**3GPP TSG-SA5 Meeting #137eS5-214310**

 **10 May - 19 May 2021**

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| *CR-Form-v11.4* |
| **CHANGE REQUEST** |
|  |
|  | **28.532** | **CR** | **0177** | **rev** | **1** | **Current version:** | **16.0.0** |  |
|  |
| *For* [***HELP***](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:***  |  |
|  |  |
| ***Source to WG:*** | Ericsson |
| ***Source to TSG:*** | S5 |
|  |  |
| ***Work item code:*** | ePM\_KPI\_5G |  | ***Date:*** | 2021-08-12 |
|  |  |  |  |  |
| ***Category:*** | **C** |  | ***Release:*** | Rel-17 |
|  | *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)* |
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| ***Reason for change:*** | There is no consistent way to report exceptions, or distinguish ambiguous values, using the existing PM XML Schema. |
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| ***Summary of change:*** | Add standardized element to report measurement result exceptions in the PM XML Schema. Editorial update to correct section header number. |
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| ***Consequences if not approved:*** | Vendors requiring such exception reporting must do so with their own non-standard elements, and/or documentation. |
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| ***Clauses affected:*** | 4.1, 12.3.2.2, 12.3.2.4, Annex C (NEW) |
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|  | **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 ...  |
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| ***Other comments:*** | Forge link: <https://forge.3gpp.org/rep/sa5/MnS/blob/S5_213396_Add_Exception_Reporting_Support_to_PM_XML_File_Schema/xsd/measData.xsd> |

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| **1st Modified Section** |

## 4.1 File Content description

Table 4.1 lists all the file content items. It also provides an explanation of the individual items.

Table 4.1 File Content Description

| File Content Item | Description |
| --- | --- |
| measDataCollection | This is the top-level tag, which identifies the file as a collection of measurement data. The file content is made up of a header ("measFileHeader"), the collection of measurement result items ("measData"), and a measurement file footer ("measFileFooter"). |
| measFileHeader | This is the measurement result file header to be inserted in each file. It includes a version indicator, the name, type and vendor name of the sending network node, and a time stamp ("collectionBeginTime"). |
| measData | The "measData" construct represents the sequence of zero or more measurement result items contained in the file. It can be empty in case no measurement data can be provided. The individual "measData" elements can appear in any order.Each "measData" element contains the name of the NE ("nEId") and the list of measurement results pertaining to that NE ("measInfo"). |
| measFileFooter | The measurement result file footer to be inserted in each file. It includes a time stamp, which refers to the end of the overall measurement collection interval that is covered by the collected measurement results being stored in this file. |
| fileFormatVersion | This parameter identifies the file format version applied by the sender. The format version defined in the present document shall be the abridged number and version of this 3GPP document (see below).The abridged number and version of a 3GPP document is constructed from its version specific full reference "3GPP […] (yyyy-mm)" by:- removing the leading "3GPP TS"- removing everything including and after the version third digit, representing editorial only changes, together with its preceding dot character- from the resulting string, removing leading and trailing white space, replacing every multi character white space by a single space character and changing the case of all characters to uppercase. |
| senderName | The senderName uniquely identifies the NE or EM that assembled this measurement file by its Distinguished Name (DN), according to the definitions in 3GPP TS 32.300 [6]. In the case of the NE-based approach, it is identical to the sender's "nEDistinguishedName". |
| senderType | This is a user configurable identifier of the type of network node that generated the file, e.g. NodeB, EM, SGSN. The string may be empty (i.e. string size =0) in case the "senderType" is not configured in the sender.  |
| vendorName | The "vendorName" identifies the vendor of the equipment that provided the measurement file. The string may be empty (i.e. string size =0) if the "vendorName" is not configured in the sender. |
| collectionBeginTime | The "collectionBeginTime" is a time stamp that refers to the start of the first measurement collection interval (granularity period) that is covered by the collected measurement results that are stored in this file. |
| neId | The unique identification of the NE in the system. It includes the user name ("nEUserName"), the distinguished name ("nEDistinguishedName") and the software version ("nESoftwareVersion") of the NE. |
| neUserName | This is the user definable name ("userLabel") defined for the NE in 3GPP TS 28.622 [23]. The string may be empty (i.e. string size =0) if the "nEUserName" is not configured in the CM applications. |
| neDistinguishedName | This is the Distinguished Name (DN) defined for the NE in 3GPP TS 32.300 [6]. It is unique across an operator's network. The string may be empty (i.e. string size =0) if the "nEDistinguishedName" is not configured in the CM applications. |
| neSoftwareVersion | This is the software version ("swVersion") defined for the NE in 3GPP TS 28.622 [23]. This is an optional parameter which allows post-processing systems to take care of vendor specific measurements modified between software versions. |
| measInfo | The sequence of measurements, values and related information. It includes a list of measurement types ("measTypes") and the corresponding results ("measValues"), together with the time stamp ("measTimeStamp") and granularity period ("granularityPeriod") pertaining to these measurements. |
| measInfoId | This attribute associates a tag name with the set of measurements defined by a *measInfo* property. This is an optional parameter that may be used to assign unique names to categories of measurements grouped together by measInfo elements. It allows parsing tools to easily isolate measurement sets by name. |
| measTimeStamp | Time stamp referring to the end of the granularity period. |
| jobId | The "jobId" represents the job with which measurement result contained in the file is associated.The "jobId" is mandatory when PMIRP is supported. |
| granularityPeriod | Granularity period of the measurement(s) in seconds. |
| reportingPeriod | Reporting period of the measurement(s) in seconds.The "reportingPeriod" is mandatory when PMIRP is supported. |
| measTypes | This is the list of measurement types for which the following, analogous list of measurement values ("measValues") pertains. The measurement types for UMTS and combined GSM/UMTS networks are specified in TS 32.405 [12], TS 32.406 [13], TS 32.407 [14], TS 32.408 [15] and for IMS in TS 32.409 [16].Measurement types for E-UTRAN are specified in TS 32.425 [17] and for EPC in TS 32.426 [18]. Measurement types for Home Node B (HNB) Subsystem (HNS) are defined in TS 32.452 [19] and for Home enhanced Node B (HeNB) Subsystem (HeNS) in TS.32.453 [20].The GSM only measurement types are defined in TS 52.402 [7].The measurement types for NR and 5GC are specified in TS 28.552 [21] and TS 32.404 [22] |
| measValues | This parameter contains the list of measurement results for the resource being measured, e.g. trunk, cell. It includes an identifier of the resource ("measObjInstId"), the list of measurement result values ("measResults"), a flag that indicates whether the data is reliable ("suspectFlag"), and exception codes if applicable. |
| measObjInstId | The "measObjInstId" field contains the local distinguished name (LDN) of the measured object within the scope defined by the "nEDistinguishedName" (see 3GPP TS 32.300 [6]). The concatenation of the "nEDistinguishedName" and the "measObjInstId" yields the DN of the measured object. The "measObjInstId" is therefore empty if the "nEDistinguishedName" already specifies completely the DN of the measured object, which is the case for all measurements specified on NE level. For example, if the measured object is a "ManagedElement" representing RNC "RNC-Gbg-1", then the "nEDistinguishedName" will be for instance "DC=a1.companyNN.com,SubNetwork=1,IRPAgent=1,SubNetwork=CountryNN,MeContext=MEC-Gbg-1,ManagedElement=RNC-Gbg-1", and the "measObjInstId" will be empty. On the other hand, if the measured object is a "UtranCell" representing cell "Gbg-997" managed by that RNC, then the "nEDistinguishedName" will be for instance the same as above, i.e. "DC=a1.companyNN.com,SubNetwork=1,IRPAgent=1,SubNetwork=CountryNN,MeContext=MEC-Gbg-1,ManagedElement=RNC-Gbg-1", and the "measObjInstId" will be for instance "RncFunction=RF-1,UtranCell=Gbg-997". The class of the "measObjInstId" is defined in item F of each measurement definition template. |
| measResults | This parameter contains the sequence of result values for the observed measurement types. The "measResults" sequence shall have the same number of elements, which follow the same order as the measTypes sequence. Normal values are INTEGERs and REALs. The NULL value is reserved to indicate that the measurement item is not applicable or could not be retrieved for the object instance. |
| exceptionCode | For a result value indicative of an error, this provides the exception code. |
| suspectFlag | Used as an indication of quality of the scanned data. FALSE in the case of reliable data, TRUE if not reliable. The default value is "FALSE", in case the suspect flag has its default value it may be omitted. |
| timestamp | This tag carries the time stamp that refers to the end of the measurement collection interval (granularity period) that is covered by the collected measurement results that are stored in this file. The minimum required information within timestamp is year, month, day, hour, minute, and second. |

The measInfo contains the sequence of measurements, values and related information, in a table-oriented structure. A graphical representation of this structure can be found in clause 6.1.

The representation of all timestamps in PM files shall follow the representations allowed by the ISO 8601 [11].
The precise format for timestamp representation shall be determined by the technology used for encoding the PM file (e.g. ASN.1, XML DTD, XML Schema). The choice of technology should ensure that this representation is derived from ISO 8601 [11]. Based on the representation used, the timestamp shall refer to either UTC time or local time or local time with offset from UTC.

At least for those measurement types that are re-used from non-3GPP standards (e.g. IP, ATM), it is required that the measType be operator definable. This is necessary to allow the operator to harmonise the numbering between different vendors' systems where appropriate. Through this harmonisation, it can be assured that identical measurements always carry the same measType value, which is required by the post-processing system.

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| **2nd Modified Section** |

#### 12.3.2.2 Mapping table

Table 12.3.2.2-1 maps the file content items in the clause 11.3.2.1.2 to those used in the XML schema based file format definitions. XML attributes are useful where data values bind tightly to its parent XML element. They have been used where appropriate.

Table 12.3.2.2-1: Mapping of File Content Items to XML tags

| File Content Item | XML schema based XML tag | Description |
| --- | --- | --- |
| measDataFile | XML element: measDataFile | Document element |
| measFileHeader | XML element: fileHeader |  |
| measData | XML element: measData |  |
| measFileFooter | XML element: fileFooter |  |
| fileFormatVersion | XML element: fileHeaderXML attribute: fileFormatVersion |  |
| senderName | XML element: fileHeaderXML attribute: dnPrefixXML element: fileHeader:fileSenderXML attribute: senderName | The DN of the sender is split into the DN prefix contained in "dnPrefix" and the Local DN (LDN) contained in "senderName". |
| senderType | XML element fileHeader:fileSenderXML attribute: senderType |  |
| vendorName | XML element fileHeaderXML attribute vendorName |  |
| collectionBeginTime | XML element: fileHeader:measDataXML attribute beginTime |  |
| measObjRootDn | XML element fileHeaderXML attribute dnPrefixXML element measData:measEntityXML attribute localDn | The DN of the root object is split into the DN prefix contained in "dnPrefix" and the Local DN (LDN) contained in "localDn". |
| measObjRootUserLabel | XML element: measData:measEntityXML attribute: userLabel |  |
| measObjRootSwVersion | XML element: measData:measEntityXML attribute: swVersion |  |
| measInfo | XML element measInfo | An instance of this XML element is added for each expired granularity period. |
| measInfoId | XML element measData:measInfoXML attribute measInfoId |  |
| jobId | XML element measData:measInfo:jobXML attribute jobId |  |
| reportingPeriod | XML element measData:measInfo:repPeriodXML attribute duration | The XML attribute "duration" shall use the truncated representation for duration "PT*n*S" (see [28]). |
| granularityPeriod | XML element measData:measInfo:granPeriodXML attribute duration | The XML attribute "duration" shall use the truncated representation for duration "PT*n*S" (see [28]). |
| measTimeStamp | XML element measData:measInfo:granPeriodXML attribute endTime |  |
| measTypes | XML element measData:measInfo:measTypes orXML element measData:measInfo:measTypeXML attribute p | Depending on sender's choice for optional positioning presence, either XML element "measTypes" or XML elements "measType" will be used. |
| measValues | XML element measData:measInfo:measValue |  |
| measObjLdn | XML element measData:measInfo:measValueXML attribute measObjLdn |  |
| measResults | XML element measData:measInfo:measValue:measResults or, when the positioning option is used,measData:measInfo:measValue:r | Depending on sender's choice for optional positioning, either XML element "measResults" or XML elements "r" is used. |
| exceptionCode | XML element:exeptionCode |  |
| suspectFlag | XML element measData:measInfo:measValue:suspect |  |
| collectionEndTime | XML element fileFooter:measDataXML attribute endTime |  |
| There is no corresponding File Content Item. | XML element measTypeXML attribute p | Only for the positioning option: XML attribute "p" of XML element "measType", used to link the performance metric type specified in "measType" to the result value. Its value is a positive integer (excl. zero) and shall be unique for each instance of "measType" in a file. |
| There is no corresponding File Content Item. | XML element rXML attribute p | Only for the positioning option: XML attribute "p" of the XML element "r", used to link the result value in "r" to its performance metric type in "measType". The value of "p" shall match the value of the XML attribute "p" in the corresponding XML element "measType". |

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| **2nd Modified Section** |

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#### 12.3.2.4 XML schema

This clause specifies the XML schema that shall be used for XML files containing performance data.

Name: measData.xsd

Version: 2.0.0

Identifier: measData.xsd-v2.0.0

<?xml version="1.0" encoding="UTF-8"?>

<!--

 3GPP TS 28.532 Performance data XML file format definition

 measData.xsd-v2.0.0

-->

<schema

 xmlns="http://www.w3.org/2001/XMLSchema"

 xmlns:md="http://www.3gpp.org/ftp/specs/archive/28\_series/28.532#measData"

 targetNamespace="http://www.3gpp.org/ftp/specs/archive/28\_series/28.532#measData"

 elementFormDefault="qualified">

 <element name="measDataFile">

 <complexType>

 <sequence>

 <element name="fileHeader">

 <complexType>

 <sequence>

 <element name="fileSender">

 <complexType>

 <attribute name="senderName" type="string" use="optional"/>

 <attribute name="senderType" type="string" use="optional"/>

 </complexType>

 </element>

 <element name="measData">

 <complexType>

 <attribute name="beginTime" type="dateTime" use="required"/>

 </complexType>

 </element>

 </sequence>

 <attribute name="fileFormatVersion" type="string" use="required"/>

 <attribute name="vendorName" type="string" use="optional"/>

 <attribute name="dnPrefix" type="string" use="optional"/>

 </complexType>

 </element>

 <element name="measData" minOccurs="0" maxOccurs="unbounded">

 <complexType>

 <sequence>

 <element name="measEntity">

 <complexType>

 <attribute name="localDn" type="string" use="optional"/>

 <attribute name="userLabel" type="string" use="optional"/>

 <attribute name="swVersion" type="string" use="optional"/>

 </complexType>

 </element>

 <element name="measInfo" minOccurs="0" maxOccurs="unbounded">

 <complexType>

 <sequence>

 <element name="job" minOccurs="0">

 <complexType>

 <attribute name="jobId" type="string" use="required"/>

 </complexType>

 </element>

 <element name="granPeriod">

 <complexType>

 <attribute name="duration" type="duration" use="required"/>

 <attribute name="endTime" type="dateTime" use="required"/>

 </complexType>

 </element>

 <element name="repPeriod" minOccurs="0">

 <complexType>

 <attribute name="duration" type="duration" use="required"/>

 </complexType>

 </element>

 <choice>

 <element name="measTypes">

 <simpleType>

 <list itemType="Name"/>

 </simpleType>

 </element>

 <element name="measType" minOccurs="0" maxOccurs="unbounded">

 <complexType>

 <simpleContent>

 <extension base="Name">

 <attribute name="p" type="positiveInteger" use="required"/>

 </extension>

 </simpleContent>

 </complexType>

 </element>

 </choice>

 <element name="measValue" minOccurs="0" maxOccurs="unbounded">

 <complexType>

 <sequence>

 <choice>

 <element name="measResults">

 <simpleType>

 <list itemType="md:measResultType"/>

 </simpleType>

 </element>

 <element name="r" minOccurs="0" maxOccurs="unbounded">

 <complexType>

 <simpleContent>

 <extension base="md:measResultType">

 <attribute name="p" type="positiveInteger" use="required"/>

 </extension>

 </simpleContent>

 </complexType>

 </element>

 </choice>

 <element minOccurs="0" maxOccurs="unbounded" name="exceptionCode">

 <complexType>

 <simpleContent>

 <extension base="string">

 <attribute name="p" type="positiveInteger" use="required"/>

 </extension>

 </simpleContent>

 </complexType>

 </element>

 <element name="suspect" type="boolean" minOccurs="0"/>

 </sequence>

 <attribute name="measObjLdn" type="string" use="required"/>

 </complexType>

 </element>

 </sequence>

 <attribute name="measInfoId" type="string" use="optional"/>

 </complexType>

 </element>

 </sequence>

 </complexType>

 </element>

 <element name="fileFooter">

 <complexType>

 <sequence>

 <element name="measData">

 <complexType>

 <attribute name="endTime" type="dateTime" use="required"/>

 </complexType>

 </element>

 </sequence>

 </complexType>

 </element>

 </sequence>

 </complexType>

 </element>

 <simpleType name="measResultType">

 <union memberTypes="integer float string">

 <simpleType>

 <restriction base="string">

 <enumeration value="NULL"/>

 </restriction>

 </simpleType>

 </union>

 </simpleType>

</schema>

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| **3rd Modified Section** |

Annex X (informative):
Example PM XML output with exception codes

The following XML excerpt shows exception code reporting for two values in the measurement data output.

<?xml version="1.0" encoding="UTF-8"?>
<?xml-stylesheet type="text/xsl" href="MeasDataCollection.xsl"?>
<measCollecFile xmlns=[http://www.3gpp.org/ftp/specs/archive/32\_series/32.435#measCollec](http://www.3gpp.org/ftp/specs/archive/32_series/32.435)
xmlns:xsi=<http://www.w3.org/2001/XMLSchema-instance>
xsi:schemaLocation="http://www.3gpp.org/ftp/specs/archive/32\_series/32.435#measCollec http://www.3gpp.org/ftp/specs/archive/32\_series/32.435#measCollec">
 <fileHeader fileFormatVersion="32.435 V7.0" vendorName="Company NN" dnPrefix="DC=a1.companyNN.com,SubNetwork=1,IRPAgent=1">
 <fileSender localDn="SubNetwork=CountryNN,MeContext=MEC-Gbg-1,ManagedElement=RNC-Gbg-1" elementType="RNC"/>
 <measCollec beginTime="2000-03-01T14:00:00+02:00"/>
 </fileHeader>
 <measData>
 <managedElement localDn="SubNetwork=CountryNN,MeContext=MEC-Gbg-1,ManagedElement=RNC-Gbg-1" userLabel="RNC Telecomville"/>
 <measInfo>
 <job jobId="1231"/>
 <granPeriod duration="PT900S" endTime="2000-03-01T14:14:30+02:00"/>
 <repPeriod duration="PT1800S"/>
 <measType p="1">attTCHSeizures</measType>
 <measType p="2">succTCHSeizures</measType>
 <measType p="3">attImmediateAssignProcs</measType>
 <measType p="4">succImmediateAssignProcs</measType>
 <measValue measObjLdn="RncFunction=RF-1,UtranCell=Gbg-997">
 <r p="1">234</r>
 <r p="2">345</r>
 <r p="3">567</r>
 <r p="4">789</r>
 </measValue>
 <measValue measObjLdn="RncFunction=RF-1,UtranCell=Gbg-998">
 <r p="1">890</r>
 <r p="2">901</r>
 <r p="3">123</r>
 <r p="4">234</r>
 </measValue>
 <measValue measObjLdn="RncFunction=RF-1,UtranCell=Gbg-999">
 <r p="1">456</r>
 <r p="2">567</r>
 <r p="3">678</r>
 <r p="4">789</r>
 <suspect>true</suspect>
 </measValue>
 </measInfo>
 </measData>
 <fileFooter>
 <measCollec endTime="2000-03-01T14:15:00+02:00"/>
 </fileFooter>
</measCollecFile>