**3GPP TSG-SA5 Meeting #162 *S5-253435***

Goteborg, Sweden, 25 - 29 August 2025

**Source: Huawei**

**Title: Rel-19 pCR TS 28.561 Update NDT NRM to solve misalignment**

**Document for: Approval**

**Agenda item: 6.19.5.1**

**Spec: 3GPP TS 28.561**

**Version: 1.0.0**

**Work Item: NDT**

**Comments**

This contribution is proposed to update NDT NRM definitions to solve misalignment and improve quality.

**Proposed Changes**

\* \* \* First Change \* \* \* \*

##### 6.2.1.3.2 NDTJob <<InformationObjectClass>>

###### 6.2.1.3.2.1 Definition

This IOC represents the properties of an NDT job demand created by an MnS consumer. An NDT job represents the characteristics (e.g., scope, scenario, etc) for a network simulation/emulation task.

The attribute "nDTJobSynchScope” indicates the scope of the network that should be synchronized into and modelled by the NDT for the specific NDT job.

The attribute "ndtJobScenario" indicates the input that is defined by MnS consumer for the characteristics of network objects that should be simulated/emulated by NDT. If the NDT is able to synchronize with an actual network, the ndtJobScenario indicates the delta between the actual network and twin network that is simulated/emulated. Otherwise, it indicates the critical features that should be modelled, allowing the NDT to use defaults for all other features. The ndtJobScenario can be network configurations or automation functionality configurations, network events, issues that are defined by MnS consumer and will be injected to NDT.

.

The attribute "ndtJobExecutionRequirements" represents requirements related to the execution of network simulation/emulation task for an NDT job, e.g., maximum run time for each simulation/emulation task, precision, etc which are used to select the model parameters (e.g., simulation/emulation step and number of simulation/emulation times) for building NDT models. It is up to implementation how the NDT model is built and used to execute the simulation/emulation task.

NOTE: the model for the specific tasks can be extended as needed.

###### 6.2.1.3.2.2 Attributes

The NDTJob IOC includes attributes inherited fromTop IOC (defined in 3GPP TS 28.622 [7]) and the following attributes.

Table 6.2.1.3.2.2-1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute Name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| nDTCapability | M | T | T | F | T |
| nDTJobSynchScope | M | T | T | F | T |
| ndtJobScenario | M | T | T | F | T |
| ndtJobExecutionRequirements | O | T | T | F | T |
| collaboratingNDT | O | T | T | F | T |
| **Attribute related roles** | | | | | |
| ndtReportRefList | M | T | T | F | T |

###### 6.2.1.3.2.3 Attribute constraints

None.

###### 6.2.1.3.2.4 Notifications

The common notifications defined in clauses 6.1 are valid for this IOC.

##### 6.2.1.3.3 NDTFunctionScope << dataType >>

###### 6.2.1.3.3.1 Definition

This dataType represents the properties of a scope that can be modelled by an NDT.

###### 6.2.1.3.3.2 Attributes

The NDTFunctionScope dataType includes the following attributes.

Table 6.2.1.3.3.2-1

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

###### 6.2.1.3.3.3 Attribute constraints

None.

###### 6.2.1.3.3.4 Notifications

The common notifications defined in clauses 6.1 are valid for this dataType.

##### 6.2.1.3.4 NDTInputDescription<<dataType>>

###### 6.2.1.3.4.1 Definition

This dataType represents a description of the network. It may be used to describe any of the following:

- aspects of the network that should be modelled in the NDT,

- configurations that should be applied or have been applied by the NDT

The objects to be considered may be described in terms of the attribute networkObjectType or by specific network object instances represented by objectInstance. If a list of specific managed objects are to be modelled, they are listed in the attribute objectInstance. Otherwise, their type if listed in the attribute networkObjectType and their specific characteristics listed in objectAttributeList.

###### 6.2.1.3.4.2 Attributes

The NDTInputDescription <<datatype>> includes the following attributes.

Table 6.2.1.3.4.2-1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute Name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| nDTInputDescriptionId | M | T | T | F | T |
| simulationData | O | T | T | F | T |
| networkEventInfo | O | T | T | F | T |
| condition | M | T | T | F | T |

###### 6.2.1.3.4.3 Attribute constraints

None

###### 6.2.1.3.4.4 Notifications

The common notifications defined in clauses 6.1 are valid for this dataType.

##### 6.2.1.3.5 NDTOutputDescription <<dataType>>

###### 6.2.1.3.5.1 Definition

This dataType represents a description of the individual outputs of the NDT modelled twin. It may be used to describe any of the following:

- states of the network that have been modelled and are being reported by the NDT,

- characteristics of the network that are being reported by the NDT.

The objects that have been modelled are described by specific network object instances represented by objectInstance and their specific characteristics (PMs, alarms, etc.) listed in objectAttributeList.

###### 6.2.1.3.5.2 Attributes

The NDTOutputDescription <<datatype>> includes the following attributes.

Table 6.2.1.3.5.2-1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute Name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| nDTOutputDescriptionId | M | T | T | F | T |
| objectInstance | M | T | T | F | F |
| objectAttributeList | M | T | T | F | T |

###### 6.2.1.3.5.3 Attribute constraints

None

###### 6.2.1.3.5.4 Notifications

The common notifications defined in clauses 6.1 are valid for this dataType.

\* \* \* Next Change \* \* \* \*

##### 6.2.1.3.8 NDTReport <<InformationObjectClass>>

###### 6.2.1.3.8.1 Definition

This IOC represents the properties of an NDT report corresponding to an NDT job.

An NDT job may run more than one task at the same time, e.g., a network configuration task and a network response task. The NDTReport contains an output for each task that is executed by the NDT job.

The attribute "NDTJobOutputData" specified performance metrics and/or alarm types that are collected and reported by NDT after the behaviour is modelled in NDT is put in a list for which each entry is an NDTOutputDataPoint.

###### 6.2.1.3.8.2 Attributes

The NDTReport IOC includes attributes inherited fromTop IOC (defined in 3GPP TS 28.622 [7]) and the following attributes.

Table 6.2.1.3.8.2-1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute Name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| nDTJobOutputData | M | T | F | F | T |
| **Attribute related roles** | | | | | |
| ndtJobRef | M | T | F | F | T |
| ndtFunctionRef | M | T | F | F | T |

###### 6.2.1.3.8.3 Attribute constraints

None.

###### 6.2.1.3.8.4 Notifications

The common notifications defined in clauses 6.1 are valid for this IOC.

\* \* \* Next Change \* \* \* \*

## 6.3 Attribute definitions

6.3.1 Attribute properties

Table 6.3.1-1

| Attribute Name | Documentation and Allowed Values | Properties |
| --- | --- | --- |
| ndtJobRef | It indicates an DN of a NDTJob Instance.  allowedValues: N/A | type: DN  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| ndtFunctionRef | It indicates an DN of a NDTFunction Instance.  allowedValues: N/A | type: DN  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| ndtReportRefList | It indicates a list of DN for NDTReport Instances.  allowedValues: N/A | type: DN  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| supportedNDTCapabilities | It indicates the different types of NDT application use cases which the NDT is capable of undertaking.  allowedValues:  "RISKY\_ACTIONS\_PREDICTION",  "EVENTS\_IMPACTS\_VERIFICATION",  "FAULT\_INJECTION",  "NETWORK\_EVENTS\_VERIFICATION"  "NETWORK\_CONFIGURATIONS\_VERIFICATION",  "AUTOMATION\_CONFIGURATION\_VERIFICATION"  "ML\_TRAINING\_DATA\_GENERATION",  "USER\_EXPERIENCE\_DATA\_GENERATION"  New values can be added to this list in future releases to support new use cases.  The meaning of these values is as follows:  "RISKY\_ACTIONS\_PREDICTION" means NDTFunction supports the use case described in 5.2.2.2.  "EVENTS\_IMPACTS\_VERIFICATION" means NDTFunction supports the use case described in 5.2.2.3.  "FAULT\_INJECTION" means NDTFunction supports the use case described in 5.2.2.4.  "NETWORK\_EVENTS\_VERIFICATION" means NDTFunction supports the use case described in 5.3.2.2.  "NETWORK\_CONFIGURATIONS\_VERIFICATION" means NDTFunction supports the use case described in 5.3.2.3.  "AUTOMATION\_CONFIGURATION\_VERIFICATION" means NDTFunction supports the use case described in 5.3.2.4.  "ML\_TRAINING\_DATA\_GENERATION" means NDTFunction supports the use case described in 5.4.2.2.  "USER\_EXPERIENCE\_DATA\_GENERATION" means NDTFunction supports the use case described in 5.4.2.3. | type: ENUM  multiplicity:1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| nDTFunctionScope | It indicates a scope that can be modelled by an NDT. | type: NDTFunctionScope  multiplicity:1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| nDTCapability | It indicates the type of application use cases that is desired to be executed.  allowedValues:  "RISKY\_ACTIONS\_PREDICTION",  "EVENTS\_IMPACTS\_VERIFICATION",  "FAULT\_INJECTION",  "NETWORK\_EVENTS\_VERIFICATION"  "NETWORK\_CONFIGURATIONS\_VERIFICATION",  "AUTOMATION\_CONFIGURATION\_VERIFICATION"  "ML\_TRAINING\_DATA\_GENERATION",  "USER\_EXPERIENCE\_DATA\_GENERATION"  New values can be added to this list in future releases to support new use cases.  The meaning of these values is as follows:  "RISKY\_ACTIONS\_PREDICTION" means NDTFunction supports the use case described in 5.2.2.2.  "EVENTS\_IMPACTS\_VERIFICATION" means NDTFunction supports the use case described in 5.2.2.3.  "FAULT\_INJECTION" means NDTFunction supports the use case described in 5.2.2.4.  "NETWORK\_EVENTS\_VERIFICATION" means NDTFunction supports the use case described in 5.3.2.2.  "NETWORK\_CONFIGURATIONS\_VERIFICATION" means NDTFunction supports the use case described in 5.3.2.3.  "AUTOMATION\_CONFIGURATION\_VERIFICATION" means NDTFunction supports the use case described in 5.3.2.4.  "ML\_TRAINING\_DATA\_GENERATION" means NDTFunction supports the use case described in 5.4.2.2.  "USER\_EXPERIENCE\_DATA\_GENERATION" means NDTFunction supports the use case described in 5.4.2.3. | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| nDTRANScope | It indicates the scope of the RAN that can be modelled by the NDT function. | type: ScopeDefinition  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| nDTCNScope | It indicates the scope of the CN that can be modelled by the NDT function. | type: ScopeDefinition  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| nDTJobSynchScope | It indicates the scope of the network that should be synchronized into and modelled by the NDT for the specific NDT job. | type: ScopeDefinition  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| ndtJobScenario | It indicates a network scenario that should be modelled in the NDTJob as an extra beyond what is synchronized from the network. The ndtJobScenario can be used for  - Verification of network response to one or more events  - evaluation of the impact of one or more failure events, e.g. a signalling storm  - Evaluating one or more network issues, e.g. a coverage issue. The network issues involve one or more network events.  - Evaluation of high-risk network operations which are listed within the planned configuration  - Verification of network configurations which are listed within the planned configuration  - Using NDT to generate ML training data  - Using NDT to generate user experience data | type: NDTInputDescription  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| NDTInputDescriptionId | It indicates the identifier for a specific input to be modelled in the NDTJob | type: string  multiplicity: 1  isOrdered: N/A  isUnique: True  defaultValue: None  isNullable: False |
| NDTOutputDescriptionId | It indicates the identifier for a specific output provided as outcomes of the NDTJob | type: string  multiplicity: 1  isOrdered: N/A  isUnique: True  defaultValue: None  isNullable: False |
| networkEventInfo | This defines the information related with a network event (a provisioning, performance measurement, KPI or fault/ alarm event) that can be introduced into the NDT.  The networkEventInfo can be used for  - Verification of network response to one or more events  - evaluation of the impact of one or more failure events, e.g. a signalling storm  - Evaluating one or more network issues, e.g. a coverage issue. The network issues involve one or more network events.  Editor’s note: The definition and modelling of networkEventInfo is to be clarified | Type: TBD  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| simulationData | This will define which management data is to be updated artificially in order to induce a particular network issue. The management data includes:   * Performance data: The name of the performance measurement or the KPI as defined in 3GPP TS 28.552 and TS 28.554 * MDT/Trace data: The name of MDT measurements as defined in 3GPP TS 32.422 * Configuration data: The name of the attribute from any of the available MOIs. | type: AttributeValuePair  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| condition | This will define the condition that has to be satisfied in order to update the simulation data for the task that is executed by the NDT. This can be defined in terms of location and time.  This will be the DN of ConditionMonitor[7]. | type: DN  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| ndtJobExecutionRequirements | It describes the performance requirements for NDT modelling, e.g., maximum run time for each simulation/emulation job, precision, etc | type: NdtJobExecutionReqts  multiplicity: 1  isOrdered: N/A  isUnique: True  defaultValue: None  isNullable: False |
| nDTJobOutputData | It indicates the list of NDTOutput(s) that are provided by the NDT function as the output for any task executed in an instantiated NDT job. | type: NDTOutputDataPoint  multiplicity: 1 ..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| maxRuntime | Maximum run time for each simulation task executed in NDT. The unit is second. | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: True  defaultValue: None  isNullable: False |
| networkState | It indicates a state of the twin network (the modelled network in the NDT) for which a configuration or reconfiguration is applied.  The networkState is the description of what exists in the network at the time when the networkConfiguration is made | type: NDTOutputDescription  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| networkConfiguration | It indicates a network configuration that is executed by the NDT and being reported in the NDT report | type: NDTOutputDescription  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| observations | It indicates an impact on the network. It shows the list of network objects that are affected and the effects on the specific objects | type: NDTOutputDescription  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| collaboratingNDT | It indicates the related NDT Job contributing as a collaborator to the executed NDT Job. It describes a relationship to an NDT job, i.e. it indicates the DN of a component NDT which provides input to the NDT job | type: DN  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| objectInstance | It indicates the MOI contained in the NDT report | type: DN  multiplicity: 1  isOrdered: N/A  isUnique: True  defaultValue: None  isNullable: False |
| objectAttributeList | It indicates the key-value pair of the characteristics of the MOI. | type: AttributeValuePair  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| managedEntitiesScope | A list of DN of managed entities which is the NDT modelling scope | type: DN  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| areaScope | Geographical area which is the NDT modelling scope | type: GeoArea  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |

\* \* \* Next Change \* \* \* \*

## 6.4 Procedure for consuming NDT management service

NDT

5.Execute the NDT job and generate corresponding reports

6. Send the NDT reports

4. Send the request for NDT job execution

1. Request the creation of an NDT

2a. Create the NDT function

3. Response for the NDT creation

MnS Consumer

2b. Synchronization

Managed entities

Figure 6.4-1: Procedure of consuming NDT management service

1. NDT MnS Producer receives a request from MnS consumer to create an NDT job instance (see createMOI operation defined in TS 28.532 [8]) which represents the consumer’s requirements for the NDT job. Examples of NDT job can be a signalling storm analysis, network configuration verification, data generation, etc.

2a. NDT MnS Producer creates the NDT function instance according to the request from MnS consumer. The request may include the scope of NDT job (e.g., simulated network objects such as network functions, S-NSSAI, time).

2b. NDT MnS Consumer synchronizes the simulated network objects related information from managed entities for NDT job modelling and validation.

3. NDT MnS Producer sends a response (see createMOI operation defined in TS 28.532[8]) to the MnS Consumer.

4. MnS consumer sends the request to NDT MnS Producer to start the execution of the NDT job instance.

5. NDT MnS producer executes the NDT job and creates an NDTReport instance (i.e., the instance of NDTReport IOC) and configures NDTJob MOI according to the modelling results.

6. NDT MnS Producer sends the NDT report to MnS consumer to indicate the network simulation/emulation results.

\* \* \* End of Changes \* \* \* \*