**3GPP TSG-SA5 Meeting #131e *S5-203458***

**e-meeting 25th May-3rd June 2020**

|  |
| --- |
| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
|  |
|  | **28.623** | **CR** | **0092** | **rev** | **-** | **Current version:** | **16.3.2** |  |
|  |
| *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** |

|  |
| --- |
|  |
| ***Title:***  | Update PM Control fragment (YANG definitions) |
|  |  |
| ***Source to WG:*** | Ericsson |
| ***Source to TSG:*** | S5 |
|  |  |
| ***Work item code:*** | eNRM |  | ***Date:*** | 2020-06-05 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-16 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)Rel-12 (Release 12)**Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
|  |  |
| ***Reason for change:*** | S5-203421 / S5-203275 Update PM Control fragment (YANG definitions) changed the stage 2 of the FM fragment. This is the corresponding YANG definition change |
|  |  |
| ***Summary of change:*** |  |
|  |  |
| ***Consequences if not approved:*** | Mismatch between Stage 2 and stage 3 |
|  |  |
| ***Clauses affected:*** | D.2.1, D.2.2, D.2.3, D.2.4, D.2.5 |
|  |  |
|  | **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:*** | YANG checked locally with pyang --strict |
|  |  |
| ***This CR's revision history:*** |  |

|  |
| --- |
| **First modification** |

## D.2.1 module \_3gpp-common-ep-rp.yang

module \_3gpp-common-ep-rp {

 yang-version 1.1;

 namespace "urn:3gpp:sa5:\_3gpp-common-ep-rp";

 prefix "eprp3gpp";

 import \_3gpp-common-yang-types { prefix types3gpp ; }

 import ietf-inet-types { prefix inet; }

 import \_3gpp-common-measurements { prefix meas3gpp; }

 organization "3GPP SA5";

 contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";

 description "Common/basic class/grouping to be inherited/reused.

 This IOC represents an end point of a link used across a reference

 point between two network entities.";

 reference

 "3GPP TS 28.622

 Generic Network Resource Model (NRM)

 Integration Reference Point (IRP);

 Information Service (IS)

 3GPP TS 28.620

 Umbrella Information Model (UIM)";

 revision 2020-06-08 { reference "CR-0092"; }

 revision 2019-06-17 {

 description "Initial revision";

 }

 grouping EP\_RPGrp {

 description "Abstract class, represents an end point of a link used

 across a reference point between two network entities.

 For naming the subclasses of EP\_RP, the following rules shall apply:

 - The name of the subclassed IOC shall have the form ’EP\_<rp>’,

 where <rp> is a string that represents the name of the reference point.

 Thus, two valid examples of EP\_RP subclassed IOC names would be:

 EP\_S1 and EP\_X2.";

 leaf userLabel {

 type string;

 description "A user-friendly (and user assignable) name of this object.";

 }

 leaf farEndEntity {

 config false;

 type types3gpp:DistinguishedName;

 }

 }

 grouping EP\_Common {

 uses EP\_RPGrp;

 uses meas3gpp:SupportedPerfMetricGroupGrp;

 list localAddress {

 description "Local IP address and VLAN ID.";

 key "ipAddress vlanId";

 min-elements 1;

 max-elements 1;

 uses types3gpp:AddressWithVlan;

 }

 leaf remoteAddress {

 description "Remote IP address.";

 mandatory true;

 type inet:ip-address;

 }

 }

}

## D.2.2 module \_3gpp-common-managed-element.yang

module \_3gpp-common-managed-element {

 yang-version 1.1;

 namespace urn:3gpp:sa5:\_3gpp-common-managed-element;

 prefix "me3gpp";

 import \_3gpp-common-yang-types { prefix types3gpp ; }

 import \_3gpp-common-top { prefix top3gpp; }

 import \_3gpp-common-measurements { prefix meas3gpp; }

 import \_3gpp-common-fm { prefix fm3gpp; }

 organization "3GPP SA5";

 contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";

 description "Defines ManagedElement which will be augmented

 by other IOCs";

 reference "3GPP TS 28.623

 Generic Network Resource Model (NRM)

 Integration Reference Point (IRP);

 Solution Set (SS) definitions

 3GPP TS 28.622

 Generic Network Resource Model (NRM)

 Integration Reference Point (IRP);

 Information Service (IS)

 3GPP TS 28.620

 Umbrella Information Model (UIM)";

 revision 2020-06-08 { reference "CR-0092"; }

 revision 2020-02-24 {

 reference "S5-201365";

 }

 revision 2019-06-17 {

 description "Initial revision";

 }

 feature MeasurementsUnderManagedElement {

 description "The MeasurementSubtree shall be contained under ManageElement";

 }

 feature FmUnderManagedElement {

 description "The FmSubtree shall be contained under ManageElement";

 }

 grouping ManagedElement\_Grp {

 description "Abstract class representing telecommunications resources.

 An ME communicates with a manager (directly or indirectly) for the

 purpose of being monitored and/or controlled. MEs may perform element

 management functionality.

 An ME (and its contained Function\_(s)) may or may not be geographically

 distributed. An ME (and its contained Function\_(s)) is often referred

 to as a Network Element";

 leaf dnPrefix {

 description "Provides naming context that allows the Managed

 Elements to be partitioned into logical domains.

 A Distingushed Name(DN) is defined by 3GPP TS 32.300,

 which splits the DN into a DN Prefix and Local DN";

 type types3gpp:DistinguishedName;

 }

 leaf userLabel {

 description "A user-friendly (and user assignable) name of this object.";

 type string;

 }

 leaf locationName {

 description "The physical location (e.g. an address) of an entity

 represented by a (derivative of) ManagedElement\_. It may contain no

 information to support the case where the derivative of

 ManagedElement\_ needs to represent a distributed multi-location NE.";

 config false;

 type string;

 }

 leaf-list managedBy {

 description "Relates to the role played by ManagementSystem\_ in the

 between ManagedSystem\_ and ManagedElement\_. This attribute contains

 a list of the DN(s) of the related subclasses of

 ManagementSystem\_ instance(s).";

 config false;

 type types3gpp:DistinguishedName;

 }

 leaf-list managedElementTypeList {

 description "The type of functionality provided by the ManagedElement.

 It may represent one ME functionality or a combination of

 more than one functionality.

 1) The allowed values of this attribute are the names of the IOC(s)

 that are (a) derived/subclassed from ManagedFunction and (b) directly

 name-contained by ManagedElement IOC (on the first level below

 ManagedElement), but with the string ’Function’ excluded.

 2) If a ManagedElement contains multiple instances of a ManagedFunction

 this attribute will not contain repeated values.

 3) The capitalisation (usage of upper/lower case) of characters in this

 attribute is insignificant. Thus, the NodeB should be case insensitive

 when reading these values.

 4) Two examples of allowed values are:

 - NodeB;

 - HLR, VLR.";

 config false;

 min-elements 1;

 type string;

 }

 }

 grouping ManagedElementGrp {

 description "Represents telecommunications equipment or

 TMN entities within the telecommunications network providing support

 and/or service to the subscriber.";

 uses ManagedElement\_Grp;

 uses meas3gpp:SupportedPerfMetricGroupGrp {

 if-feature MeasurementsUnderManagedElement ;

 }

 leaf vendorName {

 config false;

 type string;

 }

 leaf userDefinedState {

 type string;

 description "An operator defined state for operator specific usage";

 }

 leaf swVersion {

 config false;

 type string;

 }

 leaf priorityLabel {

 type uint32;

 mandatory true;

 }

 }

 list ManagedElement {

 description "Represents telecommunications equipment or

 TMN entities within the telecommunications network providing support

 and/or service to the subscriber.

 An ME communicates with a manager (directly or indirectly) over one or

 more management interfaces for the purpose of being monitored and/or

 controlled. MEs may or may not additionally perform element management

 functionality.

 An ME contains equipment that may or may not be geographically

 distributed. An ME is often referred to as a Network Element.

 A telecommunication equipment has software and hardware components.

 The IOC described above represents the case when the software component

 is designed to run on dedicated hardware component. In the case when the

 software is designed to run on ETSI NFV defined NFVI [15], the IOC

 description would exclude the NFVI component supporting the above

 mentioned subject software. A ManagedElement may be contained in either

 a SubNetwork or in a MeContext instance. A single ManagedElement may also

 exist stand-alone with no parent at all.

 The ManagedElement IOC may be used to represent combined ME functionalit

 y (as indicated by the managedElementType attribute and the contained

 instances of different functional IOCs).";

 key id;

 uses top3gpp:Top\_Grp;

 container attributes {

 uses ManagedElementGrp;

 }

 uses meas3gpp:MeasurementSubtree {

 if-feature MeasurementsUnderManagedElement ;

 }

 uses fm3gpp:FmSubtree {

 if-feature FmUnderManagedElement ;

 }

 }

}

## D.2.3 module \_3gpp-common-managed-function.yang

module \_3gpp-common-managed-function {

 yang-version 1.1;

 namespace urn:3gpp:sa5:\_3gpp-common-managed-function;

 prefix mf3gpp;

 import \_3gpp-common-yang-types { prefix types3gpp; }

 import \_3gpp-common-top { prefix top3gpp; }

 import \_3gpp-common-measurements { prefix meas3gpp; }

 organization "3GPP SA5";

 contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";

 description "The module defines a base class/grouping for major 3GPP functions.";

 reference

 "3GPP TS 28.622

 Generic Network Resource Model (NRM)

 Integration Reference Point (IRP);

 Information Service (IS)

 3GPP TS 28.620

 Umbrella Information Model (UIM)";

 revision 2020-06-08 { reference "CR-0092"; }

 revision 2019-11-21 {

 reference "S5-197275, S5-197735";

 }

 revision 2019-10-28 {

 reference S5-193518 ;

 }

 revision 2019-06-18 {

 description "Initial revision";

 }

 grouping Operation {

 reference "3gpp TS 28.622";

 leaf name {

 type string;

 mandatory true;

 }

 leaf-list allowedNFTypes {

 type string;

 min-elements 1;

 description "The type of the managed NF service instance

 The specifc values allowed are described in TS 23.501";

 }

 leaf operationSemantics {

 type enumeration {

 enum REQUEST\_RESPONSE;

 enum SUBSCRIBE\_NOTIFY;

 }

 config false;

 mandatory true;

 description "Semantics type of the operation.";

 reference "3GPP TS 23.502";

 }

 }

 grouping ManagedNFServiceGrp {

 description "A ManagedNFService represents a Network Function (NF) service.";

 reference "Clause 7 of 3GPP TS 23.501.";

 leaf userLabel {

 type string;

 description "A user-friendly (and user assignable) name of this object.";

 }

 leaf nFServiceType {

 config false;

 mandatory true;

 type string;

 description "The type of the managed NF service instance

 The specifc values allowed are described in clause 7.2 of TS 23.501";

 }

 list sAP {

 key "host port";

 min-elements 1;

 max-elements 1;

 description "The service access point of the managed NF service instance";

 uses types3gpp:SAP;

 }

 list operations {

 key name;

 min-elements 1;

 uses Operation ;

 description "Set of operations supported by the managed NF

 service instance";

 }

 leaf administrativeState {

 type types3gpp:AdministrativeState;

 mandatory true;

 description "Permission to use or prohibition against using the instance";

 }

 leaf operationalState {

 type types3gpp:OperationalState;

 config false;

 mandatory true;

 description "Describes whether the resource is installed and working";

 }

 leaf usageState {

 type types3gpp:usageState ;

 config false;

 mandatory true;

 description "Describes whether the resource is actively in use at a

 specific instant, and if so, whether or not it has spare

 capacity for additional users.";

 }

 leaf registrationState {

 type enumeration {

 enum REGISTERED;

 enum DEREGISTERED;

 }

 config false;

}

 }

 grouping Function\_Grp {

 description "A base grouping for 3GPP functions.";

 leaf userLabel {

 type string;

 description "A user-friendly (and user assignable) name of this object.";

 }

 }

 grouping ManagedFunctionGrp {

 description "Abstract root class to be inherited/reused by classes

 representing 3GPP functions.

 Anywhere this grouping is used by classes inheriting from ManagedFunction

 the list representing the inheriting class needs to include all

 contained classes of ManagedFunction too. Contained classes are

 either

 - augmented into the Function class or

 - shall be included in the list representing the inheriting clas

 using the grouping ManagedFunctionContainedClasses:

 1) EP\_RP solved using augment

 2) uses mf3gpp:ManagedFunctionContainedClasses;

 ";

 uses Function\_Grp;

 container vnfParametersList {

 description "Contains the parameter set of the VNF

 instance(s) corresponding to an NE.";

 presence "The presence of this container indicates that the ManagedFunction

 represented is realized by one or more VNF instance(s). Otherwise it

 shall be absent.";

 leaf vnfInstanceId {

 type string ;

 mandatory true;

 description "VNF instance identifier";

 reference "ETSI GS NFV-IFA 008 v2.1.1:

 Network Functions Virtualisation (NFV); Management and Orchestration;

 Ve-Vnfm reference point - Interface and Information Model Specification

 section 9.4.2

 ETSI GS NFV-IFA 015 v2.1.2: Network Functions Virtualisation (NFV);

 Management and Orchestration; Report on NFV Information Model

 section B2.4.2.1.2.3";

 }

 leaf vnfdId {

 type string ;

 description "Identifier of the VNFD on which the VNF instance is based.

 The absence of the leaf or a string length of zero for vnfInstanceId

 means the VNF instance(s) does not exist (e.g. has not been

 instantiated yet, has already been terminated).";

 reference "ETSI GS NFV-IFA 008 v2.1.1:

 Network Functions Virtualisation (NFV); Management and Orchestration;

 Ve-Vnfm reference point - Interface and Information Model Specification

 section 9.4.2";

 }

 leaf flavourId {

 type string ;

 description "Identifier of the VNF Deployment Flavour applied to this

 VNF instance.";

 reference "ETSI GS NFV-IFA 008 v2.1.1:

 Network Functions Virtualisation (NFV); Management and Orchestration;

 Ve-Vnfm reference point - Interface and Information Model Specification

 section 9.4.3";

 }

 leaf autoScalable {

 type boolean ;

 mandatory true;

 description "Indicator of whether the auto-scaling of this

 VNF instance is enabled or disabled.";

 }

 }

 container peeParametersList {

 description "Contains the parameter set for the control

 and monitoring of power, energy and environmental parameters of

 ManagedFunction instance(s).";

 presence "Present supported if the control and monitoring of PEE

 parameters is supported by the ManagedFunction or sub-class instance.";

 leaf siteIdentification {

 type string;

 mandatory true;

 description "The identification of the site where the

 ManagedFunction resides.";

 }

 leaf siteLatitude {

 type decimal64 {

 fraction-digits 4;

 range "-90.0000..+90.0000";

 }

 description "The latitude of the site where the ManagedFunction

 instance resides, based on World Geodetic System (1984 version)

 global reference frame (WGS 84). Positive values correspond to

 the northern hemisphere. This attribute is optional in case of

 BTSFunction and RNCFunction instance(s).";

 }

 leaf siteLongitude {

 type decimal64 {

 fraction-digits 4;

 range "-180.0000..+180.0000";

 }

 description "The longitude of the site where the ManagedFunction

 instance resides, based on World Geodetic System (1984 version)

 global reference frame (WGS 84). Positive values correspond to

 degrees east of 0 degrees longitude. This attribute is optional in

 case of BTSFunction and RNCFunction instance(s).";

 }

 leaf siteDescription {

 type string;

 mandatory true;

 description "An operator defined description of the site where

 the ManagedFunction instance resides.";

 }

 leaf equipmentType {

 type string;

 mandatory true;

 description "The type of equipment where the managedFunction

 instance resides.";

 reference "clause 4.4.1 of ETSI ES 202 336-12";

 }

 leaf environmentType {

 type string;

 mandatory true;

 description "The type of environment where the managedFunction

 instance resides.";

 reference "clause 4.4.1 of ETSI ES 202 336-12";

 }

 leaf powerInterface {

 type string;

 mandatory true;

 description "The type of power.";

 reference "clause 4.4.1 of ETSI ES 202 336-12";

 }

 }

 leaf priorityLabel {

 mandatory true;

 type uint32;

 }

 uses meas3gpp:SupportedPerfMetricGroupGrp;

 }

 grouping ManagedFunctionContainedClasses {

 list ManagedNFService {

 description "Represents a Network Function (NF)";

 reference "3GPP TS 23.501";

 key id;

 uses top3gpp:Top\_Grp;

 container attributes {

 uses ManagedNFServiceGrp;

 }

 }

 }

}

## D.2.4 module \_3gpp-common-measurements.yang

module \_3gpp-common-measurements {

 yang-version 1.1;

 namespace "urn:3gpp:sa5:\_3gpp-common-measurements";

 prefix "meas3gpp";

 import \_3gpp-common-top { prefix top3gpp; }

 import \_3gpp-common-yang-types { prefix types3gpp; }

 organization "3GPP SA5";

 contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";

 description "Defines Measurement and KPI related groupings

 Any list/class intending to use this should include 2 or 3 uses statements

 controlled by a feature:

 A)

+++ feature MeasurementsUnderMyClass {

+++ description 'Indicates whether measurements and/or KPIs are supported

+++ for this class.';

+++ }

 B) include the attribute measurementsList and/or kPIsList indicating the

 supported measurment and KPI types and GPs. Note that for classes

 inheriting from ManagedFunction, EP\_RP or SubNetwork these attributes are

 already inherited, so there is no need to include them once more. E.g.

+++ grouping MyClassGrp {

+++ uses meas3gpp:SupportedPerfMetricGroup;

+++ }

 C) include the class PerfmetricJob to control the measurements/KPIs. E.g.

 list MyClass {

 container attributes {

 uses MyClassGrp;

 }

+++ uses meas3gpp:MeasurementSubtree {

+++ if-feature MeasurementsUnderMyClass ;

+++ }

 }

 Measurements can be contained under ManagedElement, SubNetwork, or

 any list representing a class inheriting from Subnetwork or

 ManagedFunction. Note: KPIs will only be supported under SubNetwork";

 reference "3GPP TS 28.623

 Generic Network Resource Model (NRM)

 Integration Reference Point (IRP);

 Solution Set (SS) definitions

 3GPP TS 28.622

 Generic Network Resource Model (NRM)

 Integration Reference Point (IRP);

 Information Service (IS)";

 revision 2020-06-08 { reference "CR-0092"; }

 revision 2020-05-31 { reference "CR-0084"; }

 revision 2020-03-11 { reference "S5-201581, SP-200229"; }

 revision 2019-11-21 {

 reference "S5-197275, S5-197735";

 }

 revision 2019-10-28 {

 reference "S5-193516";

 }

 revision 2019-06-17 {

 }

 grouping SupportedPerfMetricGroupGrp {

 list SupportedPerfMetricGroup {

 config false;

 description "Captures a group of supported performance metrics and

 associated parameters related to their production and reporting.

 A SupportedPerfMetricGroup attribute which is part of an MOI may

 define performanceMetrics for any MOI under the subtree contained

 under that MOI, e.g. SupportedPerfMetricGroup on a ManagedElement

 can specify supported metrics for contained ManagedFunctions

 like a GNBDUFunction.";

 leaf-list performanceMetrics {

 type string;

 min-elements 1;

 description "Performance metrics include measurements defined in

 TS 28.552 and KPIs defined in TS 28.554. Performance metrics can

 also be those specified by other SDOs or vendor specific metrics.

 Performance metrics are identfied with their names. A name can also

 identify a vendor specific group of performance metrics.

 For measurements defined in TS 28.552 the name is constructed as

 follows:

 - 'family.measurementName.subcounter' for measurement types with

 subcounters

 - 'family.measurementName' for measurement types without subcounters

 - 'family' for measurement families

 For KPIs defined in TS 28.554 the name is defined in the KPI

 definitions template as the component designated with e).";

 }

 leaf-list granularityPeriods {

 type uint32 {

 range 1..max ;

 }

 units seconds;

 min-elements 1;

 }

 leaf-list reportingMethods {

 type enumeration {

 enum FILE\_BASED\_LOC\_SET\_BY\_PRODUCER;

 enum FILE\_BASED\_LOC\_SET\_BY\_CONSUMER;

 enum STREAM\_BASED;

 }

 min-elements 1;

 }

 }

 }

 grouping PerfMetricJobGrp {

 description "Represents the attributtes of the IOC PerfMetricJob";

 leaf administrativeState {

 default UNLOCKED;

 type types3gpp:AdministrativeState ;

 description "Enable or disables production of the metrics";

 }

 leaf operationalState {

 config false;

 mandatory true;

 type types3gpp:OperationalState ;

 description "Indicates whether the PerfMetricJob is working.";

 }

 leaf perfMetricJobGroupId {

 type string;

 description "Identifies members of a PerfMetricJob group. For the

 stream based reporting method this reference shall be present.";

 }

 leaf-list performanceMetrics {

 type string;

 min-elements 1;

 description "Performance metrics include measurements defined in

 TS 28.552 and KPIs defined in TS 28.554. Performance metrics can

 also be those specified by other SDOs or vendor specific metrics.

 Performance metrics are identfied with their names. A name can also

 identify a vendor specific group of performance metrics.

 For measurements defined in TS 28.552 the name is constructed as

 follows:

 - 'family.measurementName.subcounter' for measurement types with

 subcounters

 - 'family.measurementName' for measurement types without subcounters

 - 'family' for measurement families

 For KPIs defined in TS 28.554 the name is defined in the KPI

 definitions template as the component designated with e).";

 }

 leaf granularityPeriod {

 type uint32 {

 range 1..max ;

 }

 units seconds;

 mandatory true;

 description "Granularity period used to produce measurements. The value

 must be one of the supported granularity periods for the metric.

 For measurements of type counter this is the period at which samples

 of the internal counter value, that is incremented with every event

 occurance, are taken.

 For measurements of type gauge, this is period, over which the mean

 value of the measured variable is calculated. The mean value is

 then taken as sample.";

 }

 leaf-list objectInstances {

 type types3gpp:DistinguishedName;

 }

 leaf-list rootObjectInstances {

 type types3gpp:DistinguishedName;

 description "Each object instance designates the root of a subtree that

 contains the root object and all descendant objects.";

 }

 choice reportingCtrl {

 mandatory true;

 description "This choice defines the method for reporting collected

 performance metrics to MnS consumers as well as the parameters for

 configuring the reporting function. It is a choice between the control

 parameter required for the reporting methods, whose presence selects

 the reporting method as follows:

 - When only the fileReportingPeriod attribute is present, the MnS

 producer shall store files on the MnS producer at a location selected

 by the MnS producer and inform the MnS consumer about the availability

 of new files and the file location using the notifyFileReady

 notification.

 - When only the fileReportingPeriod and fileLocation attributes are

 present, the MnS producer shall store the files on the MnS consumer at

 the location specified by fileLocation. No notification is emitted by

 the MnS producer.

 - When only the streamTarget attribute is present, the MnS producer

 shall stream the data to the location specified by streamTarget.

 For the file-based reporting methods the fileReportingPeriod attribute

 specifies the time window during which collected measurements are stored

 into the same file before the file is closed and a new file is opened.";

 case file-based-reporting {

 leaf fileReportingPeriod {

 type uint32 {

 range 1..max;

 }

 units minutes";

 must '(number(.)\*"60") mod number(../granularityPeriod) = "0"' {

 error-message

 "The time-period must be a multiple of the granularityPeriod.";

 }

 mandatory true;

 description "For the file-based reporting method this is the time

 window during which collected measurements are stored into the same

 file before the file is closed and a new file is opened.

 The time-period must be a multiple of the granularityPeriod.

 Applicable when the file-based reporting method is supported";

 }

 leaf fileLocation {

 type string ;

 description "Applicable and must be present when the file-based

 reporting method is supported, and the files are stored on the MnS

 consumer.";

 }

 }

 case stream-based-reporting {

 leaf streamTarget {

 type string;

 mandatory true;

 description "Applicable when stream-based reporting method is

 supported.";

 }

 }

 }

 }

 grouping ThresholdMonitoringCapabilityGrp {

 description "Represents the capability of threshold monitoring(s)

 allowed to be created by ThresholdMonitor to monitor some or all

 of the measurements identified by SupportedPerfMetricGroup.";

 leaf-list supportedMonitoringGPs {

 type uint32;

 units second;

 config false;

 min-elements 1;

 description "The monitoring granularity periods supported by the

 producer for the monitored entities.";

 }

 }

 grouping ThresholdMonitorGrp {

 description "A threshold monitor that is created by the consumer for

 the monitored entities whose measurements are required by consumer

 to monitor.";

 list thresholdInfoList {

 key idx;

 leaf idx { type uint32 ; }

 leaf measurementType {

 type string;

 mandatory true;

 description "Shall be in one of the following form:

 - 'family.measurementName.subcounter' for monitoring the

 measurement types with subcounters defined.

 - 'family.measurementName' for monitoring the measurement

 types without subcounters defined.";

 }

 leaf direction {

 type enumeration {

 enum INCREASING;

 enum DECREASING;

 }

 mandatory true;

 description "

 - If it is 'INCREASING', the threshold crossing

 notification is triggered when the measurement value

 equals or exceeds a thresholdValue.

 - If it is 'DECREASING', the threshold crossing notification is

 triggered when the measurement value equals or below a

 thresholdValue.";

 }

 list thresholdPack {

 key idx;

 min-elements 1;

 leaf idx { type uint32 ; }

 leaf thresholdLevel {

 type int64;

 mandatory true;

 description "";

 }

 leaf thresholdValue {

 type int64;

 mandatory true;

 description "";

 }

 leaf threshold-low {

 type int64;

 description "The values threshold-low and threshold-high must

 be present or absent together.

 The measurementType value is allowed to oscillate between

 threshold-low and threshold-highwithout triggering the

 threshold crossing notification.";

 }

 leaf threshold-high {

 when '../threshold-low';

 type int64;

 mandatory true;

 description "The values threshold-low and threshold-high must

 be present or absent together.

 The measurementType value is allowed to oscillate between

 threshold-low and threshold-highwithout triggering the

 threshold crossing notification.";

 }

 }

 }

 leaf monitoringGP {

 type uint32;

 units second;

 mandatory true;

 description "Monitoring granularity period";

 }

 leaf monitoringNotifTarget {

 type string;

 description "Identifies the target of the notifications when the

 monitored measurement crosses or reaches the threshold set by the

 subject threshold monitor.";

 }

 leaf monitoredIOCName {

 type string;

 mandatory true;

 description "Specifies the name of list(s) representing one object

 class for which the threshold monitor is created.

 When this attribute is effective, the threshold monitor is created

 for all list nodes/entries with the specified name in the containment

 tree whose top (tree) node is the list entry containing the subject

 ThresholdMonitor list-entry containing this leaf.

 This leaf is effective when the monitoredObjectDNs contained by

 the same ThresholdMonitor list entry is empty.

 AllowedValues: The IOC names defined in the NRMs specifications.";

 }

 leaf-list monitoredObjectDNs {

 type types3gpp:DistinguishedName;

 description "Specifies the object instance(s) for threshold monitoring.

 The attribute monitoredIOCName contained by the same

 ThresholdMonitor entry has no effect unless this leaf-list empty.";

 }

 }

 grouping MeasurementSubtree {

 description "Contains classes that define measurements.

 Should be used in all classes (or classes inheriting from)

 - SubNnetwork

 - ManagedElement

 - ManagedFunction

 If a YANG module wants to augment these classes/list/groupings they must

 augment all user classes!

 If a class uses this grouping in its list it shall also use the

 grouping SupportedPerfMetricGroupGrp to add SupportedPerfMetricGroup as

 an attribute to its grouping";

 list PerfMetricJob {

 description "This IOC represents a performance metric production job. It

 can be name-contained by SubNetwork, ManagedElement, or ManagedFunction.

 To activate the production of the specified performance metrics, a MnS

 consumer needs to create a PerfMetricJob instance on the MnS producer

 and ensure that the adminState is sUNLOCKED>.

 For ultimate deactivation of metric production, the MnS consumer should

 delete the job to free up resources on the MnS producer.

 For temporary suspension of metric production, the MnS consumer can

 manipulate the value of the administrative state attribute. The MnS

 producer may disable metric production as well, for example in overload

 situations. This situation is indicated by the MnS producer with setting

 the operational state attribute to disabled. When production is resumed

 the operational state is set again to enabled.

 The perfMetricJobGroupId is a common reference across all members of a

 PerfMetricJob group. A group contains related PerfMetricJob instances.

 The attribute performanceMetrics defines the performance metrics to be

 produced and the attribute granularityPeriod defines the granularity

 period to be applied.

 All object instances below and including the instance name-containing

 the PerfMetricJob (base object instance) are scoped for performance

 metric production. Performance metrics are produced only on those object

 instances whose object class matches the object class associated to the

 performance metrics to be produced.

 The attributes objectInstances and rootObjectInstances allow to restrict

 the scope. When the attribute objectInstances is present, only the object

 instances identified by this attribute are scoped. When the attribute

 rootObjectInstances is present, then the subtrees whose root objects are

 identified by this attribute are scoped. Both attributes may be present

 at the same time meaning the total scope is equal to the sum of both

 scopes. Object instances may be scoped by both the objectInstances and

 rootObjectInstances attributes. This shall not be considered as an error

 by the MnS producer.

 When the performance metric requires performance metric production on

 multiple managed objects, which is for example the case for KPIs, the

 MnS consumer needs to ensure all required objects are scoped. Otherwise

 a PerfMetricJob creation request shall fail.

 The attribute reportingCtrl specifies the method and associated control

 parameters for reporting the produced measurements to MnS consumers.

 Three methods are available: file-based reporting with selection of the

 file location by the MnS producer, file-based reporting with selection

 of the file location by the MnS consumer and stream-based reporting.

 A PerfMetricJob creation request shall fail, when the requested

 performance metrics, the requested granularity period, the requested

 repoting method, or the requested combination thereof is not supported

 by the MnS producer.

 Creation and deletion of PerfMetricJob instances by MnS consumers is

 optional; when not supported, PerfMetricJob instances may be created and

 deleted by the system or be pre-installed.";

 key id;

 uses top3gpp:Top\_Grp ;

 container attributes {

 uses PerfMetricJobGrp ;

 }

 }

 list ThresholdMonitoringCapability {

 key id;

 max-elements 1;

 description "Represents the capability of threshold monitoring(s)

 allowed to be created by ThresholdMonitor to monitor some or all

 of the measurements identified by supportedMeasurementsGPs.

 This list entry instance represents the capability of the

 threshold monitor(s) allowed to be created for the measurements of

 the (tree) nodes of a containment tree whose top (tree) node is

 the list-entry instance containing the ThresholdMonitoringCapability

 instance.

 In case one entry (say A) is contained by a tree node (say X), and

 a similar list entry named ThresholdMonitoringCapability (say B) is

 contained by a subordinate tree node (of tree node X), the entry

 (B) contained by the subordinate tree node (Y) prevail.";

 uses top3gpp:Top\_Grp ;

 container attributes {

 uses ThresholdMonitoringCapabilityGrp ;

 }

 }

 list ThresholdMonitor {

 key id;

 description "A threshold monitor that is created by the consumer for

 the monitored entities whose measurements are required by consumer

 to monitor. The monitored entities are identified by the attribute

 monitoredObjectDNs.

 The creation request for this list entry may be rejected, if

 the measurements to be monitered are being collected

 (e.g., by a measurement job or NRM configurations) with a GP different

 from the monitoringGP; or the measurements to be monitered are not

 being collected.

 In case one entry (say A) is contained by a tree node (say X), and

 a similar list entry named ThresholdMonitor (say B) is

 contained by a subordinate tree node (of tree node X),

 when these two instances have overlaps the entry (B)

 contained by the subordinate tree node (Y) will prevail for the

 overlapped parts.";

 uses top3gpp:Top\_Grp ;

 container attributes {

 uses ThresholdMonitorGrp ;

 }

 }

 }

}

D.2.5 module \_3gpp-common-subnetwork.yang

module \_3gpp-common-subnetwork {

 yang-version 1.1;

 namespace "urn:3gpp:sa5:\_3gpp-common-subnetwork";

 prefix "subnet3gpp";

 import \_3gpp-common-yang-types { prefix types3gpp; }

 import \_3gpp-common-top { prefix top3gpp; }

 import \_3gpp-common-measurements { prefix meas3gpp; }

 import \_3gpp-common-fm { prefix fm3gpp; }

 import ietf-yang-schema-mount { prefix yangmnt; }

 organization "3GPP SA5";

 contact "https://www.3gpp.org/DynaReport/TSG-WG--S5--officials.htm?Itemid=464";

 description "Defines basic SubNetwork which will be augmented by other IOCs";

 reference "3GPP TS 28.623

 Generic Network Resource Model (NRM)

 Integration Reference Point (IRP);

 Solution Set (SS) definitions

 3GPP TS 28.622

 Generic Network Resource Model (NRM)

 Integration Reference Point (IRP);

 Information Service (IS)

 3GPP TS 28.620

 Umbrella Information Model (UIM)";

 revision 2020-06-08 { reference "CR-0092"; }

 revision 2020-03-11 {

 description "Added KPIs and corrections";

 reference "S5-201365, S5-201581, SP-200229";

 }

 revision 2020-02-24 {

 reference "S5-201365";

 }

 revision 2019-06-17 {

 description "Initial revision";

 }

 feature ExternalsUnderSubNetwork {

 description "Classes representing external entities like EUtranFrequency,

 ExternalGNBCUCPFunction, ExternalENBFunction

 are contained under a Subnetwork list/class.";

 }

 feature MeasurementsUnderSubNetwork {

 description "The MeasurementSubtree shall be contained under SubNetwork

 indicating the support of Measurements and/or KPIs";

 }

 feature FmUnderSubNetwork {

 description "The FmSubtree shall be contained under SubNetwork";

 }

 grouping Domain\_Grp {

 description "A domain is a partition of instances of managed entities

 such that :

 - the group represents a topological structure which describes the

 potential for connectivity

 - Subject to common administration

 - With common characteristics";

 leaf dnPrefix {

 type types3gpp:DistinguishedName;

 reference "Annex C of 32.300 ";

 }

 leaf userLabel {

 type string;

 description "A user-friendly (and user assignable) name of this object.";

 }

 leaf userDefinedNetworkType {

 type string;

 description "Textual information indicating network type, e.g. 'UTRAN'.";

 }

 }

 grouping SubNetworkGrp {

 uses Domain\_Grp;

 uses meas3gpp:SupportedPerfMetricGroupGrp;

 leaf-list setOfMcc {

 description "Set of Mobile Country Code (MCC).

 The MCC uniquely identifies the country of domicile

 of the mobile subscriber. MCC is part of the IMSI (3GPP TS 23.003)

 This list contains all the MCC values in subordinate object

 instances to this SubNetwork instance.

 See clause 2.3 of 3GPP TS 23.003 for MCC allocation principles.

 It shall be supported if there is more than one value in setOfMcc

 of the SubNetwork. Otherwise the support is optional.";

 type types3gpp:Mcc;

 }

 leaf priorityLabel {

 mandatory true;

 type uint32;

 }

 }

 list SubNetwork {

 key id;

 description "Represents a set of managed entities";

 uses top3gpp:Top\_Grp;

 container attributes {

 uses SubNetworkGrp;

 leaf-list parents {

 description "Reference to all containg SubNetwork instances

 in strict order from the root subnetwork down to the immediate

 parent subnetwork.

 If subnetworks form a containment hierarchy this is

 modeled using references between the child SubNetwork and the parent

 SubNetworks.

 This reference MUST NOT be present for the top level SubNetwork and

 MUST be present for other SubNetworks.";

 type leafref {

 path "../../../SubNetwork/id";

 }

 }

 leaf-list containedChildren{

 description "Reference to all directly contained SubNetwork instances.

 If subnetworks form a containment hierarchy this is

 modeled using references between the child SubNetwork and the parent

 SubNetwork.";

 type leafref {

 path "../../../SubNetwork/id";

 }

 }

 }

 uses meas3gpp:MeasurementSubtree {

 if-feature MeasurementsUnderSubNetwork ;

 }

 uses fm3gpp:FmSubtree {

 if-feature FmUnderSubNetwork ;

 }

 yangmnt:mount-point children-of-SubNetwork {

 description "Mountpoint for ManagedElement";

 reference "RFC8528 YANG Schema Mount";

 }

 // augment external parts here

 }

}

|  |
| --- |
| **End of modification** |