ETSI TS 128 623 V18.11.0 (2025-08)

TECHNICAL SPECIFICATION

Universal Mobile Telecommunications System (UMTS);
LTE;
5G;
Telecommunication management;
Generic Network Resource Model (NRM)
Integration Reference Point (IRP);
Solution Set (SS) definitions
(3GPP TS 28.623 version 18.11.0 Release 18)

Reference
RTS/TSGS-0528623vib0

Keywords
5G, LTE, UMTS

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Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
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- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

The present document is part of a TS-family covering the 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Telecommunication management; as identified below:

28.621 Generic Network Resource Model (NRM) Integration Reference Point (IRP); Requirements.

28.622 Generic Network Resource Model (NRM) Integration Reference Point (IRP); Information Service (IS).

28.623 Generic Network Resource Model (NRM) Integration Reference Point (IRP); Solution Set (SS) definitions.

1 Scope

This TS-family specifies a generic Network Resource Model, NRM (also referred to as a Management Information Model - MIM) with definitions of Information Object Classes (IOCs) and Managed Object Classes (MOCs).

The present document specifies the Solution Set definition for the Generic NRM IRP.

The Solution Set definition is related to 3GPP TS 28.622.

Note that the present document is applicable to deployment scenarios using the Service Based Management Architecture (SBMA) as defined in TS 28.533 [20]. For deployment scenarios using the IRP framework the latest Rel-14 version of TS 28.623 is applicable.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TS 32.101: "Telecommunication management; Principles and high level requirements".

[2] 3GPP TS 32.102: "Telecommunication management; Architecture".

[3] 3GPP TS 32.600: "Telecommunication management; Configuration Management (CM); Concept and high-level requirements".

[4] 3GPP TS 28.622: “Generic Network Resource Model (NRM) Integration Reference Point (IRP); Information Service (IS)”.

[5] Void

[6] Void

[7] Void

[8] Void

[9] Void.

[10] Void

[11] Void

[12] Void

[13] Void

[14] 3GPP TS 32.160: "Management and orchestration; Management Service Template".

[15] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[16] IETF RFC 8528: "YANG Schema Mount".

[17] Management and Orchestration APIs Stage 3 Repository https://forge.3gpp.org/rep/sa5/MnS/-/tree/Tag_Rel18_SA108/

[18] RFC 8525: "YANG Library"

[19] RFC 6022: "YANG Module for NETCONF Monitoring"

[20] 3GPP TS 28.533: "Management and orchestration; Architecture framework".

[21] 3GPP TS 32.161: "Management and orchestration; JSON expressions (Jex)".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [15], 3GPP TS 32.101 [1], 3GPP TS 32.102 [2], 3GPP TS 32.600 [3], 3GPP TS 28.622 [4] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [15] and 3GPP TS 32.101 [1], 3GPP TS 32.102 [2] and 3GPP TS 32.600 [3] and 3GPP TS 28.622 [4].

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [15], 3GPP TS 32.600 [3] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [15] and 3GPP TS 32.600 [3].

JSON	JavaScript Object Notation
SS	Solution Set

4 Solution Set (SS) definitions

4.0 3GPP Generic NRM IRP Solution Set Definitions

This latest Rel-14 version of TS 28.623 specifies the Solution Set definition for the Generic NRM IRP.

4.1 Void

4.2 Void

4.3 OpenAPI Definitions

The present clause contains the OpenAPI definitions of the Generic NRM in YAML format.

The Information Service (IS) of the Generic NRM is defined in 3GPP TS 28.622 [4].

Mapping rules to produce the OpenAPI definition based on the IS are defined in 3GPP TS 32.160 [14].

OpenAPI/YAML definitions are specified in 3GPP Forge [17].

Directory: OpenAPI

Files:

TS28623_ComDefs.yaml

TS28623_GenericNrm.yaml

TS28623_PmControlNrm.yaml

TS28623_ThresholdMonitorNrm.yaml

TS28623_SubscriptionControlNrm.yaml

TS28623_MnSRegistryNrm.yaml

TS28623_FileManagementNrm.yaml

TS28623_ManagementDataCollectionNrm.yaml

TS28623_QoEMeasurementCollectionNrm.yaml

TS28623_TraceControlNrm.yaml

4.4 YANG Definitions

The present clause contains the YANG definitions for the Generic NRM.

The Information Service (IS) of the Generic NRM is defined in 3GPP TS 28.622 [4].

Mapping rules to produce the YANG definition based on the IS are defined in 3GPP TS 32.160 [14].

YANG definitions are specified in 3GPP Forge [17].

Directory: yang-models

Files:

_3gpp-common-ep-rp.yang

_3gpp-common-filemanagement.yang

_3gpp-common-files.yang

_3gpp-common-managed-element.yang

_3gpp-common-managed-function.yang

_3gpp-common-managementdatacollection.yang

_3gpp-common-management-node.yang

_3gpp-common-measurements.yang

_3gpp-common-mecontext.yang

_3gpp-common-mnsagent.yang

_3gpp-common-mnsregistry.yang

_3gpp-common-qmcjob.yang

_3gpp-common-subnetwork.yang

_3gpp-common-subscription-control.yang

_3gpp-common-top.yang

_3gpp-common-trace.yang

_3gpp-common-util.yang

_3gpp-common-yang-extensions.yang

_3gpp-common-yang-types.yang

Mount information

If the class ManagedElement and the underlying hierarchy is contained under a SubNetwork, the YANG module for ManagedElement shall be mounted at the mountpoint "children-of- SubNetwork" in the YANG module _3gpp-common-subnetwork, together with the YANG modules containing IOCs that can be contained under the ManagedElement directly or under other IOCs contained by the ManagedElement.

If the class ManagedElement and the underlying hierarchy is contained under a MeContext, the YANG module for ManagedElement shall be mounted at the mountpoint "children-of-MeContext" in the YANG module _3gpp-common-mecontext, together with the YANG modules containing IOCs that can be contained under the ManagedElement directly or under other IOCs contained by the ManagedElement. See IETF RFC 8528 [16] that describes the mechanism that adds the schema trees defined by a set of YANG modules onto a mount point defined in the schema tree in another YANG module.

If a SubNetwork MOI is name-contained under another Subnetwork, the YANG module for SubNetwork shall be mounted at the mountpoint "children-of- SubNetwork" in the YANG module _3gpp-common-subnetwork, together with the YANG modules containing IOCs that can be contained under the SubNetwork directly or under other IOCs contained by the SubNetwork.

Annex 0 (informative):

Annex A-D in the latest Rel-14 version of TS 28.623 describes the solution set definition for the Generic NRM IRP.

Annex A (normative):Void

Annex B (normative):Void

Annex C (normative):Void

Annex D (normative):Void

Annex E (normative): Solution set specific provisions and examples

E.1 RESTful HTTP-based solution set

MnS producer specific schema definitions

The NRM properties supported by a specific MnS producer are specified by MnS producer specific versions of the standardized OpenAPI definition files. These definitions reflect exactly what is supported. The OpenAPI definitions for unsupported properties are removed.

For example, the schema of the Generic NRM as published by 3GPP allows both a "SubNetwork" of type "SubNetwork-Multiple" and a "MangedElement" of type "ManagedElement-Multiple" as roots. A concrete MnS producer has only one root class. Therefore, the schema definitions need to be modified accordingly in the file describing the NRM properties of a concrete MnS producer.

Furthermore, the standardized definition of "SubNetwork-Single" and "ManagedElement-Single" includes all possible name-contained objects. A concrete MnS producer supports in most cases only a subset of those. Unsupported name-containments need to be removed. For example, if "SubNetwork-Single" does not support the Intent NRM, then the following line "$ref: 'TS28312_IntentNrm.yaml#/components/schemas/SubNetwork-ncO-IntentNrm" needs to be deleted.

When objects, attributes or attribute fields are unsupported, its schema definitions need to be removed.

The MnS producer specific schema of the Generic NRM is always the root schema, that includes references to child schemas in other files, that in turn may reference other schemas, and so forth. It is recommended to locate the root schema at a URI that is composed by appending the path component "/schemas" to the URI specified in "mnsAddress":

`<mnsAddress>/schemas`

To obtain all NRM properties supported by a MnS producer it is necessary to inspect the root schema and all its descendant schemas.

References in a file may contain a relative path or an absolute path. When a reference has a relative path, the processor shall assume that the referenced file is located at the same address as the file referencing it.

Examples:

The following example shows an excerpt of a file specifying a NRM, that supports the complete Generic NRM and the complete NR NRM. The root class is "SubNetwork".

The schema definition published by 3GPP specifies the allowed root classes.

```
NrmRoot:
  oneOf:
    - type: object
      properties:
        SubNetwork:
          $ref: '#/components/schemas/SubNetwork-Multiple'
    - type: object
      properties:
        ManagedElement:
          $ref: '#/components/schemas/ManagedElement-Multiple'
```

This definition needs to be modified to produce the following schema definition that allows only "SubNetwork" as root class.

```
NrmRoot:
  type: object
  properties:
    SubNetwork:
        $ref: '#/components/schemas/SubNetwork-Multiple'
```

Furthermore, all objects name-contained by "SubNetwork" and "ManagedElement" that are not defined by the NR NRM need to be removed. The excerpt of the schema published by 3GPP may look as follows.

```
SubNetwork-Single:
  allOf:
    - $ref: '#/components/schemas/Top'
    - $ref: '#/components/schemas/SubNetwork-Attr'
    - $ref: '#/components/schemas/SubNetwork-ncO'
    - $ref: 'TS28104_MdaNrm.yaml#/components/schemas/SubNetwork-ncO-MdaNrm'
    - $ref: 'TS28105_AiMlNrm.yaml#/components/schemas/SubNetwork-ncO-AiMlNrm'
    - $ref: 'TS28312_IntentNrm.yaml#/components/schemas/SubNetwork-ncO-IntentNrm'
    - $ref: 'TS28317_RanScNrm.yaml#/components/schemas/SubNetwork-ncO-RanScNrm'
    - $ref: 'TS28536_CoslaNrm.yaml#/components/schemas/SubNetwork-ncO-CoslaNrm'
    - $ref: 'TS28538_EdgeNrm.yaml#/components/schemas/SubNetwork-ncO-EdgeNrm'
    - $ref: 'TS28541_SliceNrm.yaml#/components/schemas/SubNetwork-ncO-SliceNrm'
    - $ref: 'TS28541_NrNrm.yaml#/components/schemas/SubNetwork-ncO-NrNrm'
    - $ref: 'TS28541_5GcNrm.yaml#/components/schemas/SubNetwork-ncO-5GcNrm'

ManagedElement-Single:
  allOf:
    - $ref: '#/components/schemas/Top'
    - $ref: '#/components/schemas/ManagedElement-Attr'
    - $ref: '#/components/schemas/ManagedElement-ncO'
    - $ref: 'TS28104_MdaNrm.yaml#/components/schemas/ManagedElement-ncO-MdaNrm'
    - $ref: 'TS28105_AiMlNrm.yaml#/components/schemas/ManagedElement-ncO-AiMlNrm'
    - $ref: 'TS28536_CoslaNrm.yaml#/components/schemas/ManagedElement-ncO-CoslaNrm'
    - $ref: 'TS28541_NrNrm.yaml#/components/schemas/ManagedElement-ncO-NrNrm'
    - $ref: 'TS28541_5GcNrm.yaml#/components/schemas/ManagedElement-ncO-5GcNrm'
```

The schema describing the example NRM includes only name-containments from the NR NRM.

```
SubNetwork-Single:
  allOf:
    - $ref: '#/components/schemas/Top'
    - $ref: '#/components/schemas/SubNetwork-Attr'
    - $ref: '#/components/schemas/SubNetwork-ncO'
    - $ref: 'TS28541_NrNrm.yaml#/components/schemas/SubNetwork-ncO-NrNrm'

ManagedElement-Single:
  allOf:
    - $ref: '#/components/schemas/Top'
    - $ref: '#/components/schemas/ManagedElement-Attr'
    - $ref: '#/components/schemas/ManagedElement-ncO'
    - $ref: 'TS28541_NrNrm.yaml#/components/schemas/ManagedElement-ncO-NrNrm'
```

The next example demonstrates how to deal with attributes whose support qualifier is optional and that are not supported by a MnS producer. The "FileDownLoadJob" is a case that has as one optional attribute, the " notificationRecipientAddress". The schema published by 3GPP includes its attribute definition.

```
FileDownloadJob-Single:
  allOf:
    - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
    - type: object
      properties:
        attributes:
          type: object
          properties:
            fileLocation:
              type: string
            notificationRecipientAddress:
              $ref: 'TS28623_ComDefs.yaml#/components/schemas/Uri'
            cancelJob:
              type: string
              enum:
                - TRUE
                - FALSE
            jobMonitor:
              $ref: '#/components/schemas/FileDownloadJobProcessMonitor'
```

The schema describing what is supported on the MnS producer does not include it.

```
FileDownloadJob-Single:
  allOf:
    - $ref: 'TS28623_GenericNrm.yaml#/components/schemas/Top'
    - type: object
      properties:
        attributes:
          type: object
          properties:
            fileLocation:
```

```
            type: string
          cancelJob:
            type: string
            enum:
              - TRUE
              - FALSE
          jobMonitor:
            $ref: '#/components/schemas/FileDownloadJobProcessMonitor'
```

The following example shows possible URIs for accessing the MnS producer specific schema of the Generic NRM, the file that always needs to be retrieved first.

```
https://example.com/management/ProvMnS/1800/schemas/TS28623_GenericNrm_VS.yaml
sftp://example.com/management/ProvMnS/1800/schemas/TS28623_GenericNrm_VS.yaml
```

NtfSubscriptionControl

The format of the value of the attribute "dataNodeSelector" shall be a Jex expression that is compliant to either the Jex basic profile specified in clause 7.4 of TS 32.161 [21]) or to the Jex advanced profile specified in clause 7.5 of TS 32.161 [21]). The value of the attribute "notificationFilter" shall be a Jex expression that is compliant to the Jex conditions profile specified in clause 7.6 of TS 32.161 [21]). The accessible data nodes of the Jex expressions are equal to the nodes in the tree starting at the parent object of the "NtfSubscriptionControl" object.

Examples:

The following example demonstrates how an "NtfSubscriptionControl" object can be used for monitoring quality of service alarm notifications from all "YxzFunction" objects under all "ManagedElement" objects in a specific "SubNetwork".

```
PUT /3gpp-management/SubNetwork=SN1/NtfSubscriptionControl=NSC1 HTTP/1.1
Host: example.org
Content-Type: application/json

{
  "notificationRecipientAddress": "example.org/3gpp-management/alarm-notification-sink",
  "notificationTypes": [
    "notifyNewAlarm",
    "notifyChangedAlarmGeneral",
    "notifyClearedAlarm"
  ],
  "scope": {
    "dataNodeSelector": "/SubNetwork[id="SN1"]/ManagedElement/XyzFunction"
  },
  "notificationFilter": "alarmType=\"QUALITY_OF_SERVICE_ALARM\""
}
```

The next example shows how the operational state and administrative state attributes of all "YxzFunction" objects under all "ManagedElement" objects in a specific "SubNetwork" can be monitored.

```
PUT /3gpp-management/SubNetwork[id"=SN1"]/NtfSubscriptionControl=NSC1 HTTP/1.1
Host: example.org
Content-Type: application/json

{
  "notificationRecipientAddress": "http://example.org/3gpp-management/cm-notification-sink",
  "notificationTypes": [
    " notifyMOIChanges "
  ],
  "scope": {
    "dataNodeSelector": "/SubNetwork[id="SN"1/ManagedElement/XyzFunction/attributes\
                         (operationalState | administrativeState)"
  }
}
```

ConditionMonitor

The value of the attribute "conditions" shall be a Jex expression that is compliant to the Jex conditions profile specified in clause 7.6 of TS 32.161 [21]). The accessible data nodes of the Jex expressions are equal to the nodes in the tree starting at the parent object of the "ConditionMonitor" object.

Examples:

The following example demonstrates how the "ConditionMonitor" can be used for monitoring alarm lists. The condition below evaluates to true, when an alarm is raised on the object instance identified by "DN1".

```
"condition": \
"/SubNetwork[id="SN1"]/AlarmList[id="AL1"]/attributes/alarmRecords/*/objectInstance="DN1"
```

The occurrence of this condition may for example switch on a "PerfMetricJob" to start collecting performance metrics on the alarmed object instance. To do so the "conditionMonitorRef" attribute of the "PerfMetricJob" must specify the DN of the "ConditionMonitor".

In the next example the condition in the example above is modified to include the status of a "Scheduler". The modified condition evaluates to true, when an alarm is raised on the object instance identified by "DN1", but only in the time periods specified in the "Scheduler".

```
"condition": \
"/SubNetwork[id="SN1"]/AlarmList[id="AL1"]/attributes/alarmRecords/*/objectInstance="DN1\
 and /SubNetwork[id="SN1"]/Scheduler[id="S1"]/attributes/schedulerStatus=true"
```

E.2 YANG/Netconf-based solution set

E.2.1 NRM properties supported

The YANG module "ietf-yang-library" (RFC 8525 [18]) is available via NETCONF at the "mnsAddress". This YANG module lists the supported YANG modules and related information. The individual supported YANG modules are accessible either via the "ietf-yang-library module" as specified by the leaves "/modules-state/module/schema", "/yang-library/module-set/import-only-module/location" and "/yang-library/module-set/module/location" or via the "ietf-netconf-monitoring module" (RFC 6022 [19]) with the "<get-schema>" operation.

E.2.2 Common data types

Data types in YANG have the same name as in stage 2 also considering the mapping rule in TS 32.160 [14] clause 6.2.16.1. There are some data types that do not conform to this rule because the data type was defined by an external organisation (e.g. IETF) or pre-existing YANG definitions exist. Table E.2.2-1 lists the mapping for these exceptions.

Table E.2.2-1: Mapping of common data types

Stage-2 Type Name	YANG type	Description
FullTime	yang:time-with-zone-offset	Defined in ietf-yang-types.yang
Float	Decimal64	Defined in RFC 7950
DnList	types3gpp:DistinguishedName	A list or leaf-list of type types3gpp:DistinguishedName Defined in _3gpp-common-yang-types.yang
Fqdn	inet:host-name	Defined in ietf-inet-types.yang
Ipv4Addr	inet:ipv4-address	Defined in ietf-inet-types.yang
Ipv6Addr	inet:ipv6-address	Defined in ietf-inet-types.yang
Ipv6Prefix	inet:ipv6-prefix	Defined in ietf-inet-types.yang
Uri	inet:uri	Defined in ietf-inet-types.yang

Annex F (informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
2012-12					New version after approval	2.0.0	11.0.0
2013-06	SA#60	SP-130304	002	2	Correction of XML schema	11.0.0	11.1.0
2014-06	SA#64	SP-140332	003	1	upgrade XSD	11.1.0	11.2.0
		SP-140358	004	-	remove the feature support statements		
2014-09	SA#65	SP-140560	005	-	Update the link from Solution Set to Information Service due to the end of Release 12	11.2.0	12.0.0
2015-12	SA#70	SP-150691	006	1	Add missing id attribute	12.0.0	12.1.0
2016-01					Upgrade to Rel-13 (MCC)	12.1.0	13.0.0
2016-03	SA#71	SP-160031	010	1	Make the XML schema well formed	13.0.0	13.1.0

Change history							
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2016-06	SA#72	SP-160407	0011	-	F	Update the link from IRP Solution Set to IRP Information Service	13.2.0
2017-03	SA#75	-	-	-		Promotion to Release 14 without technical change	14.0.0
2017-06	SA#76	SP-170510	0015	2	B	Modifications to align with IS to support Configuration Management for mobile networks that include virtualized network functions	14.1.0
2018-03	SA#79	SP-180060	0016	1	B	Add attribute peeParametersList to Solution Set definitions	15.0.0
2018-12	SA#82	SP-181042	0018	1	F	Update NRM root IOCs Solution Set to support priority	15.1.0
2019-03	SA#83	SP-190121	0020	1	F	Update Generic NRM Solution Set to support JSON	15.2.0
2019-06	SA#84	SP-190371	0021	-	B	Add IOCs for threshold monitoring control	16.0.0
2019-09	SA#85	SP-190745	0026	1	F	generate JSON definition for generic NRM based on new style guideline	16.1.0
2019-09	SA#85	SP-190744	0027	-	A	Add IDL XML YANG solutions	16.1.0
2019-09	SA#85	SP-190751	0029	-	A	Correct references and remove not need abbreviations	16.1.0
2019-12	SA#86	SP-191166	0031	1	F	Correct XML solution set for generic NRM	16.2.0
2019-12	SA#86	SP-191166	0035	-	B	Updates to YANG SS	16.2.0
2019-12	SA#86	SP-191173	0037	1	A	Add the definition of attribute measurementsList	16.2.0
2019-12	SA#86	SP-191166	0039	-	B	Add heartbeat control NRM fragment - Stage 3	16.2.0
2019-12	SA#86	SP-191166	0040	-	B	Add notification subscription control NRM fragment - Stage 3	16.2.0
2020-03	SA#87E	SP-200163	0041	2	B	Add configurable KPI control NRM	16.3.0
2020-03	SA#87E	SP-200163	0042	-	B	Add configurable FM - YANG Solution	16.3.0
2020-03	SA#87E	SP-200230	0043	1	F	Add OpenAPI definitions required by the ProvMnS	16.3.0
2020-03	SA#87E	SP-200169	0045		F	Correct errors in yang solution set	16.3.0
2020-03	SA#87E					Correction in the implementation of CR0041	16.3.1
2020-03	SA#87E					Correction of implementation	16.3.2
2020-07	SA#88E	SP-200490	0046	2	B	Add OpenAPI definitions for the FM control fragment	16.4.0
2020-07	SA#88E	SP-200489	0047	-	F	Correct OpenAPI definition for notificationTypes	16.4.0
2020-07	SA#88E	SP-200483	0079	2	B	Add trace control NRM fragment stage 3	16.4.0
2020-07	SA#88E	SP-200484	0080	-	D	Fix inconsistent formatting	16.4.0
2020-07	SA#88E	SP-200493	0081	-	B	Stage3 add the NRM fragment for SON management	16.4.0
2020-07	SA#88E	SP-200485	0082	-	F	Update the definition of SNssai	16.4.0
2020-07	SA#88E	SP-200490	0084	-	F	Update ManagedElement YANG moduel	16.4.0
2020-07	SA#88E	SP-200596	0085	1	F	Update Nrm YANG	16.4.0
2020-07	SA#88E	SP-200490	0087	2	F	Update PM control fragment (OpenAPI definitions)	16.4.0
2020-07	SA#88E	SP-200490	0088	-	F	Clarify usage of the VsDataContainer (OpenAPI definitions)	16.4.0
2020-07	SA#88E	SP-200490	0089	-	F	Add common data definitions (OpenAPI definitions)	16.4.0
2020-07	SA#88E	SP-200490	0091	-	F	Update FM control fragment (YANG definitions)	16.4.0
2020-07	SA#88E	SP-200490	0092	-	F	Update PM Control fragment (YANG definitions)	16.4.0
2020-07	SA#88E	SP-200490	0093	1	F	Correct genericNRM definition in XML solution	16.4.0
2020-09	SA#89e	SP-200729	0095	-	F	Correction of YANG errors	16.5.0
2020-09	SA#89e	SP-200727	0101	1	A	Clean-up definitions and references	16.5.0
2020-09	SA#89e	SP-200729	0102	-	B	YANG SS for Trace Control	16.5.0
2020-09	SA#89e	SP-200724	0103	-	F	Add missing definitions to comDefs.yaml (OpenAPI definitions)	16.5.0
2020-09	SA#89e	SP-200724	0104	-	F	Correct various smaller errors (e.g. validation errors) in genericNRM.yaml (OpenAPI definitions)	16.5.0
2020-09	SA#89e	SP-200729	0105	1	F	Correct ThresholdMonitor definition (OpenAPI definitions)	16.5.0
2020-09	SA#89e	SP-200729	0106	-	F	Update HeartbeatControl YANG definition	16.5.0
2020-09	SA#89e	SP-200729	0107	-	F	Update ThresholdMonitor YANG definition	16.5.0
2020-12	SA#90e	SP-201057	0108	-	F	Correction of NRM YANG errors	16.6.0
2020-12	SA#90e	SP-201063	0109	1	F	Add new MDT specific parameter collection period for NR aligning with 28.622 for stage 3	16.6.0
2020-12	SA#90e	SP-201057	0110	-	F	Remove thresholdLevel attribute from ThresholdMonitor (OpenAPI definition)	16.6.0
2020-12	SA#90e	SP-201050	0111	1	F	Correct and add types in comDefs.yaml (OpenAPI definition)	16.6.0
2020-12	SA#90e	SP-201050	0112	1	F	Use comDefs.yaml instead of local definitions in genericNrm.yaml (OpenAPI definition)	16.6.0
2020-12	SA#90e	SP-201057	0113	1	F	Update attribute perfMetricJobGroupId.	16.6.0
2020-12	SA#90e	SP-201057	0114	-	F	Remove value handling from the granularityPeriod description	16.6.0
2020-12	SA#90e	SP-201088	0115	-	F	Correct and add types in comDefs.yaml (OpenAPI definition)	16.6.0
2020-12	SA#90e	SP-201063	0117		F	Correct trace target parameter for trace control in stage 3	16.6.0
2020-12	SA#90e	SP-201089	0118	1	F	Remove incorrect S-NSSAI definition from YANG SS	16.6.0
2021-03	SA#91e	SP-210146	0121	-	F	Fix compilation errors	16.7.0
2021-03	SA#91e	SP-210153	0125	-	F	YANG compilation error and missing stage 2 corrections	16.7.0
2021-06	SA#92e	SP-210406	0119	2	F	Replace legacy IRPAgent with MnsAgent (OpenAPI definition)	16.8.0
2021-06	SA#92e	SP-210397	0127	1	F	Correction of Trace/MDT related parameters (OpenAPI definition)	16.8.0
2021-06	SA#92e	SP-210397	0128	1	F	Align Trace/MDT related parameters to TS 32.422 (OpenAPI definition)	16.8.0
2021-06	SA#92e	SP-210406	0129	1	F	Clean up regarding common data types (OpenAPI definition)	16.8.0
2021-06	SA#92e	SP-210411	0130	-	F	Correct definition of additionalInformation (YANG)	16.8.0

2021-09	SA#93e	SP-210886	0131	1	F	Replace local data type definition for notificationFilter by common filter definition	16.9.0
2021-09	SA#93e	SP-210886	0132	1	F	Correct data type of notificationId (YANG definitions)	16.9.0
2021-09	SA#93e	SP-210886	0133	1	F	Clarify resource id is required and nullable (OpenAPI definitions)	16.9.0
2021-09	SA#93e	SP-210865	0134	-	F	Correction and clarification of reporting in TraceJob (stage3)	16.9.0
2021-09	SA#93e	SP-210865	0135	-	F	Adaptation and cleanup of Trace/MDT related parameters (stage3)	16.9.0
2021-09	SA#93e	SP-210871	0136	-	F	YANG updates to correct YANG merging problems	16.9.0
2021-09	SA#93e	SP-210867	0137	1	F	Correction of YANG Solution set	16.9.0
2021-12	SA#94e	SP-211475	0139	1	F	Correction of YANG Solution set	16.10.0
2021-12	SA#94e	SP-211458	0142	-	F	Introduce missing IEs for HSS and UDM Trace Record	16.10.0
2021-12	SA#94e	SP-211465	0138	1	B	Add new common types for YANG	17.0.0
2021-12	SA#94e	SP-211467	0140	-	B	Add support for MnS Discovery	17.0.0
2021-12	SA#94e	SP-211473	0141	-	B	Add new common types for YANG	17.0.0
2022-03	SA#95e	SP-220168	0144	1	C	Asynchronous operation NRM additions - YANG Stage-3	17.1.0
2022-03	SA#95e	SP-220177	0146	1	B	Enhance NRM with geographical information supporting MDA	17.1.0
2022-03	SA#95e	SP-220163	0147	1	B	Add support for discovery of managed entities	17.1.0
2022-03	SA#95e	SP-220183	0148	-	B	Add file retrieval NRM fragment (OpenAPI definitions)	17.1.0
2022-03	SA#95e	SP-220183	0149	1	B	Add file download NRM fragment (OpenAPI definitions)	17.1.0
2022-03	SA#95e	SP-220171	0153	-	B	Add parameter to configure beam level measurements in NR MDT	17.1.0
2022-03	SA#95e	SP-220183	0154	-	B	Add attribute to configure an identifier of a TraceJob	17.1.0
2022-03	SA#95e	SP-220187	0156		B	Add file download NRM fragment (YANG)	17.1.0
2022-06	SA#96	SP-220498	0159	-	A	Stage 3 Yang fix for 3GPP Common Trace	17.2.0
2022-06	SA#96	SP-220498	0162	1	A	OpenAPI file name and dependence change for comDefs.yaml	17.2.0
2022-06	SA#96	SP-220498	0163	1	A	OpenAPI file name and dependence change for genericNrm.yaml	17.2.0
2022-06	SA#96	SP-220498	0166	-	A	yaml indentation correction for comDefs.yaml	17.2.0
2022-06	SA#96	SP-220516	0168	-	A	Alignment of attribute names of TraceJob IOC to TS 32.422 (stage 3)	17.2.0
2022-06	SA#96	SP-220496	0169	-	F	Fix description of attribute mnsScope	17.2.0
2022-06	SA#96	SP-220516	0174	-	A	Alignment of attribute values of attribute tjMDTReportInterval to TS 32.422, TS 38.413 and TS 38.423	17.2.0
2022-06	SA#96	SP-220505	0175	-	B	Add stage 3 for management data collection and discovery (OpenAPI definitions)	17.2.0
2022-06	SA#96					Correction of implementation in D.2.10	17.2.1
2022-06	SA#96					Further corrections on the changes in the code from the annexes	17.2.2
2022-09	SA#97e	SP-220853	0180	-	A	YANG Corrections	17.3.0
2022-09	SA#97e	SP-220859	0182	1	A	Adding missing interface for SMF	17.3.0
2022-09	SA#97e	SP-220863	0186	-	F	Correction of file names in OpenAPI Solution Set	17.3.0
2022-09	SA#97e	SP-220864	0188	-	A	Correction of attribute names according to Upper Camel Case Convention and WKA	17.3.0
2022-09	SA#97e	SP-220855	0185	1	B	Add QMC job (stage 3 YANG)	18.0.0
2022-09	SA#97e					Alignment with content in FORGE	18.0.1
2022-09	SA#97e					Alignment with content in FORGE (Yang)	18.0.2
2023-01	SA#98e	SP-221172	0189	-	F	YANG Corrections in Word TS	18.1.0
2023-01	SA#98e	SP-221188	0191	1	B	FIles and File IOCs YANG	18.1.0
2023-01	SA#98e	SP-221186	0194	-	A	Add YANG for ManagementDataCollection	18.1.0
2023-01	SA#98e	SP-221188	0197	-	B	NRM enhancements for NF List	18.1.0
2023-01	SA#98e	SP-221173	0202	1	A	Adding YANG begin and End markers	18.1.0
2023-01	SA#98e	SP-221186	0204	1	A	Correct yaml definition for ManagementDataCollection IOC	18.1.0
2023-01	SA#98e	SP-221187	0206	-	A	Adding a new data type only to represent GeoArea via convex polygon - Stage 3	18.1.0
2023-01	SA#98e	SP-221172	0212	-	F	YANG Corrections	18.1.0
2023-01	SA#98e	SP-221176	0215		B	Definition of parameters MDT Alignment Information and Available RAN Visible QoE Metrics (stage3, YANG)	18.1.0
2023-01	SA#98e	SP-221170	0218	-	A	Add missing attribute properties to YANG	18.1.0
2023-01	SA#98e	SP-221197	0219	1	A	Correct M6 Delay Threshold to align with TS 38.314 and TS 38.413	18.1.0
2023-01	SA#98e					Fixing minor implementation mistakes	18.1.1
2023-03	SA#99	SP-230199	0223	1	A	Fix IpAddr stage 3 definition	18.2.0
2023-03	SA#99	SP-230207	0226	-	A	Adding altitude to GeoArea datatype - Stage 3	18.2.0
2023-03	SA#99	SP-230200	0230	-	A	Missing Mount information	18.2.0
2023-03	SA#99	SP-230210	0233	1	A	Correcting traceRecordingSessionReference property (stage3)	18.2.0
2023-03	SA#99	SP-230204	0234	1	F	YANG Corrections	18.2.0
2023-03	SA#99	SP-230208	0240	1	A	Clarify reporting and monitoring period usage in SupportedPerfMetricGroup datatype. (stage3)	18.2.0
2023-03	SA#99	SP-230211	0241	-	F	Correct YANG for ReportingCtrl	18.2.0
2023-03	SA#99					Correction of annexes for alignment with FORGE	18.2.1
2023-06	SA#100	SP-230653	0214	3	B	Add stage 3 for data type AvailabilityStatus	18.3.0
2023-06	SA#100	SP-230651	0244	1	F	Correcting the min and max Items possible for fiveQIValue attribute in Stage 3	18.3.0
2023-06	SA#100	SP-230649	0246	-	A	correction to stage 3 implementation for MnSInfo and MnsRegistry	18.3.0
2023-06	SA#100	SP-230651	0250	-	F	YANG Corrections	18.3.0
2023-06	SA#100					CR implementation corrections	18.3.1

2023-09	SA#101	SP-230944	0243	4	A	Clarify MnsRegistry handling, YANG SS R18	18.4.0
2023-09	SA#101	SP-230938	0255	-	B	Rel18 CR TS 28.623 Stage 3 Re-structuring Trace job	18.4.0
2023-09	SA#101	SP-230938	0256	-	C	Rel-18 CR TS 28.623 Report Amount for M4, M5, M6 and M7 measurements in LTE	18.4.0
2023-09	SA#101	SP-230960	0257	-	C	Introduce MnS Producer Notification Capabilility	18.4.0
2023-09	SA#101	SP-230942	0260	1	A	Rel-18 CR 28.623 Clarify HeartbeatControl IOC definition (stage3, yang)	18.4.0
2023-09	SA#101	SP-230938	0261		B	Rel-18 CR TS 28.623 Stage 3 Re-structuring Trace job (yang)	18.4.0
2023-09	SA#101	SP-230944	0266	-	A	Improve DistinguishedName pattern in YANG - R18	18.4.0
2023-12	SA#102	SP-231458	0267	-	B	TS28.623 Rel18 OpenAPI SS for QMCJob	18.5.0
2023-12	SA#102	SP-231472	0268	-	B	TS28.623 Rel18 OpenAPI SS for SupportedNotifications	18.5.0
2023-12	SA#102	SP-231458	0269	1	C	Rel-18 CR 28.623 Move normative YANG and YAML code to Forge	18.5.0
2023-12	SA#102	SP-231492	0271	1	A	Rel-18 CR 28.623 YANG Corrections and inVariant	18.5.0
2023-12	SA#102	SP-231453	0272	-	B	Rel-18 CR TS 28.623 Stage 3 Report Amount parameter in NR	18.5.0
2023-12	SA#102	SP-231492	0274		A	Rel-18 CR TS 28.623 Stage 3 Correction of ExcessPacketDelayThreshold definition	18.5.0
2023-12	SA#102	SP-231458	0276	1	B	Rel18 TS28.623 Add NRM fragments for scheduler and condition monitor (OpenAPI definition)	18.5.0
2023-12	SA#102	SP-231452	0278		A	Rel-18 CR 28.623 Clarify MnS scope value for Managed Elements (stage3, yang)	18.5.0
2023-12	SA#102	SP-231457	0287	1	A	Rel-18 CR TS28.623 Correct the yaml definition for ThresholdMonitor IOC to align with stage2 definition	18.5.0
2023-12	SA#102	SP-231458	0288	1	F	Rel-18 CR TS28.623 Separate yaml file for trace control NRM fragment	18.5.0
2023-12	SA#102	SP-231477	0289		B	Rel-18 CR TS 28.623 Enhance the ManagementDataCollection to support request management data per PLMN	18.5.0
2023-12	SA#102	SP-231453	0290	1	B	Rel-18 CR TS28.623 Adding NPN Area Scope of MDT	18.5.0
2023-12	SA#102	SP-231494	0291	-	F	Rel-18 CR TS 28.623 Solution Sets clarifications	18.5.0
2023-12	SA#102	SP-231488	0294	3	A	Rel-18 CR TS 28.623 Align N38 in SMF with TS23.501	18.5.0
2023-12	SA#102	SP-231453	0295	1	B	Rel-18 CR TS 28.623 MDT support for NPN	18.5.0
2023-12	SA#102	SP-231471	0299	1	A	Rel-18 CR 28.623 Add measurement bin support to NRM (stage3, yang)	18.5.0
2023-12	SA#102	SP-231488	0302		A	Rel-18 CR TS28.623 Adding N16 and N16a into module_3gpp-common-trace.yang	18.5.0
2023-12	SA#102	SP-231494	0305	1	F	Rel-18 TS 28.623 YANG Correction of GeoAreaGrp and GeoCoordinateGrp	18.5.0
2023-12	SA#102					Add code files in zip	18.5.1
2024-03	SA#103	SP-240205	0307	1	F	TS28.623 Rel18 correction to Schema definition Issues for SubNetwork and ManagedElement of OpenAPI SS	18.6.0
2024-03	SA#103	SP-240168	0308	1	B	Rel-18 CR TS 28.623 Add annex with example for advertising NRM properties	18.6.0
2024-03	SA#103	SP-240168	0309		C	Rel-18 CR 28.623 Specify notificationFilter	18.6.0
2024-03	SA#103	SP-240185	0311		A	TS28.623 Rel18 correction to ReportingCtrl stage 3 OpenAPI implementation	18.6.0
2024-03	SA#103	SP-240395	0312		F	Rel-18 CR TS28.623 Separate yaml file for control NRM fragment	18.6.0
2024-03	SA#103	SP-240205	0314		F	Rel-18 CR 28.623 Removal of the Corba and XML Solution Sets	18.6.0
2024-03	SA#103	SP-240168	0315		C	Rel-18 CR 28.623 Remove-Update FM related parts	18.6.0
2024-03	SA#103	SP-240180	0316	1	B	Enhance TraceJob for UE level measurements collection	18.6.0
2024-03	SA#103	SP-240168	0317		B	Rel-18 CR 28.623 Change Filter data type from XPath 1.0 to Jex and new Error Response Code(OpenAPI)	18.6.0
2024-03	SA#103	SP-240205	0328	1	F	Rel-18 CR 28.623 YANG Corrections	18.6.0
2024-03	SA#103	SP-240168	0329	1	B	Rel-18 CR 28.623 Add new method for specifying the scope of subscriptions (OpenAPI definitions)	18.6.0
2024-03	SA#103	SP-240168	0309		C	Rel-18 CR 28.623 Specify notificationFilter	18.6.0
2024-06	SA#104	SP-240805	0333	1	A	Rel-18 CR 28.623 System created extension	18.7.0
2024-06	SA#104	SP-240809	0338	-	F	TS28.623 Rel18 corrections to Schema definition Issues for SubNetwork OpenAPI SS for TS28.318	18.7.0
2024-06	SA#104	SP-240805	0340	-	A	TS28.623 Rel18 correction to OpenAPI stage 3 issues in TS28623_ComDefs.yaml	18.7.0
2024-06	SA#104	SP-240805	0342	1	A	Rel-18 CR 28.623 Add missing trace message support to trace job (stage 3, yang)	18.7.0
2024-06	SA#104	SP-240805	0344	1	A	Rel-18 CR 28.623 Add missing trace message support to trace job (stage 3, yaml)	18.7.0
2024-06	SA#104	SP-240809	0346	-	F	Rel-18 CR 28.623 YANG Corrections	18.7.0
2024-06	SA#104	SP-240821	0348	-	F	Rel-18 CR TS 28.623 Add missing defautValue in YAML files to align with stage2	18.7.0
2024-06	SA#104	SP-240809	0353	1	F	Rel-18 CR TS 28.623 Change NpnId from dataType to choice to align with TS 38.331	18.7.0
2024-06	SA#104	SP-240809	0354	-	F	TS28.623 Rel18 Introducing Nrm root to Generic NRM YAML	18.7.0
2024-06	SA#104	SP-240820	0356	1	F	Rel-18 CR Clarify clause on MnS producer specific NRM schema	18.7.0
2024-06	SA#104	SP-240820	0357	1	F	Rel-18 CR Clarify use of Jex by the ConditionMonitor	18.7.0
2024-06	SA#104	SP-240809	0359	1	F	Rel-18 CR 28.623 YANG Corrections	18.7.0

2024-06	SA#104	SP-240809	0360	1	F	Rel-18 CR TS 28.623 Aligning Stage 3 YAML QMC attributes with Stage 2	18.7.0
2024-06	SA#104	SP-240805	0362	-	A	Rel-18 CR TS 28.623 Remove notifyFileDeletion as notification type (YANG, stage 3)	18.7.0
2024-06	SA#104	SP-240805	0365	-	A	Rel-18 CR 28.623 Fix trace attribute definition (stage 3, yaml)	18.7.0
2024-06	SA#104	SP-240805	0366	-	A	Rel-18 CR 28.623 Fix trace attribute definition (stage 3, yang)	18.7.0
2024-06	SA#104	SP-240818	0367	-	F	Rel-18 CR 28.623 Clarification of attribute name for 5GC UE measurements	18.7.0
2024-09	SA#105	SP-241175	0358	3	F	Rel-18 CR 28.623 Correction of TraceJob attribute names according to specified name style	18.8.0
2024-09	SA#105	SP-241178	0376	-	F	Rel-18 CR 28.623 Clarification of attribute name for 5GC UE measurements	18.8.0
2024-09	SA#105	SP-241175	0378	1	F	Rel-18 CR 28.623 Correction on MDT configuration in MR-DC	18.8.0
2024-09	SA#105	SP-241162	0382	-	A	Rel-18 CR 28.623 MeContext YANG mapping	18.8.0
2024-09	SA#105	SP-241173	0388	-	F	Rel18 correction to duplicate Scope definition and misalignment	18.8.0
2024-09	SA#105	SP-241179	0390	-	F	Rel-18 CR 28.623 Clarify usage of JEX for the dataNodeSelector attribute of NtfSubscriptionControl	18.8.0
2024-09	SA#105	SP-241179	0392	-	F	Rel-18 CR 28.623 Update ConditionMonitor for YANG	18.8.0
2024-09	SA#105	SP-241170	0397	-	A	Rel-18 CR 28.623 Cleanup of TraceJob	18.8.0
2024-09	SA#105	SP-241170	0401	1	A	Rel-18 CR 28.623 Correction of TraceJob attributes MBSFN Area List and Area Configuration For Neighboring Cells (stage 3)	18.8.0
2024-09	SA#105	SP-241175	0403	1	F	Rel-18 CR TS 28.623 Add missing interface and Trigger events for core functions	18.8.0
2024-09	SA#105	SP-241179	0407	1	F	Rel-18 CR TS 28.623 Correction of scope and add reference	18.8.0
2024-09	SA#105	SP-241162	0418	-	A	Rel-18 CR TS 28.623 Common data types for YANG solution set	18.8.0
2024-09	SA#105	SP-241175	0420	-	F	Rel-18 CR TS 28.623 Correction to AreaScope (stage 3, YANG)	18.8.0
2024-09	SA#105	SP-241175	0425	-	F	Rel-18 CR TS 28.623 Correction to AreaScope (stage 3, YAML)	18.8.0
2024-12	SA#106	SP-241631	0434	-	A	Rel-18 CR TS 28.623 Correct the YAML definition for PerfMetricJob and ProcessMonitor to align with stage2	18.9.0
2024-12	SA#106	SP-241642	0437	-	F	Rel-18 CR to TS 28.623 Correct wrong CR number in managed element YANG file	18.9.0
2024-12	SA#106	SP-241636	0439	1	A	Rel-18 CR 28.623 Correction for "NR Measurent Type" for TraceControlNrm	18.9.0
2024-12	SA#106	SP-241642	0441	-	F	Correction to Jex for dataNodeSelector and notificationFilter in OpenAPI	18.9.0
2024-12	SA#106	SP-241642	0443	1	F	Update Forge link and a few miscellaneous corrections	18.9.0
2024-12	SA#106	SP-241642	0459	1	F	Rel-18 CR 28.623 YANG Corrections SA5-157	18.9.0
2024-12	SA#106	SP-241642	0466	-	F	Rel18 CR 28.623 correction to duplicate AreaScope in stage 3	18.9.0
2024-12	SA#106	SP-241636	0470	1	A	Rel-18 CR TS 28.623 Correction to AreaScope (stage 3, YANG)	18.9.0
2024-12	SA#106	SP-241631	0473	-	A	Rel-18 CR TS 28.623 Remove unneeded fileLocation attribute (stage 3)	18.9.0
2024-12	SA#106	SP-241642	0475	1	F	correction to stage 3 implementation issues for listOfTraceMetrics and ueCoreMeasurements	18.9.0
2024-12	SA#106	SP-241646	0484	-	A	Rel-18 CR TS 28.623 Add information for IRP based solutions	18.9.0
2024-12	SA#106	SP-241631	0487	-	A	Rel-18 CR 28.623 Update PM YANG mapping	18.9.0
2024-12	SA#106	SP-241631	0490	1	A	Rel-18 CR 28.623 Correction of limitation of convex polygons for geographical area	18.9.0
2025-03	SA#107	SP-250161	0460	1	F	Rel-18 CR TS 28.623 Corrections of measurement type	18.10.0
2025-03	SA#107	SP-250154	0503	-	A	Rel-18 CR TS 28.623 Correct Trace-MDT (YANG)	18.10.0
2025-03	SA#107	SP-250150	0507	2	F	Rel-18 CR 28.623 YANG stage-3 Corrections	18.10.0
2025-03	SA#107	SP-250151	0511	2	F	Rel-18 CR 28.623 Clarify usage of notifyFileReady for PM (yang)	18.10.0
2025-03	SA#107	SP-250150	0513	1	F	Rel18 CR 28.623 Correction of geographical area	18.10.0
2025-06	SA#108	SP-250557	0531	1	F	Rel-18 CR 28.623 YANG stage-3 corrections	18.11.0
2025-06	SA#108	SP-250555	0535	1	A	Rel-18 CR TS 28.623 Corrections on MDT PLMN List	18.11.0

History

Document history		
V18.6.0	May 2024	Publication
V18.7.0	July 2024	Publication
V18.8.0	October 2024	Publication
V18.9.0	January 2025	Publication
V18.10.0	March 2025	Publication
V18.11.0	August 2025	Publication