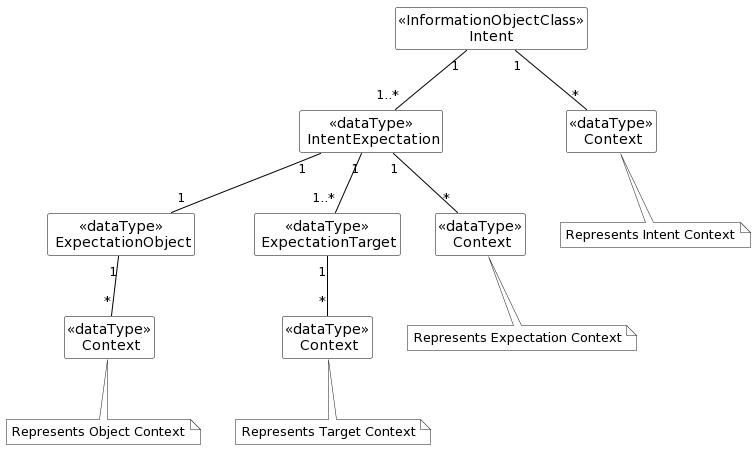


Figure 6.2.1.1.1-2: Relationship UML diagram for intent



Figure 6.2.1.1.1-3: Relationship UML diagram for intent report

##### 6.2.1.1.2 Inheritance



Figure 6.2.1.1.2-1: Inheritance UML diagram for intent driven management

#### 6.2.1.2 Class definition

##### 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 |
| 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 |
| intentNegotiationConsumerFeedback | O | T | T | T | T |
| **Attribute related roles** | | | | | |
| intentReportReference | M | T | F | F | F |

###### 6.2.1.2.1.3 Attribute constraints

|  |  |
| --- | --- |
| Name | Definition |
| intentAdminState  Support Qualifier | Condition: MnS consumer-suspension mechanism is supported. |
| intentPreemptionCapability  Support 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 | -- |

##### 6.2.1.2.2 IntentReport <<InformationObjectClass>

###### 6.2.1.2.2.1 Definition

This IOC represents intent report information from MnS producer to MnS consumer. The IntentReport instance is created by MnS producer automatically when creating an Intent instance. When the MnS producer delete an intent instance based on a request from MnS consumer, the corresponding intent report instance is also deleted by MnS producer automatically. MnS consumers cannot request MnS producer to create or delete IntentReport instance.

The IntentReport IOC includes

- intentFulfilmentReport, which represents the properties of fulfillment information for expectation target, intent expectation, and the whole intent. The fulfilmentReport will be observed from the start of each observation period (specified in Intent IOC), then at the end of each observation period, the corresponding values will be derived and configured.

- intentConflictReport, which represents detected conflict information, including conflict type (i.e., intent conflict, expectation conflict and target conflict) and possible solution recommendations to address the conflicts.

- intentFeasibilityCheckReport, which indicates that the intent is feasible or infeasible. Intent feasibility check information is provided after MnS producer automatically performs feasibility check when receiving the intent creation and modification request from MnS consumer.

Each instance of IntentReport IOC can contain one or any combination of intentFulfilmentReport, intentConflictReport and intentFeasibilityCheckReport.

Different MnS consumers can use the "getMOIAttributes" operation to query different attributes of the IntentReport <<IOC>> to obtain corresponding intent report information (including intentFulfilmentReport, intentConflictReport and intentFeasibilityCheckReport).

Different MnS consumers can subscribe attribute value change notifications for IntentReport <<IOC>> to obtain the notification for different intent report information.

###### 6.2.1.2.2.2 Attributes

The IntentReport <<IOC>> includes attributes inherited fromTop IOC (defined in TS 28.622 [6]) and the following attributes

Table 6.2.1.2.2.2-1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute Name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| intentFulfilmentReport | CM | T | F | F | T |
| intentConflictReports | CM | T | F | F | T |
| intentFeasibilityCheckReport | CM | T | F | F | T |
| lastUpdatedTime | M | T | F | F | T |
| intentNegotiationReport | CM | T | F | F | T |
| Attribute related to roles | | | | | |
| intentReference | M | T | F | F | F |

###### 6.2.1.2.2.3 Attribute constraints

Table 6.2.1.2.2.3-1

|  |  |
| --- | --- |
| Name | Definition |
| intentFulfilmentReport  Support Qualifier | Condition: intent fulfilment information is supported by IntentReport |
| intentConflictReports  Support Qualifier | Condition: intent conflict information is supported by IntentReport |
| intentFeasibilityCheckReport  Support Qualifier | Condition: intent feasibility check information is supported by IntentReport |
| intentNegotiationReport | Condition: intent negotiation is supported by the Intent Mns producer |

###### 6.2.1.2.2.4 Notifications

The common notifications defined in clause 6.2.1.5 are valid for this IOC, without exceptions or additions

##### 6.2.1.2.3 IntentHandlingFunction <<InformationObjectClass>>

###### 6.2.1.2.3.1 Definition

This IOC represents the intent handling capabilities can be supported by a specific intent handling function of MnS producer. IntentHandlingFunction instances are created by the MnS producer or are pre-installed, and also are modified, deleted by the MnS producer if needed. MnS consumers cannot request to create, modify or delete IntentHandlingFunction instances.

An MnS consumer can query the IntentHandlingFunction IOC to obtain the intent handling capability information for a specific intent handling function of MnS producer. Based on the obtained intent handling capability information and management requirements, MnS consumer generates the corresponding intent information and sends it to MnS producer. The intent information includes the expectation object and expectation targets which are not only supported by the obtained intent handing capabilities, but also satisfy the MnS consumer’s management requuirements.

The MnS consumer also can use the DN of IntentHandlingFunction instance to query all Intent instances handled by a specific intent handling function.

###### 6.2.1.2.3.2 Attributes

The IntentHandlingFunction <<IOC>> includes attributes inherited fromTop IOC (defined in TS 28.622 [6]) and the following attributes

Table 6.2.1.2.3.2-1

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

###### 6.2.1.2.3.3 Attribute constraints

None.

###### 6.2.1.2.3.4 Notifications

The common notifications defined in clause 6.2.1.5 are valid for this IOC, without exceptions or additions.

#### 6.2.1.3 DataType definition

##### 6.2.1.3.1 IntentExpectation <<dataType>>

6.2.1.3.1.1 Definition

IntentExpectation <<dataType>>represents MnS consumer's requirements, goals and contexts given to a 3GPP system*.*

The IntentExpectation <<dataType>> includes contextSelectivity used to define how to select among the stated expectationContexts.

6.2.1.3.1.2 Attributes

The IntentExpectation includes the following attributes.

Table 6.2.1.3.1.2-1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute Name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| expectationId | M | T | T | T | T |
| expectationVerb | O | T | T | T | F |
| expectationObject | M | T | T | F | F |
| expectationTargets | M | T | T | F | F |
| contextSelectivity | O | T | T | F | F |
| expectationContexts | O | T | T | F | F |
| NOTE: The scenario specific IntentExpectations in clause 6.2.2 are defined utilizing the constructs of this generic IntentExpectation <<dataType>>. | | | | | |

6.2.1.3.1.3 Attribute constraints

None.

###### 6.2.1.3.1.4 Notifications

The notifications specified for the IOC using this <<dataType>> for its attribute(s), shall be applicable.

##### 6.2.1.3.2 ExpectationObject <<dataType>>

6.2.1.3.2.1 Definition

The ExpectationObject <<dataType>> represents the Object to which the IntentExpectation should apply.

6.2.1.3.2.2 Attributes

The ExpectationObject includes the following attributes.

Table 6.2.1.3.2.2-1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute Name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| objectType | CM | T | T | F | F |
| objectInstance | CM | T | T | F | F |
| objectContexts | O | T | T | F | F |

6.2.1.3.2.3 Attribute constraints

Table 6.2.1.3.2.3-1

|  |  |
| --- | --- |
| Name | Definition |
| objectType  Support Qualifier | Condition: The intent expectation is not for a specific object instance or MnS consumer have no knowledge of the DN of this specific object instance. |
| objectInstance  Support Qualifier | Condition: The intent expectation is for a specific object instance and MnS consumer have the knowledge of the DN of this specific object instance. |

##### 6.2.1.3.3 ExpectationTarget <<dataType>>

###### 6.2.1.3.3.1 Definition

The ExpectationTarget <<dataType>> represents the target of the IntentExpectation that are required to be achieved.

The ExpectationTarget <<dataType>> includes a contextSelectivity used to define how to select among the stated targetContexts.

###### 6.2.1.3.3.2 Attributes

The ExpectationTarget includes the following attributes.

Table 6.2.1.3.3.2-1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute Name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| targetName | M | T | T | F | T |
| targetCondition | M | T | T | F | F |
| targetValueRange | M | T | T | F | F |
| contextSelectivity | O | T | T | F | F |
| targetContexts | O | T | T | F | F |

###### 6.2.1.3.3.3 Attribute constraints

None.

###### 6.2.1.3.3.4 Notifications

The notifications specified for the IOC using this <<dataType>> for its attribute(s), shall be applicable.

##### 6.2.1.3.4 Context <<dataType>>

6.2.1.3.4.1 Definition

The Context <<dataType>> represents the properties of a context. A context describes the condition. The context may apply to the intent, the intent expectation, the expectation targets or to the expectation object.

6.2.1.3.4.2 Attributes

The Context includes the following attributes.

Table 6.2.1.3.4.2-1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute Name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| contextAttribute | M | T | T | F | F |
| contextCondition | M | T | T | F | F |
| contextValueRange | M | T | T | F | F |

6.2.1.3.4.3 Attribute constraints

None.

##### 6.2.1.3.5 FulfilmentInfo << dataType >>

###### 6.2.1.3.5.1 Definition

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). The fulfilment information describes the MnS producer's assessment of the degree to which a specific aspect of the intent is being fulfilled. The MnS consumer may however assess the fulfilment differently, e.g. the MnS consumer may evaluate the delivered outcome or network state to compute its fulfilment satisfaction.

The fulfilmentStatus field indicates whether the intent is being fulfilled or not being fulfilled. The possible values of the fulfilment include:

- NOT\_FULFILLED: This is the default status for any aspect of the intent and the fulfilmentStatus remains as "NOT\_FULFILLED" until the actions undertaken meet the requirements as stated by the MnS consumer.

- FULFILLED: This is the status if the MnS producer considers that the intent, expectation or target is being fulfilled as desired by the MnS consumer that created the intent.

The degree of fulfilment of an intent with the NOT\_FULFILLED status may have multiple explanations and related states. These different progress states and conditions are recorded in the notFulfilledState field. notFulfilledState is present only when FulfilmentInfo is implemented for IntentFulfilmentInfo. The possible values of the notFulfilledState include:

- ACKNOWLEDGED: this is the default state and is the initial notFulfilledState right after the intent has been received and its instance has been created.

- COMPLIANT: this is the state after the feasibility check has been run for the intent and the intent is accepted as being compliant for fulfilment.

- DEGRADED: this is the state if an intent that was previously fulfilled but after a period of observation it is found not be meeting the initially stated requirements.

- SUSPENDED: this is the state if the MnS producer or MnS consumer decides to suspend the fulfilment of the intent, expectation or target for whatever reason. This notFulfilledState shall be supported by a reason such as the event(s) that were observed when fulfilment was attempted.

- TERMINATED: This state is registered if the respective aspect of the intent (i.e. either an expectation, a target or the whole intent) shall not be considered for fulfilment e.g. when an authorized MnS consumer sends an indication terminating the specific aspect of the intent. For instance, if the MnS consumer sends an update of the intent in which a particular target is eliminated, then that target shall be marked as "TERMINATED".

- FULFILMENTFAILED: This is the state when the MnS producer decides that the intent, expectation or target cannot be fulfilled. This state shall be supported by a reason such as the event(s) that were observed when fulfilment was attempted.

For some scenarios (in particular for the notFulfilledState with value "DEGRADED", “TERMINATED", "SUSPENDED" and "FULFILMENTFAILED"), the notFulfilledState should be supported by extra information describing or related to the state. This extra information is recorded into the notFulfilledReasons field.

###### 6.2.1.3.5.2 Attributes

The FulfilmentInfo includes the following attributes.

Table 6.2.1.3.5.2-1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute Name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| fulfilmentStatus | M | T | F | F | T |
| notFulfilledState | CM | T | F | F | T |
| notFulfilledReasons | CO | T | F | F | T |

###### 6.2.1.3.5.3 Attribute constraints

Table 6.2.1.3.5.3-1

|  |  |
| --- | --- |
| Name | Definition |
| notFulfilledState  Support Qualifier | Condition: when FulfilmentInfo is implemented for IntentFulfilmentInfo |
| notFulfilledReasons  Support Qualifier | Condition: when FulfilmentInfo is implemented for IntentFulfilmentInfo |

###### 6.2.1.3.5.4 Notifications

The notifications specified for the IOC using this <<dataType>> for its attribute(s), shall be applicable.

##### 6.2.1.3.6 IntentFulfilmentReport <<dataType>>

###### 6.2.1.3.6.1 Definition

This <<dataType>> includes the intentFulfilmentInfo and expectationFulfilmentResults. The intentFulfilmentInfo describes status of fulfilment of an intent and the related reasons for the infeasible status.

###### 6.2.1.3.6.2 Attributes

The IntentFulfilmentReport includes the following attributes.

Table 6.2.1.3.6.2-1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Attribute Name** | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| intentFulfilmentInfo | M | T | F | F | T |
| expectationFulfilmentResults | O | T | F | F | T |

###### 6.2.1.3.6.3 Attribute constraints

None.

##### 6.2.1.3.7 ExpectationFulfilmentResult <<dataType>>

###### 6.2.1.3.7.1 Definition

ExpectationFulfilmentResult <<dataType>> includes the expectationFulfilmentInfo and targetFulfilmentResults for each IntentExpectation. The expectationFulfilmentInfo describes status of fulfilment of an intentExpectation and the related reasons for the infeasible status.

###### 6.2.1.3.7.2 Attributes

The ExpectationFulfilmentResult includes the following attributes.

Table 6.2.1.3.7.2-1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Attribute Name** | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| expectationId | M | T | F | T | T |
| expectationFulfilmentInfo | M | T | F | F | T |
| targetFulfilmentResults | O | T | F | F | T |

###### 6.2.1.3.7.3 Attribute constraints

None.

##### 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.

###### 6.2.1.3.8.2 Attributes

The TargetFulfilmentResult includes the following attributes.

Table 6.2.1.3.8.2-1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 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 |

###### 6.2.1.3.8.3 Attribute constraints

None.

##### 6.2.1.3.9 IntentConflictReport << dataType >>

###### 6.2.1.3.9.1 Definition

IntentConflictReport <<dataType>> represents the conflict information for the detected conflict.

When a conflict is detected, the MnS producer will configure the value of attributes of IntentConflictReport and notify the MnS consumer about the conflict, indicating the intent, intent expectation or expectation target which give rise to the conflict. The value of recommendedSolutions may be configured by MnS producer and notified to MnS consumer.

###### 6.2.1.3.9.2 Attributes

The IntentConflictReport includes the following attributes.

**Table 6.2.1.3.9.2-1**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute Name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| conflictId | M | T | F | T | T |
| conflictType | M | T | F | F | T |
| conflictingIntent | CM | T | F | F | T |
| conflictingExpectation | CM | T | F | F | T |
| conflictingTarget | CM | T | F | F | T |
| recommendedSolutions | O | T | F | F | T |

###### 6.2.1.3.9.3 Attribute constraints

|  |  |
| --- | --- |
| Name | Definition |
| conflictingIntent  Support Qualifier | Condition: This will be present if the value of conflictType is INTENT\_CONFLICT |
| conflictingExpectation  Support Qualifier | Condition: This will be present if the value of conflictType is EXPECTATION\_CONFLICT |
| conflictingTarget  Support Qualifier | Condition: This will be present if the value of conflictType is TARGET\_CONFLICT |

##### 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 |
| infeasibilityReasons | M | T | F | F | T |

###### 6.2.1.3.10.3 Attribute constraints

Void.

##### 6.2.1.3.11 IntentHandlingCapability <<dataType>>

###### 6.2.1.3.11.1 Definition

The IntentHandlingCapability <<dataType>> represents expectation object information and expectation target information which can be supported by a specific intent handling function of MnS producer.

The IntentHandlingCapability <<dataType>> includes a supportedExpectationObjectType and corresponding supportedExpectationTargetNames.

###### 6.2.1.3.11.2 Attributes

The IntentHandlingCapability includes the following attributes.

Table 6.2.1.3.11.2-1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute Name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| intentHandlingCapabilityId | M | T | F | F | T |
| supportedExpectationObjectType | M | T | F | F | T |
| supportedExpectationTargetNames | M | T | F | F | T |

###### 6.2.1.3.11.3 Attribute constraints

None.

##### 6.2.1.3.12 ValueRangeType<<choice>>

###### 6.2.1.3.12.1 Definition

This <<choice>> defines the data type for value of the "targetValueRange" and "contextValueRange".

###### 6.2.1.3.12.2 Attributes

Table 6.2.1.3.12.2-1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute Name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| CHOICE\_1.1 real | CM | T | T | F | F |
| CHOICE\_2.1 enum | CM | T | T | F | F |
| CHOICE\_3.1 string | CM | T | T | F | F |
| CHOICE\_4.1 boolean | CM | T | T | F | F |
| CHOICE\_5.1 integer | CM | T | T | F | F |
| CHOICE\_6.1 timeWindow | CM | T | T | F | F |
| CHOICE\_7.1 dateTime | CM | T | T | F | F |
| CHOICE\_8.1 geoArea | CM | T | T | F | F |
| CHOICE\_9.1 pLMNId | CM | T | T | F | F |
| CHOICE\_10.1 geoCoordinate | CM | T | T | F | F |
| CHOICE\_11.1 uEGroup | CM | T | T | F | F |
| CHOICE\_12.1 frequency | CM | T | T | F | F |

###### 6.2.1.3.12.3 Attribute constrains

Table 6.2.1.3.12.3-1

|  |  |
| --- | --- |
| Name | Definition |
| CHOICE\_1.1 real CM Support Qualifier | Condition: This attribute shall be supported, when the type is Real. |
| CHOICE\_2.1 enum CM Support Qualifier | Condition: This attribute shall be supported, when the type is Enum. |
| CHOICE\_3.1 string CM Support Qualifier | Condition: This attribute shall be supported, when the type is String. |
| CHOICE\_4.1 boolean CM Support Qualifier | Condition: This attribute shall be supported, when the type is Boolean. |
| CHOICE\_5.1 integer CM Support Qualifier | Condition: This attribute shall be supported, when the type is Integer. |
| CHOICE\_6.1 timeWindow CM Support Qualifier | Condition: This attribute shall be supported, when the type is TimeWindow. |
| CHOICE\_7.1 dateTime CM Support Qualifier | Condition: This attribute shall be supported, when the type is DateTime. |
| CHOICE\_8.1 geoArea CM Support Qualifier | Condition: This attribute shall be supported, when the type is GeoArea. |
| CHOICE\_9.1 pLMNId CM Support Qualifier | Condition: This attribute shall be supported, when the type is PLMNId. |
| CHOICE\_10.1 geoCoordinate CM Support Qualifier | Condition: This attribute shall be supported, when the type is GeoCoordinate. |
| CHOICE\_11.1 uEGroup CM Support Qualifier | Condition: This attribute shall be supported, when the type is UEGroup. |
| CHOICE\_12.1 frequency CM Support Qualifier | Condition: This attribute shall be supported, when the type is frequency. |

##### 6.2.1.3.13 Frequency<<dataType>>

###### 6.2.1.3.13.1 Definition

It describes 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.

###### 6.2.1.3.13.2 Attributes

Table 6.2.1.3.13.2-1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute Name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| arfcn | CM | T | T | F | F |
| freqband | CM | T | T | F | F |

###### 6.2.1.3.13.3 Attribute constrains

Table 6.2.1.3.13.3-1

|  |  |
| --- | --- |
| Name | Definition |
| arfcn CM Support Qualifier | Condition: This attribute shall be supported, when the frequency information represent RF reference frequency. |
| freqband CM Support Qualifier | Condition: This attribute shall be supported, when the frequency information represent frequency operating band. |

##### 6.2.1.3.14 UEGroup <<dataType>>

###### 6.2.1.3.14.1 Definition

This <<dataType>> describes the UE Group, which is represented by specific 5QI, specific S-NSSAI, or a specific combination of S-NSSAI and 5QI

###### 6.2.1.3.14.2 Attributes

Table 6.2.1.3.14.2-1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute Name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| fiveQI | CM | T | T | F | F |
| sNSSAI | CM | T | T | F | F |

###### 6.2.1.3.14.3 Attribute constrains

Table 6.2.1.3.14.3-1

|  |  |
| --- | --- |
| Name | Definition |
| fiveQI CM Support Qualifier | Condition: This attribute shall be supported, when UE group is represented by 5QI. |
| sNSSAI CM Support Qualifier | Condition: This attribute shall be supported, when UE group is represented by S-NSSAI. |

##### 6.2.1.3.X IntentNegotiationReport <<dataType>>

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

This <<dataType>> represents the MnS producer's information to the MnS consumer regarding intent negotiations. It may contain information on:

1) PossibleOutcomeList, a list of which (among the desired outcomes in an intent) the MnS producer is able to fulfil. It is an ordered list where the top entry indicates the best outcomes according to information available at the MnS producer. For each possibleoutcome, the fulfillableOutcomesReport includes information on the impact on the related ExpectationObjects.If used to indicate the best possible outcome, it will contain only 1 entry.

fulfillableTargets, indicating the list of intent expectations and expectation targtes that the MnS producer is able to fulfil according to the constratints at the MnS producer. It includes information on the impact on the related ExpectationObjects.

3) RecommendedChangesReport, indicating (recommendation of) which aspects of the intent can (if changed) enable the intent to be fulfillable according to the constraints at the MnS producer

3) SupportedAlternativesReport, which is the list of alternatives available at the MnS producer with which the intent may be fulfilled. Providing such a list inherently asks the MnS consumer to provide information on the MnS consumer’s preference among the alternatives. For each alternative, the SupportedAlternativesReport includes information on the impact on the related ExpectationObjects.

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

Table 6.2.1.3.X.2-1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute Name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| PossibleOutcomeList | O | T | T | F | T |
| fulfillableTargets | O | T | T | F | T |
| RecommendedChangesReport | O | T | T | F | T |
| SupportedAlternativesReport | O | T | T | F | T |

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

None

##### 6.2.1.3.6 PotentialIntentOutcome <<dataType>>

###### 6.2.1.3.6.1 Definition

This <<dataType>> indicates a single outcome evaluated by the MnS producer. It is a list of expectationFulfilmentResults for one or more intents.

###### 6.2.1.3.6.2 Attributes

The PotentialIntentOutcome includes the following attributes.

Table 6.2.1.3.6.2-1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Attribute Name** | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| intentFulfilmentInfo | M | T | F | F | T |
| expectationFulfilmentResults | O | T | F | F | T |

###### 6.2.1.3.6.3 Attribute constraints

None.

##### 6.2.1.3.Y IntentNegotiationFeedback <<dataType>>

###### 6.2.1.3.Y.1 Definition

This <<dataType>> contains the feedback information that the MnS consumer's provides to the MnS producer as response during intent Negotiation. The data is written into the intent for which the MnS consumer provides feedback. It contains:

- An attribute, prefferedAlternative, which indicates for a specific alternative among those indicated by the MnS producer.

- An attribute, consumerUtilityFunction which indicates the consumer’s utility function for the intent for which the Mns consumer and producer are negotiating. The utility function indicates a policy that should be used by the MnS producer to select among the alternatives.

- An attribute, consumerSatisfactionIndex which indicates the MnS consumer's satisfaction with one or more of the MnS producer’s alternatives. It may contain a list indicating the MnS consumer's expected satisfaction from the different alternatives e.g. as evaluated form the MnS consumer's utility function. It may also indicate a single value for a single solution that has been deployed by the MnS producer.

###### 6.2.1.3.Y.2 Attributes

Table 6.2.1.3.Y.2-1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute Name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| preferedAlternative | O | T | T | T | F |
| consumerUtilityFunction | O | T | T | T | F |
| consumerSatisfactionIndex | O | T | T | T | F |

###### 6.2.1.3.Y.3 Attribute constrains

None

#### 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: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: IntentExpectation  multiplicity: 1..\*  isOrdered: True  isUnique: True  defaultValue: None  isNullable: False |
| intentFulfilmentInfo | It describes status of fulfilment of an intent and the related reasons for that status.  allowedValues: Not Applicable | type: FulfilmentInfo  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| expectationFulfilmentInfo | It describes status of fulfilment of an intentExpectation and the related reasons for that status.  allowedValues: Not Applicable | type: FulfilmentInfo  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| targetFulfilmentInfo | It describes status of fulfilment of an expectationTarget and the related reasons for that status.  allowedValues: Not Applicable | type: FulfilmentInfo  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: "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: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: "ACKNOWLEDGED"  isNullable: False |
| notFulfilledReasons | It describes the reasons/observations related to the specific notFulfilledState  allowedValues: Not Applicable | type: String  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: 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: Context  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| expectationId | A unique identifier of the intentExpectation within the intent.  allowedValues: Not Applicable | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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, function  Ensure: AssuranceintentExpectation, e.g. Ensure the target performance value.  allowedValues: DELIVER, ENSURE  Vendor extensions are allowed | type: String  multiplicity: 1  isOrdered:N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| expectationObject | It describes the expectation objects to which the IntentExpectation should apply.  allowedValues: Not Applicable | type: ExpectationObject  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: Enum  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| objectInstance | It describes a specific object instance (e.g. instance of managed object) to which the intentExpectation should apply.  allowedValues: Not Applicable | type: DN  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: Context  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: 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: ExpectationTarget  multiplicity: 1..\*  isOrdered: True  isUnique: True  defaultValue: None  isNullable: 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: Context  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: 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: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: Enum  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: "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: ValueRangeType  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: 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: Context  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: 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: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: Enum  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: "IS\_EQUAL\_TO"  isNullable: False |
| contextValueRange | It describes the range of values that applicable to the ContextAttribute and the ContextCondition.  AllowedValue: depends on the contextCondition  The 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: ValueRangeType  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: 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: integer  multiplicity: 1  isOrdered: False  isUnique: True  defaultValue: 1  isNullable: False |
| geoArea | It describes a geographical area defined in 3GPP TS 28.622[6].  AllowedValue: As defined by the data type | type: GeoArea  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: 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: PLMNId  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: DateTime  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: TimeWindow  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| geoCoordinate | It describes the information of a geoCoordinate defined in 3GPP TS 28.622[6].  AllowedValue: As defined by the data type | type: GeoCoordinate  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: Frequency  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: UEGroup  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| fiveQI | It describes the information of a 5QI defined in 3GPP TS 28.541[5].  AllowedValue: 0 - 255 | type: integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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-NSSAI  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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 fulfilment  allowedValues: "ACTIVATED", "DEACTIVATED" | type: Enum  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: "ACTIVATED"  isNullable: False |
| intentReference | It indicates the associated intent instance  allowedValues: Not Applicable | type: DN  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| intentReportReference | It indicates the associated intent report instance(s)  allowedValues: Not Applicable | type: DN  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: 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: Integer  multiplicity: 0..1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| intentFulfilmentReport | It describes the fulfillment information which is reported for the associated intent instance.  allowedValues: Not Applicable | type: IntentFulfilmentReport  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| intentConflictReports | It describes the conflict information which is reported for associated intent instance if needed.  allowedValues: Not Applicable | type: IntentConflictReport  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| conflictId | It is used to identify the detected conflict within an IntentReport instance.  allowedValues: Not Applicable | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| conflictType | It describes the type of intent conflict.  allowedValues: INTENT\_CONFLICT, EXPECTATION\_CONFLICT, TARGET\_CONFLICT | type: Enum  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| conflictingIntent | It describes the DN of the conflicting intent  allowedValues: Not Applicable | type: DN  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| conflictingExpectation | It describes the expectationId of the conflicting IntentExpectation within an Intent.  allowedValues: Not Applicable | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| conflictingTarget | It describes the targetName of the conflicting ExpectationTarget within an IntentExpectation.  allowedValues: Not Applicable | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: ENUM  multiplicity: 1  isOrdered: False  isUnique: True  defaultValue: 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: ExpectationFulfilmentResult  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: 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: TargetFulfilmentResult  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: 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: Number  multiplicity: 0..1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| intentFeasibilityCheckReport | It describes the intent feasibility check information which is reported if needed.  allowedValues: Not Applicable | type: IntentFeasibilityCheckReport  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| feasibilityCheckResult | It describes the result of intent fulfilment feasibility check  allowedValues: FEASIBLE, INFEASIBLE | type: Enum  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: 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 INFEASIBLE  NOTE: The ENUM value for infeasibilityReason is not specified in present document. | type: ENUM  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: 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: IntentHandlingCapability  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: 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: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: Enum  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: 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: String  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| lastUpdatedTime | It describes the time for the latest update of the IntentReport Instance. | type: DateTime  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: 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: Enum  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: "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 modification  allowedValue: TRUE, FALSE | type: Boolean  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: "FALSE"  isNullable: False |
| intentNegotiationReport | It contains the information that the MnS producer provides to the MnS consumer during intent negotiations. | type: IntentNegotiationFeedback  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| PossibleOutcomeList | it indicates the possible or fulfillable outcomes for the intent expectations and expectationTargets within that intent and the relative cost/impact (on the related ExpecationObjects) of achieving that outcome  for each possible outcome, a PotentialIntentOutcome is provided. Impacts on ExpecationObjects that were not in the original intent may be added to the report as new intentExpectations | type: PotentialIntentOutcome  multiplicity: 1 .. \*  isOrdered: True  isUnique: N/A  defaultValue: None  isNullable: False |
| fulfillableTargets | It indicates the list of intent expectations and expectation targets that the MnS producer is able to fulfil according to the constratints at the MnS producer. It includes information on the impact on the related ExpectationObjects. | type: PotentialIntentOutcome  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| RecommendedChangesReport | It indicates the potential changes to the intent that could make the intent fulfillable. It is of type pair <A,B> where both A and B are of type PotentialIntentOutcome with A representing the  Changes that can be made while B represents the impact of those changes. | type: pair <PotentialIntentOutcome, PotentialIntentOutcome >  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| SupportedAlternativesReport | It indicates the MnS producer's alternatives from which the MnS consumer may chose. It is an ordered list with each entry a type pair <string, PotentialIntentOutcome > where the string indicates identifier information for the alternative while PotentialIntentOutcome indicates details including impact of the alternative. Inclusion of a SupportedAlternativesReport inherently asks the MnS consumer to choose one alternative among those in the SupportedAlternativesReport. | type: pair <string, PotentialIntentOutcome >  multiplicity: 1 .. \*  isOrdered: True  isUnique: N/A  defaultValue: None  isNullable: False |
| intentNegotiationConsumerFeedback | It contains the feedback information that the MnS consumer's provides to the MnS producer as response during intent Negotiation. | type: IntentNegotiationReport  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| preferredAlternative | indicates for a specific alternative among those indicated by the MnS producer. It indicates the identifier of one of the alternatives among those provided to the MnS consumer by the MnS producer | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| consumerUtilityFunction | It indicates the consumer’s utility function for the intent for which the Mns consumer and producer are negotiating. The utility function indicates a policy that should be used by the MnS producer to select among the alternatives. | type: UtilityFunction  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| consumerSatisfactionIndex | It indicates the MnS consumer's satisfaction with one or more of the MnS producer’s alternatives. .It represents the computed outcomes of MnS consumer's utility function an integer in the range  [0,100]. The highest possible value indicates that the solution provided by the MnS producer achieves the best possible outcomes that the MnS consumer expected, e.g., that it achieves the highest range of a target whose desired values were defining as falling in a range. If it is provided in response to a report from an MnS producer indicating several candidate alternatives and their impacts, the satisfaction index is ordered according to the order of the reports. If it is provided as feedback for a single solution that was selected by the MnS producer and deployed, it indicates the MnS consumer’s satisfaction with the deployed solution.: | type: integer  multiplicity: 1..\*  isOrdered: True  isUnique: True  defaultValue: None  isNullable: False |
| NOTE: For "IS\_ALL\_OF", the value shall be a match of the entire list. | | |

#### 6.2.1.5 Common notifications

##### 6.2.1.5.1 Configuration notifications

This clause presents a list of notifications, defined in TS 28.532 [3], that an MnS consumer may receive. The notification header attribute objectClass/objectInstance shall capture the DN of an instance of a class defined in the present document.

Table 6.2.1.5.1-1

| Name | Qualifier | Notes |
| --- | --- | --- |
| notifyMOICreation | O | -- |
| notifyMOIDeletion | O | -- |
| notifyMOIAttributeValueChanges | O | -- |

|  |
| --- |
| **End Change** |