**3GPP TSG-SA5 Meeting #129-e *S5-201365rev2***

**Online, , 24th Feb 2020 - 4th Mar 2020**

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| --- |
| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
|  |
|  | **28.623** | **CR** | **0042** | **rev** | **-** | **Current version:** | **16.2.0** |  |
|  |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **X** | Core Network | **X** |

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|  |
| ***Title:***  | Add configurable FM - YANG Solution |
|  |  |
| ***Source to WG:*** | Ericsson España S.A. |
| ***Source to TSG:*** | S5 |
|  |  |
| ***Work item code:*** | eNRM |  | ***Date:*** | 2020-02-14 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***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:*** | Add a YANG solution set for the configurable FM solution documented in the stage 2 CR |
|  |  |
| ***Summary of change:*** | Added new module \_3gpp-common-fm.yang and modified \_3gpp-common-managed-element.yang and \_3gpp-common-subnetwork.yang |
|  |  |
| ***Consequences if not approved:*** | YANG solution set for configurable FM missing |
|  |  |
| ***Clauses affected:*** | D.2.2, D.2.5, D.2.A |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** | **Y** |  |  O&M Specifications | CR S5-201121 rev3 |
|  |  |
| ***Other comments:*** | The changes are visible in the ETSI Forge Gitlab at https://forge.etsi.org/rep/3GPP/SA5/data-models/merge\_requests/18/diffsIncludes commits:9efa6d446ce17dbec7b2094e75005732030dc6adb8c1450cfc82f91472a451796afcec9b016c589af7412c6f7564d8423d8bfd8f795e5f78a0b4de13 |
|  |  |
| ***This CR's revision history:*** |  |

***First Change***

## 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";

 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 2020-02-24 {

 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:Measurements {

 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; // TODO: should this have a min-element/max-elements?

 uses top3gpp:Top\_Grp;

 container attributes {

 uses ManagedElementGrp;

 }

 uses meas3gpp:MeasurementSubtree {

 if-feature MeasurementsUnderManagedElement ;

 }

 uses fm3gpp:FmSubtree {

 if-feature FmUnderManagedElement ;

 }

 }

}

***Next Change***

## 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";

 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 2020-02-24 {

 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";

 }

 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:Measurements;

 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

 }

}

***Next Change***

## D.2.a module \_3gpp-common-fm.yang

module \_3gpp-common-fm {

 yang-version 1.1;

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

 prefix "fm3gpp";

 import ietf-yang-types { prefix yang; }

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

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

 organization "3GPP SA5";

 description "Defines a Fault Management model";

 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 2020-02-24 {

 reference "S5-201365";

 }

 typedef eventType {

 type enumeration {

 enum COMMUNICATIONS\_ALARM {

 value 2;

 }

 enum QUALITY\_OF\_SERVICE\_ALARM {

 value 3;

 }

 enum PROCESSING\_ERROR\_ALARM {

 value 4;

 }

 enum EQUIPMENT\_ALARM {

 value 5;

 }

 enum ENVIRONMENTAL\_ALARM {

 value 6;

 }

 enum INTEGRITY\_VIOLATION {

 value 7;

 }

 enum OPERATIONAL\_VIOLATION {

 value 8;

 }

 enum PHYSICAL\_VIOLATIONu {

 value 9;

 }

 enum SECURITY\_SERVICE\_OR\_MECHANISM\_VIOLATION {

 value 10;

 }

 enum TIME\_DOMAIN\_VIOLATION {

 value 11;

 }

 }

 description "General category for the alarm.";

 }

 typedef severity-level {

 type enumeration {

 enum CRITICAL { value 3; }

 enum MAJOR { value 4; }

 enum MINOR { value 5; }

 enum WARNING { value 6; }

 enum INDETERMINATE { value 7; }

 enum CLEARED { value 8; }

 }

 description "The possible alarm serverities.

 Aligned with ERICSSON-ALARM-MIB.";

 }

 grouping AlarmRecordGrp {

 description "Contains alarm information of an alarmed entity of a

 name-tree whose top is FMControlAttachment.

 One MonitoredEntity2 has at most one AlarmList. The producer assigns an

 identifier, called alarmId, to each AlarmRecord in the AlarmList. An

 alarmId unambiguously identifies one alarm record in the AlarmList.

 The producer maintains one AlarmList containing currently active

 alarms i.e.:

 a) Alarm record(s) whose perceivedSeverity is not CLEARED and;

 b) Alarm record(s) whose perceivedSeverity is CLEARED and its ackState

 is not ACKNOWLEDGED.

 The producer may remove alarm records that are not active alarms.

 The availability and accuracy of time carried by the

 time parameters in individual entries of the list shall be

 'best effort'.

 Reason: A Management System is not required to persistently store

 these times or other alarm information (as in case of synchronization

 information may be provided by the NE), while also some NE's do not

 keep these times (and a later attempt to retrieve the alarm data

 from the NEs will not deliver these time data).";

 leaf alarmType {

 config false ;

 type eventType;

 description "General category for the alarm.";

 }

 leaf objectClass\_objectInstance {

 type string;

 config false ;

 description "";

 }

 leaf alarmId {

 type string;

 description "Identifies the alarmRecord";

 }

 leaf alarmRaisedTime {

 type yang:date-and-time ;

 config false ;

 }

 leaf alarmChangedTime {

 type yang:date-and-time ;

 config false ;

 description "not applicable if related alarm has not changed";

 }

 leaf alarmClearedTime {

 type yang:date-and-time ;

 config false ;

 description "not applicable if related alarm was not cleared";

 }

 leaf probableCause {

 type string;

 // the valuespace may be restricted later

 config false ;

 }

 leaf perceivedSeverity {

 type severity-level;

 description "This is Writable only if producer supports consumer

 to set perceivedSeverity to CLEARED";

 }

 leaf rootCauseIndicator {

 type string;

 // the valuespace may be restricted later

 config false ;

 description "";

 }

 leaf specificProblem {

 type string;

 // the valuespace may be restricted later

 config false ;

 description "";

 }

 leaf backedUpStatus {

 type string;

 // the valuespace may be restricted later

 config false ;

 description "not applicable if related alarm is a security alarm";

 }

 leaf trendIndication {

 type string;

 // the valuespace may be restricted later

 config false ;

 description "not applicable if related alarm is a security alarm";

 }

 leaf thresholdInfo {

 type string;

 // the valuespace may be restricted later

 config false ;

 description "not applicable if related alarm is a security alarm";

 }

 leaf stateChangeDefinition {

 type string;

 // the valuespace may be restricted later

 config false ;

 description "not applicable if related alarm is a security alarm";

 }

 leaf monitoredAttributes {

 type string;

 // the valuespace may be restricted later

 config false ;

 description "not applicable if related alarm is a security alarm";

 }

 leaf proposedRepairActions {

 type string;

 config false ;

 description "not applicable if related alarm is a security alarm";

 }

 leaf additionalText {

 type string;

 config false ;

 description "";

 }

 leaf additionalInformation {

 type string;

 config false ;

 description "";

 }

 leaf ackTime {

 type yang:date-and-time ;

 config false ;

 description "The time the alarm was acknowledged

 not applicable if related alarm was not acknowledged

 nor unacknowledged";

 }

 leaf ackUserId {

 type string;

 config false ;

 description "not applicable if related alarm was not acknowledged

 nor unacknowledged";

 }

 leaf ackSystemId {

 type string;

 // the valuespace may be restricted later

 config false ;

 description "not applicable if related alarm was not acknowledged

 nor unacknowledged";

 }

 leaf ackState {

 type string;

 // the valuespace may be restricted later

 description "not applicable if related alarm was not acknowledged

 nor unacknowledged";

 }

 leaf clearUserId {

 type string;

 // the valuespace may be restricted later

 config false ;

 description "not applicable if related alarm was not cleared";

 }

 leaf clearSystemId {

 type string;

 // the valuespace may be restricted later

 config false ;

 description "not applicable if related alarm was not cleared";

 }

 leaf serviceUser {

 type string;

 // the valuespace may be restricted later

 config false ;

 description "not applicable if related alarm is not a security alarm";

 }

 leaf serviceProvider {

 type string;

 // the valuespace may be restricted later

 config false ;

 description "not applicable if related alarm is not a security alarm";

 }

 leaf securityAlarmDetector {

 type string;

 // the valuespace may be restricted later

 config false ;

 description "not applicable if related alarm is not a security alarm";

 }

 }

 grouping FMControlGrp {

 description "Represents a capability to manage alarm records and alarm

 notifications.";

 leaf administrativeState {

 type types3gpp:AdministrativeState ;

 default LOCKED;

 description "The consumer sets this attribute to UNLOCKED instructing

 the producer to report and record alarm information.

 The consumer sets the attribute to LOCKED instructing detection,

 reporting and recording of alarm information are no longer needed.";

 }

 leaf operationalState {

 type types3gpp:OperationalState ;

 default DISABLED;

 config false;

 description "The producer sets this attribute to ENABLED, indicating

 that it has the resource and ability to record alarm in AlarmList

 and sending alarm notification to faultReportTarget (an attribute

 of NtfSubscriptionControl IOC);

 else, it sets the attribute to DISABLED.";

 }

 }

 grouping AlarmListGrp {

 description "Represents the list of alarm records.";

 leaf numOfAlarmRecords {

 type uint32 ;

 config false;

 description "The number of alarm records in the AlarmList";

 }

 leaf lastModification {

 type yang:date-and-time ;

 config false;

 description "The last time when an alarm record is modified";

 }

 list alarmRecordList {

 key alarmId;

 description "List of alarmRecords";

 uses AlarmRecordGrp;

 }

 }

 grouping FmSubtree {

 description "Contains FM related classes.

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

 - SubNnetwork

 - ManagedElement

 If some YAM wants to augment these classes/list/groupings they must

 augment all user classes!";

 list FMControl {

 key id;

 max-elements 1;

 description "Represents a capability to manage alarm records and alarm

 notifications. The alarm records and notifications managed are related to

 managed entities of the naming-tree whose top instance is one

 name-containing this FMControl.

 The FMControl MnS producer, upon detection of an abnormal behaviour of

 its managed entities, would create or update an alarm record of the

 AlarmList. Consumer who has a subscription with NtfSubscriptionControl

 MnS would receive alarm notifications.";

 uses top3gpp:Top\_Grp ;

 container attributes {

 uses FMControlGrp ;

 }

 }

 list AlarmList {

 key id;

 max-elements 1;

 description "Represents the list of alarm records. The alarm records are

 related to managed entities of the naming-tree whose top instance is one

 name-containing this AlarmList.

 The producer would create this AlarmList instance.

 Over time, the producer may produce, say n notifications, for a

 particular alarmed object instance. The number of records in the

 AlarmList may not be n.

 AlarmList shall hold, for the same alarmed object instance, only one

 record if and only if, the notifications carry identical values for

 eventType, probableCause and specificProblem. See the

 Matching-Criteria-Attributes definition

 in 3GPP TS 28.532.";

 uses top3gpp:Top\_Grp ;

 container attributes {

 uses AlarmListGrp ;

 }

 }

 }

}

***End of Change***