**3GPP TSG-SA5 Meeting #140e *S5-216043***

**e-meeting** **15th - 24th November 2021**

**Source: Nokia, Nokia Shanghai Bell****, Huawei**

**Title: Extend Attributes of the Intent IOC**

**Document for: Approval**

**Agenda Item: 6.4.10**

# 1 Decision/action requested

***The group is asked to discuss and approval.***

# 2 References

[1] 3GPP draft TS 28.312: “Management and orchestration; Intent driven management services for mobile networks v0.5.0”.

# 3 Rationale

This contribution proposes to Extend attributes of the Intent IOC for an Intent-driven Management Service

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# 4 Detailed proposal

It proposes to make the following changes to TS 28.312[1].

|  |
| --- |
| **1st Change** |

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

### 6.2.1 Information model definition for Intent

#### 6.2.1.1 Class diagram

@startuml TS 28.541 figure 6.2.1-2 (as of MArch 2021)

' UML diagram for 3GPP TS 28.541 clause 6

skinparam ClassStereotypeFontStyle normal

skinparam ClassBackgroundColor White

skinparam shadowing false

skinparam monochrome true

hide members

hide circle

'skinparam maxMessageSize 250

class ManagedEntity <<ProxyClass>>

class Intent <<InformationObjectClass>>

class intentExpectation <<dataType>>

class intentTarget <<dataType>>

class context<<dataType>>

class IntentReport <<DataType>>

ManagedEntity "1" \*-- "\*" Intent: <<names>>

Intent "1" \*-r- "\*" intentExpectation

Intent "1" \*-d- "\*" context

intentExpectation "1" \*-r- "\*" intentTarget

intentExpectation "1" \*-d- "\*" context

'ManagedEntity -d- IntentReport: <<FFS>>

Intent \*-l- IntentReport: <<FFS>>

intentTarget "1" \*-d- "\*" context

note top of ManagedEntity

 Represents the following IOCs:

 Subnetwork or

 Other ICs are FFS

 end note

note "{xor}" as N1

 (Intent, context) .. N1

 N1 .. (intentTarget, context)

N1 .. (intentExpectation, context)

@enduml



Figure 6.2.1.1.1-1 Relationship UML diagram for intent

Editor’s Note: Whether the intentExpectation is a <<dataType>> or a <<IOC>> is FFS.

##### 6.2.1.1.2 Inheritance

@startuml TS 28.541 figure 6.2.1-2 (as of MArch 2021)

' UML diagram for 3GPP TS 28.541 clause 6

skinparam ClassStereotypeFontStyle normal

skinparam ClassBackgroundColor White

skinparam shadowing false

skinparam monochrome true

hide members

hide circle

class Top <<InformationObjectClass>>

class Intent <<InformationObjectClass>>

'class intentExpectation <<dataType>>

'class Context <<dataType>>

'class IntentTarget <<dataType>>

Top <|-- Intent

'Top <|-- intentExpectation

@enduml





Figure 6.2.1.1.2-1 Inheritance UML diagram for generic intent

#### 6.2.1.2 Class definition

##### 6.2.1.2.1 Intent <<IOC>>

###### 6.2.1.2.1.1 Definition

This IOC represents the properties of an Intent. The Intent IOC contains one or multiple intentExpectation(s) which includes MnS consumer’s requirements, goals and constraints given to a 3GPP system*.*

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.

###### 6.2.1.2.1.2 Attributes

The Intent includes attributes inherited fromTOP IOC (defined in TS 28.622) and the following attributes:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute Name | Support Qualifier | isReadable  | isWritable | isInvariant | isNotifyable |
| intentExpectation | M | T | T | F | T |
| userLabel | M | T | T | F | T |
| IntentContext | O | T | T | F | T |
| intentFulfillmentReport | M | T | F | F | T |

Editor’s Note: whether other the attributes are needed for the Intent IOC needs further discussion.

###### 6.2.1.2.1.3 Attribute constraints

None

##### 6.2.1.2.2 IntentExpectation

IntentExpectation class represent MnS consumer’s requirements, goals and constraints given to a 3GPP system*.*

Editor’s Note: more description for IntentExpectation will be added later based on the further discussion.

###### 6.2.1.2.2.1 Definition

IntentExpectation class represent MnS consumer’s requirements, goals and constraints given to a 3GPP system.

###### 6.2.1.2.2.2 Attributes

The IntentExpectation includes the following attributes:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute Name | Support Qualifier | isReadable  | isWritable | isInvariant | isNotifyable |
| ExpectationId | M | T | T | T | T |
| applicableObjectType | M | T | T | F | T |
| applicableObjectContexts | M | T | T | F | T |
| IntentTargets | M | T | T | F | T |
| ExpetationContexts | O | T | T | F | T |
| expetationFulfillmentReport |  |  |  |  |  |

Editor’s Note: whether other the attributes are needed for the IntentExpectation IOC needs further discussion.

###### 6.2.1.2.2.3 Attribute constraints

None

##### 6.2.1.2.3 IntentReport

###### 6.2.1.2.3.1 Definition

IntentReport class represent intent fulfilment feedback information that MnS consumer can obtained from a 3gpp system.

Editor’s Note: more description for IntentReport will be added later based on the further discussion.

###### 6.2.1.2.3.2 Attributes

TBD

###### 6.2.1.2.3.3 Attribute constraints

TBD

#### 6.2.1.3 DataType definition

##### 6.2.1.3.1 IntentTarget <<dataType>>

###### 6.2.1.3.1.1 Definition

This <<dataType>> represents the Targets of the IntentExpectation that are required to be achieved .

###### 6.2.1.3.1.2 Attributes

The IntentTarget includes the following attributes:

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

###### 6.2.1.3.1.3 Attribute constraints

None

##### 6.2.1.3.2 context << dataType >>

###### 6.2.1.3.2.1 Definition

This IOC represents the properties of a context. A context describes the list of constraints and conditions that should evaluate to True when the targets are fulfilled but are themselves not to be enforced. The context may apply to the intent, the intent expectation, the intent targets or to the managed object as filter information used to identify the manged objects to which the targets are intended.

###### 6.2.1.3.2.2 Attributes

The context includes the following attributes:

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

###### 6.2.1.3.2.3 Attribute constraints

None

##### 6.2.1.3.C FulfilmentReport <<dataType>>

###### 6.2.1.3.C.1 Definition

This <<dataType>> represents the properties of the status of fulfilment for each intent, intentExpectation or IntentTarget.

###### 6.2.1.3.C.2 Attribute

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

#### 6.2.1.4 Attribute definition

| Attribute Name | Documentation and Allowed Values | Properties |
| --- | --- | --- |
| userLabel | A user-friendly (and user assignable) name of the intent.allowedValues: Not Applicable | type: Stringmultiplicity: 1isOrdered: FisUnique: FdefaultValue: NoneisNullable: False |
| intentExpectation | It indicates the expectations including requirements, goals and constraints given to a 3GPP system. It states the list of specific outcomes desired to be realized for a specific type of managed object | type: FFSmultiplicity: \*isOrdered: FisUnique: FdefaultValue: NoneisNullable: False  |
| FulfilStatus | It describes the status of the intent fulfilment result, which is configured by MnS producer and can be read by MnS consumer.allowedValues: "FULFILLED", “NOT\_FULFILLEDEditor’s Note: whether other allowed values should be supported is FFS, and the name for the attribute intentFulfilStatus is FFS. | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: None isNullable: False |
| intentContext | It describes the list of constraints and conditions that should apply for the entire intent even if there may be specific constraints and conditions defined for specific parts of the intent.allowedValues: triple of (attribute, condition, value range) | type: Contextmultiplicity: 1isOrdered: FalseisUnique: FalsedefaultValue: NoneisNullable: False |
| intentExpectationIdentifier | A user-friendly (and user assignable) name of the intentExpectation.allowedValues: Not Applicable | type: Stringmultiplicity: 1isOrdered: FalseisUnique: FalsedefaultValue: NoneisNullable: False |
| ApplicableObjectType | It describes the type of managed object to which the given intentExpectation should apply. It is used together with the ObjectContext to identify the specific entity to which the intentExpectation should apply. E.g. the intentExpectation may be stated for a slice (type of Object) with identitier IIOT\_Atomotive\_2021 (identifier as context). Alternatively, the intentExpectation may be stated for a slice (type of Object) serving IIoT users (context 1) with slice profile supporting automotive connectivity (context 2).allowedValues: NA | type: stringmultiplicity: 1isOrdered: FalseisUnique: FalsedefaultValue: NoneisNullable: False |
| ApplicableObjectContext | It describes the list of constraints and conditions to be used as filter information to identify the specific intentObject 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 intentTarget of the considered intentExpectation.E.g. the intentExpectation may be stated for a slice (type of Object) with identitier IIOT\_Atomotive\_2021 (identifier as context). Alternatively, the intentExpectation may be stated for a slice (type of Object) serving IIoT users (context 1) with slice profile supporting automotive connectivity (context 2).ApplicableObjectContext may also be used to select a specific instance of Object, i.e., given the type of object in "ObjectType", the object instance is identified using the identifier of the object instance under Object context e.g. to refer to cell instance number 234, we state the Object context as {cell\_id, "=", 234}. The object identifier is in that case the contextallowedValues: depends on Object in the IntentExpectation | type: Contextmultiplicity: 1isOrdered: FalseisUnique: FalsedefaultValue: NoneisNullable: False |
| expectedIntentTargets | It describes the list of specific outcomes on configurations and observables related to the stated intentObject (e.g. parameters, gauges, counters, KPIs, etc) that are desired to be realized for a given intentExpectation.allowedValues: depends on Object in the IntentExpectation | type: intentTargetmultiplicity: 1isOrdered: FalseisUnique: FalsedefaultValue: NoneisNullable: False |
| expectationContext | It describes the list of 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 Object in the IntentExpectation | type: Contextmultiplicity: 1isOrdered: FalseisUnique: FalsedefaultValue: NoneisNullable: False |
| objectStateAttribute | It describes a specific attribute of a managed object on which an outcomes may be stated, either a configuration or observable of that managed object. The attributes may be a parameter, gauge, counter, KPI, weighted metric, etc. related to that managed objectallowedValues: depends on Object in the IntentExpectation | type: stringmultiplicity: 1isOrdered: FalseisUnique: FalsedefaultValue: NullisNullable: True |
| targetCondition | It expresses the limits within which the ObjectStateAttribute is allowed/supposed to be allowedValues: is equal to; is less than; is greater than; Note: Others conditions like "is within the range" or "is outside the range" can be expressed in terms of these basic conditions | type: enummultiplicity: upto 2isOrdered: FalseisUnique: FalsedefaultValue: "is equal to"isNullable: False |
| targetValueRange | It describes the range of values that applicatioble to the TargetName and the TargetCondition.  | type: FFSmultiplicity: upto 2isOrdered: FalseisUnique: FalsedefaultValue: NullisNullable: True |
| targetContext | It describes the list of constraints and conditions that should apply for a specific intentTarget. Note there may be other constraints and conditions defined for the entire intent or the intentExpectation.allowedValues: triple of (attribute, condition, value range) | type: Contextmultiplicity: 1isOrdered: FalseisUnique: FalsedefaultValue: NoneisNullable: False |
| contextType | Defines the roles for which a given context shall play.allowedValues: {"ObjectContext", "ExpectationContext", "TargetContext", "IntentContext"} | type: enummultiplicity: 1isOrdered: FalseisUnique: FalsedefaultValue: NoneisNullable: False |
| contextAttribute | It describes a specific attribute of or related to a managed object or to characteristics thereof (e.g. its control parameter, gauge, counter, KPI, weighted metric,, etc) or an attribute related to the operating conditions of the managed object (szch as weather conditions, load conditions, etc). | type: DNmultiplicity: 1isOrdered: FalseisUnique: FalsedefaultValue: NullisNullable: 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; Note: Others conditions like "is within the range" or "is outside the range" can be expressed in terms of these basic conditions | type: enummultiplicity: upto 2isOrdered: FalseisUnique: FalsedefaultValue: "is equal to"isNullable: False |
| contextValueRange | It describes the range of values that explicatable to the ContextAttribute and the ContextCondition.  | type: FFSmultiplicity: upto 2isOrdered: FalseisUnique: FalsedefaultValue: NullisNullable: True |
| FulfillmentReport | It indicates the reports for the level of fulfillment of an intent, intentExpectation or IntentTarget  | type: FFSmultiplicity: \*isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| reason | It represents the reason when the intentFulfilStatus is NOT\_FULFILLED.It describes why the target cannot be fulfilled. | type: Stringmultiplicity: \*isOrdered: FisUnique: FdefaultValue: NoneisNullable: True |

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| --- |
| **2nd Change** |

Annex <A> (informative):

Mapping the 3GPP and the TM Forum intentExpectation Models

The TM forum defines the structure of an intent as a list of expectations with each expectation containing the requirements goals and constraints to be achieved. The expectation is defined to contain 2 attributes - the imm:target and the imm:params. On the hand, the intentExpectation defined in 3GPP (see clause 6.2.1.2.2) contain more attributes some of which (the ApplicableobjectType, ApplicableobjectContexts, intentTargets and expectationContexts)can be mapped to the TM Forum model.

Following the table to illustrate the attributes mapping between 3GPP Intent Expectation and TM Forum IntentExpectation

|  |  |
| --- | --- |
| **3GPP Intent Expectation**  | **TM Forum Intent Expectation** |
| **Class Property** | **Attribute** |
| objectType | imm:target |
| objectContexts  |  imm:params |
| intentTargets |
| expectationContexts |

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

|  |
| --- |
| **End of changes** |