

**Source:** SA5 (Telecom Management)  
**Title:** 4 R99 CR 32.104, Rel-4/5/6 CR 32.401 Correction of measObjInstId & measType length limitations  
**Document for:** Approval  
**Agenda Item:** 7.5.3

Doc-1 <sup>st</sup> -Level	Doc-2 <sup>nd</sup> -Level	Spec	CR	Rev	Phase	Subject	Cat	Ver-Cur	Wi
SP-040572	S5-048676	32.104	014	--	R99	Correction of measObjInstId length limitations in the Measurement Report File Format	F	3.8.0	OAM-PM
SP-040572	S5-048677	32.401	016	--	Rel-4	Correction of measObjInstId and measType length limitations in the Measurement Report File Format	F	4.4.0	OAM-PM
SP-040572	S5-048678	32.401	017	--	Rel-5	Correction of measObjInstId and measType length limitations in the Measurement Report File Format	A	5.3.0	OAM-PM
SP-040572	S5-048679	32.401	018	--	Rel-6	Correction of measObjInstId and measType length limitations in the Measurement Report File Format	A	6.2.0	OAM-PM

## CHANGE REQUEST

⌘ **32.104 CR 014** ⌘ rev - ⌘ **Current vers 3.8.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

**Proposed change affects:** | UICC apps  ME  Radio Access Network  Core Network

<b>Title:</b>	⌘ Correction of measObjInstld length limitations in the Measurement Report File Format		
<b>Source:</b>	⌘ SA5 (Ulf H. binette, <a href="mailto:ulf.hubINETTE@ericsson.com">ulf.hubINETTE@ericsson.com</a> )		
<b>Work item code:</b>	⌘ OAM-PM	<b>Date:</b>	⌘ 20/08/2004
<b>Category:</b>	⌘ <b>F</b>	<b>Release:</b>	⌘ R99
	Use <u>one</u> of the following categories: <b>F</b> (correction) <b>A</b> (corresponds to a correction in an earlier release) <b>B</b> (addition of feature), <b>C</b> (functional modification of feature) <b>D</b> (editorial modification) Detailed explanations of the above categories can be found in 3GPP <a href="#">TR 21.900</a> .		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) Rel-4 (Release 4) Rel-5 (Release 5) Rel-6 (Release 6)

<b>Reason for change:</b>	⌘ The length limitation of measObjInstld is not aligned with the specification of LDN (Local Distinguished Name) and neDistinguishedName of TS 32.106-8 (Name Convention for Managed Objects).
<b>Summary of change:</b>	⌘ Correct the max length specified for measObjInstld.
<b>Consequences if not approved:</b>	⌘ The measurement report file format would not allow measurement files of objects whose LDN is greater than 64 characters.

<b>Clauses affected:</b>	⌘ Annex A										
<b>Other specs affected:</b>	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;"> </td> </tr> </table>	Y	N		X		X	X		Other core specifications Test specifications O&M Specifications	⌘ Rel-4/5/6 32.401
Y	N										
	X										
	X										
X											
<b>Other comments:</b>	⌘ Rel-4/5/6 32.401 related CRs in S5-048677/8/9.										

<b>Change in Clause Annex A</b>
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## Annex A (normative): Measurement Report File Format

This annex describes the format of measurement result files that can be transferred from the network (NEs or EM) to the NM. Two alternative format definitions are specified, one using ASN.1 with binary encoding (BER), the other applying XML, which is ASCII based. Each 3G-system implementation complying with the present document shall support at least one of the two alternatives.

Both the ASN.1 and XML file format definitions implement the measurement result structure and parameters defined in subclauses 5.2 and 5.3 of the present document, except from the measurement job id, which is only needed to correlate measurement result reports with measurement jobs within the area of measurement administration (see subclause 5.2.1.4). The two defined file format definitions correspond 1:1 to each other. This implies that the value ranges and size constraints defined in the ASN.1 definition shall also be valid for implementations of the XML format definition. From that perspective, the two format definitions can be regarded as two different instances of the same single format.

The following conditions have been considered in defining this file format:

- \* Since the files are transferred via a machine-machine interface, the files applying the format definitions should be machine readable using standard tools;
- \* The file format should be independent of the data transfer protocol used to carry the file from one system to another;
- \* The file format should be generic across 3G systems;
- \* The file format should be flexible enough to include all possible measurement types, i.e. those specified within annex C as well as measurements defined within other standards bodies, or vendor specific measurement types;
- \* The file format should not impose any dependency between granularity periods for the generation of measurement results and file upload cycles for the file transfer from the network to the NM;
- \* The file format should be flexible enough to support both the NE-based and the EM-based approaches, as discussed in annex B.1.1 of the present document;
- \* The file format should be usable for other interfaces than Itf-N if required. The measurement file header could be augmented to indicate this other usage, however this would be a non-standard extension. In the ASN.1 file format definition, this is accommodated by the use of the ellipse notation. XML allows such additions through extra DTDs, provided by the definer of the non-standard extension.

### A.1 Parameter description and mapping table

Table A.1 maps the tags defined in the ASN.1 file format definition to those used in the XML file format definition. It also provides an explanation of the individual parameters. The XML tags defined in the DTD (see subclause A.3.1) have been kept as short as possible in order to minimise the size of the XML measurement result files.

Table A.1 Mapping of ASN.1 Measurement Report File Format tags to XML tags

ASN.1 Tag	XML tag	Description
MeasDataCollection	mdc	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 (i measFileHeader), the collection of measurement result items (i measData), and a measurement file footer (i measFileFooter).
measFileHeader	mfh	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 (i collectionBeginTime).
measData	md	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 (i nEId) and the list of measurement results pertaining to that NE (i measInfo).
measFileFooter	mff	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	ffv	This parameter identifies the file format version applied by the sender. The format version defined in the present document shall be i 1 for both the XML and ASN.1 formats alike.
senderName	sn	The senderName uniquely identifies the NE or EM that assembled this measurement file, according to the definitions in 3GPP TS 32.106. It is identical to the sender's nEDistinguishedName. The string may be empty (i.e. string size =0) in case it is not configured in the sender.
senderType	st	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 i senderType is not configured in the sender.
vendorName	vn	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 i vendorName is not configured in the sender.
collectionBeginTime	cbt	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	neid	The unique identification of the NE in the system. It includes the user name (i nEUserName) and the distinguished name (i nEDistinguishedName) of the NE.
nEUserName	neun	This is the user definable NE name, cf. 3GPP TS 32.106. The string may be empty (i.e. string size =0) if the i nEUserName is not configured.
nEDistinguishedName	nedn	This is the distinguishedName defined for the NE in 3GPP TS 32.106. It is unique across an operator's 3G network. The string may be empty (i.e. string size =0) if the i nEDistinguishedName is not configured.
measInfo	mi	The sequence of measurements, values and related information. It includes a list of measurement types (i measTypes) and the corresponding results (i measValues), together with the time stamp (i measTimeStamp) and granularity period (i granularityPeriod) pertaining to these measurements.
measTimeStamp	mts	Time stamp referring to the end of the granularity period.
granularityPeriod	gp	Granularity period of the measurement(s) in seconds.
measTypes	mt	This is the list of measurement types for which the following, analogous list of measurement values (i measValues) pertains. The 3G standard measurement types are defined in annex C of this TS.
measValues	mv	This parameter contains the list of measurement results for the resource being measured, e.g. trunk, cell. It includes an identifier of the resource (i measObjInstId), the list of measurement result values (i measResults) and a flag that indicates whether the data is reliable (i suspectFlag).
measObjInstId	moid	The i measObjInstId field identifies the measured object class and its instance, e.g. trunk1 means object class is trunk and instance #1 is being measured. The

ASN.1 Tag	XML tag	Description
		values for this parameter are defined in annex C of this TS.
measResults	r	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.
suspectFlag	sf	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	ts	GeneralizedTime format. 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, together with an ASN.1 and a XML example, can be found in annex D.

Measurement types and measurement groups will be defined in Release 2000. This also applies to the exact details concerning the arrangement of the information in the files, since that aspect may be dependent on the measurement type/group definitions.

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. This requirement will eventually be reflected in annex C, which discusses and specifies the measurement definition.

## A.2 ASN.1 file format definition

For ASN.1 formatted files, BER encoding rules shall apply. Embedded comments are integral parts of the standard format; i.e. any implementation-claiming conformance to this annex shall also conform to the comments.

### PM-File-Description

```

DEFINITIONS AUTOMATIC TAGS ::= BEGIN
MeasDataCollection ::= SEQUENCE
{
    measFileHeader    MeasFileHeader,
    measData          SEQUENCE OF MeasData,
    measFileFooter    MeasFileFooter
}

MeasFileHeader ::= SEQUENCE
{
    fileFormatVersion    INTEGER,
    senderName           PrintableString (SIZE (0..400)),
    senderType           SenderType,
    vendorName           PrintableString (SIZE (0..32)),
    collectionBeginTime TimeStamp,
    ...
}

```

- The sole purpose of the ellipse notation used in the file header is to facilitate inter-release compatibility, vendor specific additions are not allowed in implementations claiming conformance to the TS. However, it is acknowledged that this feature does enable the use of non-standard extensions to the file header without losing compatibility to the file format specified in the present document.

SenderType ::= PrintableString (SIZE (0..8))

TimeStamp ::= GeneralizedTime

```
MeasData ::= SEQUENCE
{
  nEId          NEId,
  measInfo     SEQUENCE OF MeasInfo
}
```

```
NEId ::= SEQUENCE
{
  nEUserName    PrintableString (SIZE (0..64)),
  nEDistinguishedName PrintableString (SIZE (0..400))
}
```

```
MeasInfo ::= SEQUENCE
{
  measTimeStamp      TimeStamp,
  granularityPeriod  INTEGER,
  measTypes          SEQUENCE OF MeasType,
  measValues         SEQUENCE OF MeasValue
}
```

MeasType ::= PrintableString (SIZE (1..32))

```
MeasValue ::= SEQUENCE
{
  measObjInstId    MeasObjInstId,
  measResults      SEQUENCE OF MeasResult,
  suspectFlag      BOOLEAN DEFAULT FALSE
}
```

MeasObjInstId ::= PrintableString (SIZE (0+..40064))

-- [The size of the concatenated measObjInstId and neDistinguishedName must not exceed 400.](#)

MeasResult ::= CHOICE

```
{
  iValue          INTEGER,
  rValue          REAL,
  noValue         NULL,
  ...
}
```

-- 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. The sole purpose of the ellipse notation used in the MeasResult choice is to facilitate inter-release compatibility in case the choice needs to be extended in future releases.

MeasFileFooter ::= TimeStamp

END

## A.3 XML file format definition

The character encoding shall be a subset of UTF-8. The characters in the ASN.1 type PrintableString are allowed, i.e.:

- A-Z

- a-z
- 0-9
- <space> ð ( ) + , - . / : = ? ÿ

For encoding of the information content, XML (see Extensible Markup Language (XML) 1.0, W3C Recommendation 10-Feb-98) will be used. The XML **document type declaration** contains the mark-up declarations that provide a grammar for the measurement file format. This grammar is known as a Document Type Definition (DTD).

The DTD to be used is defined below. The type definitions and constraints for data types and values defined in the ASN.1 format, such as string sizes, shall implicitly be applied to the XML result files also. The representation of the timestamps within the XML file shall follow the 'GeneralizedTime' ASN.1 type.

```
<!-- MeasDataCollection.dtd version 1.1-->
<!ELEMENT mdc (mfh , md*, mff )>
<!ELEMENT mfh (ffv, sn, st, vn, cbt) >
<!ELEMENT md (neid , mi*)>
<!ELEMENT neid (neun, nedn)>
<!ELEMENT mi (mts,gp, mt*, mv*)>
<!ELEMENT mv (moid , r*, sf? )>
<!ELEMENT mff (ts)>
<!ELEMENT ts (#PCDATA)>
<!ELEMENT sf (#PCDATA)>
<!ELEMENT r (#PCDATA)>
<!ELEMENT mt (#PCDATA)>
<!ELEMENT moid (#PCDATA)>
<!ELEMENT gp (#PCDATA)>
<!ELEMENT mts (#PCDATA)>
<!ELEMENT nedn (#PCDATA)>
<!ELEMENT neun (#PCDATA)>
<!ELEMENT cbt (#PCDATA)>
<!ELEMENT vn (#PCDATA)>
<!ELEMENT st (#PCDATA)>
<!ELEMENT sn (#PCDATA)>
<!ELEMENT ffv (#PCDATA)>

<!-- end of MeasDataCollection.dtd -->
```

The number of Measurement Result tags (r) per observed object instance tags (moid) shall always equal the number of Measurement Types (mt) tags. In case the result is a REAL value the decimal separator shall be '.'. In case the result is 'NULL' then the 'r' mark-up shall be empty.

The following header shall be used in actual XML measurement result files (cf. annex D for an example):

```
<?xml version="1.0"?>
<?xml-stylesheet type="text/xsl" href="MeasDataCollection.xsl" ?>
<!DOCTYPE mdc SYSTEM "MeasDataCollection.dtd" >
<mdc xmlns:HTML="http://www.w3.org/TR/REC-xml">
```

- Line 1: xml version number 1 shall be used.
- The reference to an XSL (Extensible Stylesheet Language) or CSS (Cascading Style Sheet) file in line 2 of the header is optional. It may be configured by the operator to be inserted for the purpose of presenting the XML file in a web browser GUI. It is up to the receiver of the file to decide on the usage of this stylesheet reference, e.g. ignore it if not needed or choosing a configured default if no style sheet reference is supplied in the file.
- Line 4: A reference to the W3C Recommendation web page for XML.

Quick guide to XML notation:    ? zero or one occurrence  
                                   + one or more occurrences

\* zero or more occurrences

#PCDATA parsed character data

<b>End of Change in Annex A</b>
<b>End of Document</b>

## Annex E (informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
Dec 1999	S_06	SP-99579	--	--	Approved at TSG SA #6 and placed under Change Control	--	3.0.0
Mar 2000	S_07	SP-000016	001	--	Reduction of measurement job advance period	3.0.0	3.1.0
Mar 2000	S_07	SP-000016	002	--	PM file format - ASN.1 description	3.0.0	3.1.0
Mar 2000	--	--	--	--	Cosmetic	3.1.0	3.1.1
Jun 2000	S_08	SP-000231	003	--	Measurement definition template	3.1.1	3.2.0
Jun 2000	S_08	SP-000232	004	--	Inclusion of XML file format definition	3.1.1	3.2.0
Jun 2000	S_08	SP-000233	005	--	Example of XML file format for PM result files	3.1.1	3.2.0
Jun 2000	S_08	SP-000234	006	--	Addition of missing abbreviations	3.1.1	3.2.0
Sep 2000	S_09	SP-000434	007	--	Clarification of the table oriented structure of the file format, and addition of ASN.1 example, according to annex D	3.2.0	3.3.0
Dec 2000	S_10	S5-000479	008	--	Clarification of measurement definition template	3.3.0	3.4.0
Dec 2001	S_14	SP-010638	010	--	Correction of declaration in XML header	3.4.0	3.5.0
Jun 2003	S_20	SP-030291	011	--	Remove ambiguity in NE file generation behaviour in case of multiple granularity periods	3.5.0	3.6.0
Mar 2004	S_23	SP-040133	012	--	Correction of XML Measurement Report File format example	3.6.0	3.7.0
Jun 2004	S_24	SP-040265	013	--	Correction in requirement for granularity periods	3.7.0	3.8.0



## CHANGE REQUEST

⌘ **32.401 CR 016** ⌘ rev - ⌘ Current version: **4.4.0** ⌘

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**Proposed change affects:** | UICC apps  ME  Radio Access Network  Core Network

<b>Title:</b>	⌘ Correction of measObjInstId and measType length limitations in the Measurement Report File Format		
<b>Source:</b>	⌘ SA5 (Ulf H. binette, <a href="mailto:ulf.hubINETTE@ericsson.com">ulf.hubINETTE@ericsson.com</a> )		
<b>Work item code:</b>	⌘ OAM-PM	<b>Date:</b>	⌘ 20/08/2004
<b>Category:</b>	⌘ <b>F</b>	<b>Release:</b>	⌘ Rel-4
	Use <u>one</u> of the following categories: <b>F</b> (correction) <b>A</b> (corresponds to a correction in an earlier release) <b>B</b> (addition of feature), <b>C</b> (functional modification of feature) <b>D</b> (editorial modification) Detailed explanations of the above categories can be found in 3GPP <a href="#">TR 21.900</a> .		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) Rel-4 (Release 4) Rel-5 (Release 5) Rel-6 (Release 6)

<b>Reason for change:</b>	⌘	a) The length limitation of measObjInstId is not aligned with the specification of LDN (Local Distinguished Name) and neDistinguishedName of TS 32.300 (Name Convention for Managed Objects). b) The length limitation of measType is not aligned with TS 32.403 (Performance Measurements for UMTS and combined UMTS/GSM).
<b>Summary of change:</b>	⌘	Correct the max lengths specified for measObjInstId and measType.
<b>Consequences if not approved:</b>	⌘	a) The measurement report file format would not allow measurement files of objects whose LDN is greater than 64 characters. b) The measurement report file format would not allow measurement files with measurement types currently specified in TS 32.403, [i.e., measurement template item e)], which have a length exceeding 32 characters.

<b>Clauses affected:</b>	⌘ Annex A										
<b>Other specs affected:</b>	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;"> </td> </tr> </table>	Y	N		X		X	X		Other core specifications Test specifications O&M Specifications	⌘ Rel-5/6 32.401
Y	N										
	X										
	X										
X											
<b>Other comments:</b>	⌘ Rel-5/6 Mirror CRs in S5-048678/9.										

<b>Change in Clause Annex A</b>
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## Annex A (normative): Measurement Report File Format

This annex describes the format of measurement result files that can be transferred from the network (NEs or EM) to the NM. Two alternative format definitions are specified, one using ASN.1 with binary encoding (BER), the other applying XML, which is ASCII based. Each 3G-system implementation complying with the present document shall support at least one of the two alternatives.

Both the ASN.1 and XML file format definitions implement the measurement result structure and parameters defined in clauses 5.2 and 5.3 of the present document, except from the measurement job id, which is only needed to correlate measurement result reports with measurement jobs within the area of measurement administration (see clause 5.2.1.4). The two defined file format definitions correspond to each other (except with some minor XML specific optimisations). This implies that the value ranges and size constraints defined in the ASN.1 definition shall also be valid for implementations of the XML format definition. From that perspective, the two format definitions can be regarded as two different instances of the same single format.

The following conditions have been considered in defining this file format:

- Since the files are transferred via a machine-machine interface, the files applying the format definitions should be machine readable using standard tools.
- The file format should be independent of the data transfer protocol used to carry the file from one system to another.
- The file format should be generic across 3G systems.
- The file format should be flexible enough to include all possible measurement types, i.e. those specified within annex C as well as measurements defined within other standards bodies, or vendor specific measurement types.
- The file format should not impose any dependency between granularity periods for the generation of measurement results and file upload cycles for the file transfer from the network to the NM.
- The file format should be flexible enough to support both the NE-based and the EM-based approaches, as discussed in annex B, clause B.1.1 of the present document.
- The file format should be usable for other interfaces than Itf-N if required. The measurement file header could be augmented to indicate this other usage, however this would be a non-standard extension. In the ASN.1 file format definition, this is accommodated by the use of the ellipse notation. XML allows such additions through extra DTDs, provided by the definer of the non-standard extension.

### A.1 Parameter description and mapping table

Table A.1 maps the tags defined in the ASN.1 file format definition to those used in the XML file format definition. It also provides an explanation of the individual parameters. The XML tags defined in the DTD (see clause A.3.1) have been kept as short as possible in order to minimise the size of the XML measurement result files. XML tag attributes are useful where data values bind tightly to its parent element. They have been used where appropriate.

**Table A.1: Mapping of ASN.1 Measurement Report File Format tags to XML tags**

ASN.1 Tag	XML tag	Description

ASN.1 Tag	XML tag	Description
MeasDataCollection	mdc	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	mfh	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	md	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	mff	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	ffv	This parameter identifies the file format version applied by the sender. The format version defined in the present document shall be "2" for both the XML and ASN.1 formats alike.
senderName	sn	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 [10]. In the case of the NE-based approach, it is identical to the sender's "nEDistinguishedName". The string may be empty (i.e. string size =0) in case the DN is not configured in the sender.
senderType	st	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	vn	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	cbt	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	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	neun	This is the user definable name ("userLabel") defined for the NE in 3GPP TS 32.622 [24]. The string may be empty (i.e. string size =0) if the "nEUserName" is not configured in the CM applications.
nEDistinguishedName	nedn	This is the Distinguished Name (DN) defined for the NE in 3GPP TS 32.300 [10]. It is unique across an operator's 3G network. The string may be empty (i.e. string size =0) if the "nEDistinguishedName" is not configured in the CM applications.
nESoftwareVersion	nesw	This is the software version ("swVersion") defined for the NE in 3GPP TS 32.622 [24]. This is an optional parameter which allows post-processing systems to take care of vendor specific measurements modified between software versions.
measInfo	mi	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.
measTimeStamp	mts	Time stamp referring to the end of the granularity period.
granularityPeriod	gp	Granularity period of the measurement(s) in seconds.
measTypes	mt	This is the list of measurement types for which the following, analogous list of measurement values ("measValues") pertains. The GSM only measurement types are defined in TS 52.402 [22]. The measurement types for UMTS and combined UMTS/GSM implementations are specified in TS 32.403 [23].
measValues	mv	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") and a flag that indicates whether the data is reliable ("suspectFlag").

ASN.1 Tag	XML tag	Description
measObjInstId	moid	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 [10]). 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	r	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.
suspectFlag	sf	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	ts	ASN.1 GeneralizedTime format. The minimum required information within timestamp is year, month, day, hour, minute, and second.
Not Required	mt p	An optional positioning XML attribute specification of XML element "mt", used to identify a measurement type for the purpose of correlation to a result. The value of this XML attribute specification is expected to be a non-zero, non-negative integer value that is unique for each instance of XML element "mt" that is contained within the measurement data collection file.
Not Required	r p	An optional positioning XML attribute specification of XML element "r", used to correlate a result to a measurement type. The value of this XML attribute specification should match the value of XML attribute specification "p" of corresponding XML element "mt".

The measInfo contains the sequence of measurements, values and related information, in a table-oriented structure. A graphical representation of this structure, together with an ASN.1 and a XML example, can be found in annex C.

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. This requirement will eventually be reflected in TS 52.402 [22] and TS32.403 [23], which specify the performance measurements for GSM (TS 52.402 [22]) and UMTS and combined UMTS/GSM systems (TS 32.403 [23]).

## A.2 ASN.1 file format definition

For ASN.1 formatted files, BER encoding rules shall apply. Embedded comments are integral parts of the standard format; i.e. any implementation-claiming conformance to this annex shall also conform to the comments.

```

PM-File-Description
DEFINITIONS AUTOMATIC TAGS ::= BEGIN
MeasDataCollection ::= SEQUENCE
{
    measFileHeader MeasFileHeader,
    measData       SEQUENCE OF MeasData,
    measFileFooter MeasFileFooter
}

MeasFileHeader ::= SEQUENCE
{
    fileFormatVersion INTEGER,
    senderName PrintableString (SIZE (0..400)),
    senderType SenderType,
    vendorName PrintableString (SIZE (0..32)),

```

```

    collectionBeginTime TimeStamp,
    ...
}
-- The sole purpose of the ellipse notation used in the file header is to facilitate inter-release
compatibility, vendor specific additions are not allowed in implementations claiming conformance to
the TS. However, it is acknowledged that this feature does enable the use of non-standard
extensions to the file header without loosing compatibility to the file format specified in the
present document.

SenderType ::= PrintableString (SIZE (0..8))

TimeStamp ::= GeneralizedTime

MeasData ::= SEQUENCE
{
    nEId          NEId,
    measInfo      SEQUENCE OF MeasInfo
}

NEId ::= SEQUENCE
{
    nEUserName      PrintableString (SIZE (0..64)),
    nEDistinguishedName PrintableString (SIZE (0..400)),
    nESoftwareVersion PrintableString (SIZE (0..64)) OPTIONAL
}

MeasInfo ::= SEQUENCE
{
    measTimeStamp      TimeStamp,
    granularityPeriod  INTEGER,
    measTypes          SEQUENCE OF MeasType,
    measValues         SEQUENCE OF MeasValue
}

MeasType ::= PrintableString (SIZE (1..432))
MeasValue ::= SEQUENCE
{
    measObjInstId      MeasObjInstId,
    measResults        SEQUENCE OF MeasResult,
    suspectFlag        BOOLEAN DEFAULT FALSE
}

MeasObjInstId ::= PrintableString (SIZE (0..4064))

-- The size of the concatenated measObjInstId and neDistinguishedName must not exceed 400.

MeasResult ::= CHOICE
{
    iValue INTEGER,
    rValue REAL,
    noValue NULL,
    ...
}

-- 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. The sole
purpose of the ellipse notation used in the MeasResult choice is to facilitate inter-release
compatibility in case the choice needs to be extended in future releases.

MeasFileFooter ::= TimeStamp
END

```

---

## A.3 XML file format definition

The character encoding shall be a subset of UTF-8. The characters in the ASN.1 type PrintableString are allowed, i.e.:

- A-Z;
- a-z;
- 0-9;
- <space>'() +, - . / : = ?'.

For encoding of the information content, XML (see Extensible Markup Language (XML) 1.0, W3C Recommendation 10-Feb-98) will be used. The XML **document type declaration** contains the mark-up declarations that provide a grammar for the measurement file format. This grammar is known as a Document Type Definition (DTD).

The DTD to be used is defined below. The type definitions and constraints for data types and values defined in the ASN.1 format, such as string sizes, shall implicitly be applied to the XML result files also. The representation of the timestamps within the XML file shall follow the "GeneralizedTime" ASN.1 type.

```
<!-- MeasDataCollection.dtd version 2.0-->
<?xml version="1.0" encoding="UTF-8"?>
<!ELEMENT mdc (mfh , md*, mff )>
<!ELEMENT mfh (ffv, sn, st, vn, cbt) >
<!ELEMENT md (neid , mi*)>
<!ELEMENT neid (neun, nedn, nesw?)>
<!ELEMENT mi (mts,gp, mt*, mv*)>
<!ELEMENT mv (moid , r*, sf? )>
<!ELEMENT mff (ts)>
<!ELEMENT ts (#PCDATA)>
<!ELEMENT sf (#PCDATA)>
<!ELEMENT r (#PCDATA)>
<!ATTLIST r p CDATA "">
<!ELEMENT mt (#PCDATA)>
<!ATTLIST mt p CDATA "">
<!ELEMENT moid (#PCDATA)>
<!ELEMENT gp (#PCDATA)>
<!ELEMENT mts (#PCDATA)>
<!ELEMENT nedn (#PCDATA)>
<!ELEMENT neun (#PCDATA)>
<!ELEMENT nesw (#PCDATA)>
<!ELEMENT cbt (#PCDATA)>
<!ELEMENT vn (#PCDATA)>
<!ELEMENT st (#PCDATA)>
<!ELEMENT sn (#PCDATA)>
<!ELEMENT ffv (#PCDATA)>

<!-- end of MeasDataCollection.dtd -->
```

The number of Measurement Result tags (r) per observed object instance tags (moid) shall always equal the number of Measurement Types (mt) tags. In case the result is a REAL value the decimal separator shall be ".". In case the result is "NULL" then the "r" mark-up shall be empty.

The following header shall be used in actual XML measurement result files (cf. annex D for an example):

```
<?xml version="1.0"?>
<?xml-stylesheet type="text/xsl" href="MeasDataCollection.xsl" ?>
<!DOCTYPE mdc SYSTEM "MeasDataCollection.dtd" >
<mdc xmlns:HTML="http://www.w3.org/TR/REC-xml">
```

- Line 1: xml version number 1 shall be used.
- The reference to an XSL (Extensible Stylesheet Language) or CSS (Cascading Style Sheet) file in line 2 of the header is optional. It may be configured by the operator to be inserted for the purpose of presenting the XML file in a web browser GUI. It is up to the receiver of the file to decide on the usage of this stylesheet reference, e.g. ignore it if not needed or choosing a configured default if no style sheet reference is supplied in the file.
- Line 4: A reference to the W3C Recommendation web page for XML.

Quick guide to XML notation: ? zero or one occurrence  
 + one or more occurrences  
 \* zero or more occurrences  
 #PCDATA parsed character data

<p><b>End of Change in Annex A</b>  <b>End of Document</b></p>
--

## Annex D (informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
June 2001	S_12	SP-010237	--	--	Submitted to TSG SA #12 for Information.	--	1.0.0
June 2001	--	--	--	--	MCC editorials	1.0.0	1.0.1
Sep 2001	S_13	SP-010467	--	--	Submitted to TSG SA #13 for Approval	2.0.0	4.0.0
Dec 2001	S_14	SP-010638	001	--	Correction of declaration in XML header	4.0.0	4.1.0
Sep 2002	S_17	SP-020501	002	--	Alignment with CM TSs of measurement file parameter descriptions and examples	4.1.0	4.2.0
Jun 2003	S_20	SP-030291	005	--	Clarification of NE file generation behaviour in case of multiple granularity periods	4.2.0	4.3.0
Jun 2003	S_20	SP-030291	007	--	Correction of Measurement Result File Name Definition for alignment with Windows based systems	4.2.0	4.3.0
Jun 2004	S_24	SP-040265	013	--	Correction in requirement for granularity periods	4.3.0	4.4.0

## CHANGE REQUEST

⌘ **32.401 CR 017** ⌘ rev - ⌘ **Current vers 5.3.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

**Proposed change affects:** | UICC apps  ME  Radio Access Network  Core Network

<b>Title:</b>	⌘ Correction of measObjInstId and measType length limitations in the Measurement Report File Format		
<b>Source:</b>	⌘ SA5 (Ulf H. binette, <a href="mailto:ulf.hubINETTE@ericsson.com">ulf.hubINETTE@ericsson.com</a> )		
<b>Work item code:</b>	⌘ OAM-PM	<b>Date:</b>	⌘ 20/08/2004
<b>Category:</b>	⌘ <b>A</b>	<b>Release:</b>	⌘ Rel-5
	Use <u>one</u> of the following categories:		Use <u>one</u> of the following releases:
	<b>F</b> (correction)		2 (GSM Phase 2)
	<b>A</b> (corresponds to a correction in an earlier release)	R96	(Release 1996)
	<b>B</b> (addition of feature),	R97	(Release 1997)
	<b>C</b> (functional modification of feature)	R98	(Release 1998)
	<b>D</b> (editorial modification)	R99	(Release 1999)
	Detailed explanations of the above categories can be found in 3GPP <a href="#">TR 21.900</a> .	Rel-4	(Release 4)
		Rel-5	(Release 5)
		Rel-6	(Release 6)

<b>Reason for change:</b>	⌘	a) The length limitation of measObjInstId is not aligned with the specification of LDN (Local Distinguished Name) and neDistinguishedName of TS 32.300 (Name Convention for Managed Objects).
		b) The length limitation of measType is not aligned with TS 32.403 (Performance Measurements for UMTS and combined UMTS/GSM).
<b>Summary of change:</b>	⌘	Correct the max lengths specified for measObjInstId and measType.
<b>Consequences if not approved:</b>	⌘	a) The measurement report file format would not allow measurement files of objects whose LDN is greater than 64 characters.
		b) The measurement report file format would not allow measurement files with measurement types currently specified in TS 32.403, [i.e., measurement template item e)], which have a length exceeding 32 characters.

<b>Clauses affected:</b>	⌘	Annex A										
<b>Other specs affected:</b>	⌘	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;"> </td> </tr> </table>	Y	N		X		X	X		Other core specifications Test specifications O&M Specifications	⌘ Rel-6 32.401
Y	N											
	X											
	X											
X												
<b>Other comments:</b>	⌘	Rel-5 Mirror CR of S5-048677. Rel-6 Mirror CR in S5-048679.										



## Change in Clause Annex A

# Annex A (normative): Measurement Report File Format

This annex describes the format of measurement result files that can be transferred from the network (NEs or EM) to the NM. Three alternative format definitions are specified, one using ASN.1 with binary encoding (BER), the two others applying XML (see [25]), which is ASCII based. Of the two alternative XML format definitions, one is based on DTD, while the other is based on XML schema (see [26], [27] and [28]). Each 3G-system implementation complying with the present document shall support at least one of the three alternatives.

NOTE: It is not intended to have the DTD based XML format from Release 6 onwards defined as one of the alternate valid file formats for measurement result files.

Both the ASN.1 and XML file format definitions implement the measurement result structure and parameters defined in clauses 5.2 and 5.3 of the present document, except from the measurement job id, which is only needed to correlate measurement result reports with measurement jobs within the area of measurement administration (see clause 5.2.1.4). The three defined file format definitions correspond to each other (except with some minor XML specific optimisations). This implies that the value ranges and size constraints defined in the ASN.1 definition shall also be valid for implementations of the XML format definition. From that perspective, the three format definitions can be regarded as three different instances of the same single format.

The following conditions have been considered in defining this file format:

- Since the files are transferred via a machine-machine interface, the files applying the format definitions should be machine readable using standard tools.
- The file format should be independent of the data transfer protocol used to carry the file from one system to another.
- The file format should be generic across 3G systems.
- The file format should be flexible enough to include all possible measurement types, i.e. those specified within annex C as well as measurements defined within other standards bodies, or vendor specific measurement types.
- The file format should not impose any dependency between granularity periods for the generation of measurement results and file upload cycles for the file transfer from the network to the NM.
- The file format should be flexible enough to support both the NE-based and the EM-based approaches, as discussed in annex B, clause B.1.1 of the present document.
- The file format should be usable for other interfaces than Itf-N if required. The measurement file header could be augmented to indicate this other usage, however this would be a non-standard extension. In the ASN.1 file format definition, this is accommodated by the use of the ellipse notation. XML allows such additions through extra DTDs, provided by the definer of the non-standard extension.

## A.1 Parameter description and mapping table

Table A.1 maps the tags defined in the ASN.1 file format definition to those used in the XML file format definitions, DTD based and XML schema based. It also provides an explanation of the individual parameters. The XML tags defined in the DTD (see clause A.3.1) have been kept as short as possible in order to minimise the size of the XML measurement result files. XML tag attributes are useful where data values bind tightly to its parent element. They have been used where appropriate.

**Table A.1 Mapping of ASN.1 Measurement Report File Format tags to XML tags**

ASN.1 Tag	DTD based XML tag	XML schema based XML tag	Description
MeasDataCollection	mdc	measCollecFile	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	mfh	fileHeader	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	md	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	mff	fileFooter	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	ffv	fileHeader 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) for XML formats and the ASN.1 format alike. The abridged number and version of a 3GPP document is constructed from its version specific full reference "3GPP [Ö] (yyyy-mm)" by: <ul style="list-style-type: none"> <li>- removing the leading "3GPP TS"</li> <li>- removing everything including and after the version third digit, representing editorial only changes, together with its preceding dot character</li> <li>- 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.</li> </ul>
senderName	sn	fileHeader dnPrefix and fileSender localDn	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 [10]. In the case of the NE-based approach, it is identical to the sender's "nEDistinguishedName". For ASN.1 and DTD based XML format, the string may be empty (i.e. string size =0) in case the DN is not configured in the sender. For the XML schema based XML format, the DN is split into the DN prefix and the Local DN (LDN) (see 3GPP TS 32.300 [10]). XML attribute specification "dnPrefix" may be absent in case the DN prefix is not configured in the sender. XML attribute specification "localDn" may be absent in case the LDN is not configured in the sender.
senderType	st	fileSender elementType	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. For the XML schema based XML format, XML attribute specification "elementType" may be absent in case the "senderType" is not configured in the sender.
vendorName	vn	fileHeader 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. For the XML schema based XML format, XML attribute specification "vendorName" may be absent in case the "vendorName" is not configured in the sender.

ASN.1 Tag	DTD based XML tag	XML schema based XML tag	Description
collectionBeginTime	cbt	measCollec beginTime	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	neid	managedElement	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	neun	managedElement userLabel	This is the user definable name ("userLabel") defined for the NE in 3GPP TS 32.622 [24]. The string may be empty (i.e. string size =0) if the "nEUserName" is not configured in the CM applications. For the XML schema based XML format, XML attribute specification "userLabel" may be absent in case the "nEUserName" is not configured in the CM applications.
nEDistinguishedName	nedn	fileHeader dnPrefix and managedElement localDn	This is the Distinguished Name (DN) defined for the NE in 3GPP TS 32.300 [10]. It is unique across an operator's 3G network. The string may be empty (i.e. string size =0) if the "nEDistinguishedName" is not configured in the CM applications. For the XML schema based XML format, the DN is split into the DN prefix and the Local DN (LDN) (see 3GPP TS 32.300 [10]). XML attribute specification "localDn" may be absent in case the LDN is not configured in the CM applications.
nESoftwareVersion	nesw	managedElement swVersion	This is the software version ("swVersion") defined for the NE in 3GPP TS 32.622 [24]. This is an optional parameter which allows post-processing systems to take care of vendor specific measurements modified between software versions. For the XML schema based XML format, XML attribute specification "swVersion" may be absent in case the "nESoftwareVersion" is not configured in the CM applications.
measInfo	mi	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.
measTimeStamp	mts	granPeriod endTime	Time stamp referring to the end of the granularity period.
granularityPeriod	gp	granPeriod duration	Granularity period of the measurement(s) in seconds. For the XML schema based XML format, the value of XML attribute specification "duration" shall use the truncated representation "PTnS" (see [28]).
measTypes	mt	measTypes or measType	This is the list of measurement types for which the following, analogous list of measurement values ("measValues") pertains. The GSM only measurement types are defined in TS 52.402 [22]. The measurement types for UMTS and combined UMTS/GSM implementations are specified in TS 32.403 [23]. For the XML schema based XML format, depending on sender's choice for optional positioning presence, either XML element "measTypes" or XML elements "measType" will be used.
measValues	mv	measValue	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") and a flag that indicates whether the data is reliable ("suspectFlag").

ASN.1 Tag	DTD based XML tag	XML schema based XML tag	Description
measObjInstId	moid	measValue measObjLdn	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 [10]). 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	r	measResults or r	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. For the XML schema based XML format, depending on sender's choice for optional positioning presence, either XML element "measResults" or XML elements "r" will be used.
suspectFlag	sf	suspect	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	ts	measCollec endTime	ASN.1 GeneralizedTime format. The minimum required information within timestamp is year, month, day, hour, minute, and second.
Not Required	mt p	measType p	An optional positioning XML attribute specification of XML elements "mt" (DTD based) and "measType" (XML schema based), used to identify a measurement type for the purpose of correlation to a result. The value of this XML attribute specification is expected to be a non-zero, non-negative integer value that is unique for each instance of XML element "mt" or "measType" that is contained within the measurement data collection file.
Not Required	r p	r p	An optional positioning XML attribute specification of XML element "r", used to correlate a result to a measurement type. The value of this XML attribute specification should match the value of XML attribute specification "p" of corresponding XML element "mt" (DTD based) or "measType" (XML schema based).

The measInfo contains the sequence of measurements, values and related information, in a table-oriented structure. A graphical representation of this structure, together with an ASN.1 and a XML example, can be found in annex C.

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. This requirement will eventually be reflected in TS 52.402 [22] and TS 32.403 [23], which specify the performance measurements for GSM (TS 52.402 [22]) and UMTS and combined UMTS/GSM systems (TS 32.403 [23]).

## A.2 ASN.1 file format definition

For ASN.1 formatted files, BER encoding rules shall apply. Embedded comments are integral parts of the standard format; i.e. any implementation-claiming conformance to this annex shall also conform to the comments.

```

PM-File-Description
DEFINITIONS AUTOMATIC TAGS ::= BEGIN
MeasDataCollection ::= SEQUENCE
{
    measFileHeader MeasFileHeader,
    measData SEQUENCE OF MeasData,
    measFileFooter MeasFileFooter
}

MeasFileHeader ::= SEQUENCE
{
    fileFormatVersion PrintableString (SIZE (0..15)),
    senderName PrintableString (SIZE (0..400)),
    senderType SenderType,
    vendorName PrintableString (SIZE (0..32)),
    collectionBeginTime TimeStamp,
    ...
}
-- The sole purpose of the ellipse notation used in the file header is to facilitate inter-release
compatibility, vendor specific additions are not allowed in implementations claiming conformance to
the TS. However, it is acknowledged that this feature does enable the use of non-standard
extensions to the file header without loosing compatibility to the file format specified in the
present document.

SenderType ::= PrintableString (SIZE (0..8))

TimeStamp ::= GeneralizedTime

MeasData ::= SEQUENCE
{
    nEId NEId,
    measInfo SEQUENCE OF MeasInfo
}

NEId ::= SEQUENCE
{
    nEUserName PrintableString (SIZE (0..64)),
    nEDistinguishedName PrintableString (SIZE (0..400)),
    nESoftwareVersion PrintableString (SIZE (0..64)) OPTIONAL
}

MeasInfo ::= SEQUENCE
{
    measTimeStamp TimeStamp,
    granularityPeriod INTEGER,
    measTypes SEQUENCE OF MeasType,
    measValues SEQUENCE OF MeasValue
}

MeasType ::= PrintableString (SIZE (1..6432))
MeasValue ::= SEQUENCE
{
    measObjInstId MeasObjInstId,
    measResults SEQUENCE OF MeasResult,
    suspectFlag BOOLEAN DEFAULT FALSE
}

MeasObjInstId ::= PrintableString (SIZE (0..40064))
-- The size of the concatenated MeasObjInstId and neDistinguishedName must not exceed 400.

MeasResult ::= CHOICE
{
    iValue INTEGER,
    rValue REAL,
    noValue NULL,
    ...
}
-- 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. The sole
purpose of the ellipse notation used in the MeasResult choice is to facilitate inter-release
compatibility in case the choice needs to be extended in future releases.

```

MeasFileFooter ::= TimeStamp  
END

## A.3 DTD based XML file format definition

The character encoding shall be a subset of UTF-8. The characters in the ASN.1 type PrintableString are allowed, i.e.:

- A-Z;
- a-z;
- 0-9;
- <space> ' ( ) + , - . / : = ? '.

For encoding of the information content, XML (see Extensible Markup Language (XML) 1.0, W3C Recommendation 10-Feb-98) will be used. The XML **document type definition** contains the mark-up declarations that provide a grammar for the measurement file format. This grammar is known as a Document Type Definition (DTD).

The DTD to be used is defined below. The type definitions and constraints for data types and values defined in the ASN.1 format, such as string sizes, shall implicitly be applied to the XML result files also. The representation of the timestamps within the XML file shall follow the "GeneralizedTime" ASN.1 type.

```
<!-- MeasDataCollection.dtd version 2.0-->
<?xml version="1.0" encoding="UTF-8"?>
<!ELEMENT mdc (mfh , md* , mff )>
<!ELEMENT mfh (ffv , sn , st , vn , cbt) >
<!ELEMENT md (neid , mi*)>
<!ELEMENT neid (neun , nedn , nesw?)>
<!ELEMENT mi (mts , gp , mt* , mv*)>
<!ELEMENT mv (moid , r* , sf? )>
<!ELEMENT mff (ts)>
<!ELEMENT ts (#PCDATA)>
<!ELEMENT sf (#PCDATA)>
<!ELEMENT r (#PCDATA)>
<!ATTLIST r p CDATA "">
<!ELEMENT mt (#PCDATA)>
<!ATTLIST mt p CDATA "">
<!ELEMENT moid (#PCDATA)>
<!ELEMENT gp (#PCDATA)>
<!ELEMENT mts (#PCDATA)>
<!ELEMENT nedn (#PCDATA)>
<!ELEMENT neun (#PCDATA)>
<!ELEMENT nesw (#PCDATA)>
<!ELEMENT cbt (#PCDATA)>
<!ELEMENT vn (#PCDATA)>
<!ELEMENT st (#PCDATA)>
<!ELEMENT sn (#PCDATA)>
<!ELEMENT ffv (#PCDATA)>

<!-- end of MeasDataCollection.dtd -->
```

The number of Measurement Result tags (r) per observed object instance tags (moid) shall always equal the number of Measurement Types (mt) tags. In case the result is a REAL value the decimal separator shall be ".". In case the result is "NULL" then the "r" mark-up shall be empty.

The following header shall be used in actual XML measurement result files (cf. annex D for an example):

```
<?xml version="1.0" encoding="UTF-8"?>
<?xml-stylesheet type="text/xsl" href="MeasDataCollection.xsl" ?>
<!DOCTYPE mdc SYSTEM "MeasDataCollection.dtd" >
<mdc xmlns:HTML="http://www.w3.org/TR/REC-xml">
```

- Line 1: xml version number 1 shall be used.
- The reference to an XSL (Extensible Stylesheet Language) or CSS (Cascading Style Sheet) file in line 2 of the header is optional. It may be configured by the operator to be inserted for the purpose of presenting the XML file in a web browser GUI. It is up to the receiver of the file to decide on the usage of this stylesheet reference, e.g. ignore it if not needed or choosing a configured default if no style sheet reference is supplied in the file.

- Line 4: A reference to the W3C Recommendation web page for XML.

Quick guide to XML notation: ? zero or one occurrence

+ one or more occurrences

\* zero or more occurrences

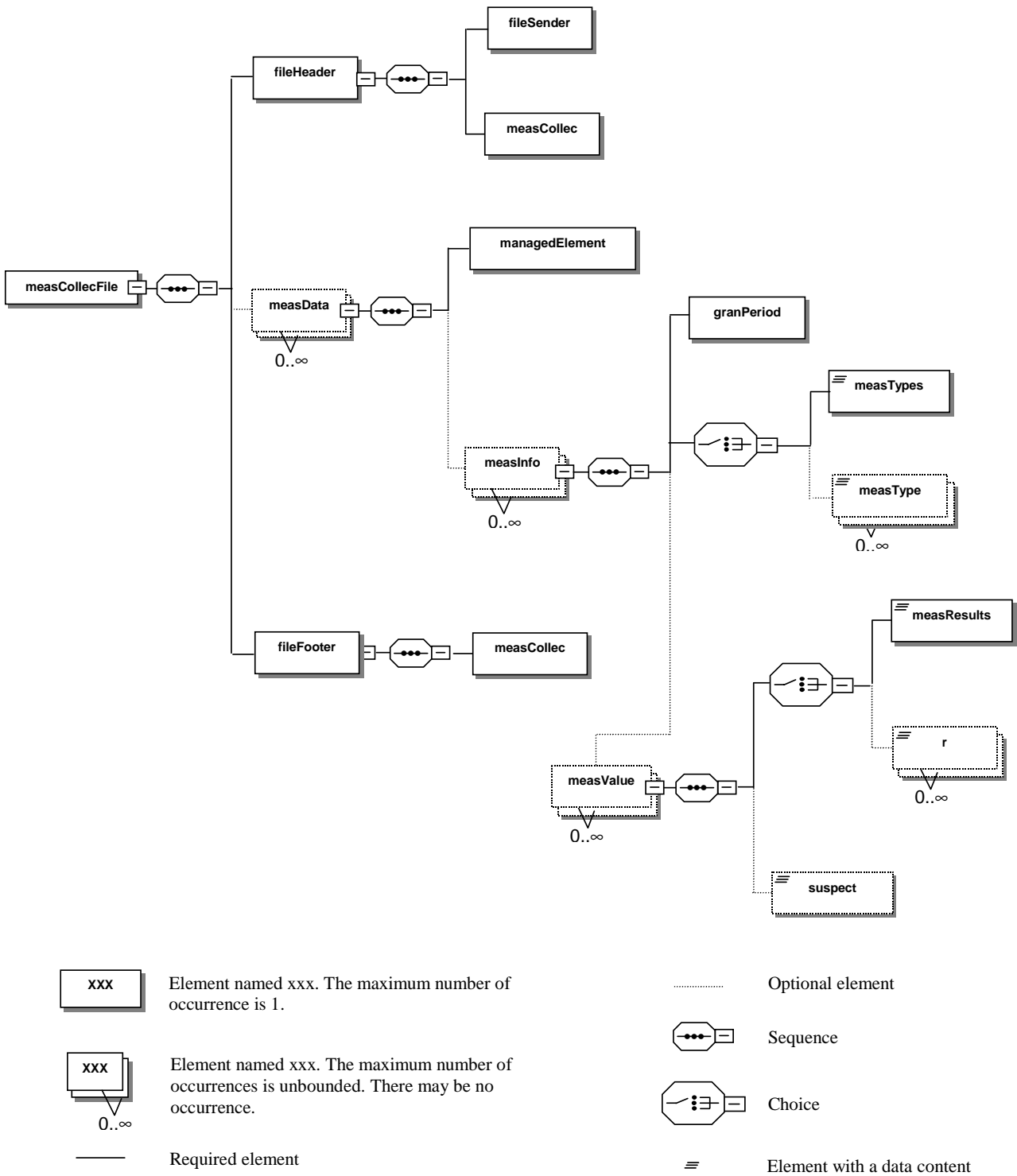
#PCDATA parsed character data

---

## A.4 XML schema based XML file format definition

### A.4.1 Measurement collection data file XML diagram

Figure A.1 describes the XML element structure of the measurement collection data file:



**Figure A.1: XML diagram of the measurement collection data file**

## A.4.2 Measurement collection data file XML schema

The following XML schema `measCollec.xsd` is the schema for measurement collection data XML files:

```
<?xml version="1.0" encoding="UTF-8"?>
<!--
3GPP TS 32.401 PM Concept and Requirements
```



```
Measurement collection data file XML schema
measCollec.xsd
-->

<schema
  targetNamespace=
"http://www.3gpp.org/ftp/specs/latest/rel-5/32_series/32401-530.zip#measCollec"
  elementFormDefault="qualified"
  xmlns="http://www.w3.org/2001/XMLSchema"
  xmlns:mc=
"http://www.3gpp.org/ftp/specs/latest/rel-5/32_series/32401-530.zip#measCollec"
>

<!-- Measurement collection data file root XML element -->

<element name="measCollecFile">
  <complexType>
    <sequence>
      <element name="fileHeader">
        <complexType>
          <sequence>
            <element name="fileSender">
              <complexType>
                <attribute name="localDn" type="string" use="optional"/>
                <attribute name="elementType" type="string" use="optional"/>
              </complexType>
            </element>
            <element name="measCollec">
              <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="managedElement">
              <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="granPeriod">
                    <complexType>
                      <attribute
                        name="duration"
                        type="duration"
                        use="required"
                      />
                      <attribute
                        name="endTime"
                        type="dateTime"
                        use="required"
                      />
                    </complexType>
                  </element>
                </sequence>
              </complexType>
            </element>
          </sequence>
        </complexType>
      </element>
    </sequence>
  </complexType>
</element>
```

```

<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="mc:measResultType"/>
          </simpleType>
        </element>
        <element name="r"
          minOccurs="0" maxOccurs="unbounded">
          <complexType>
            <simpleContent>
              <extension base="mc:measResultType">
                <attribute name="p" type="positiveInteger"
                  use="required"/>
              </extension>
            </simpleContent>
          </complexType>
        </element>
      </choice>
      <element name="suspect" type="boolean" minOccurs="0"/>
    </sequence>
    <attribute name="measObjLdn"
      type="string" use="required"/>
  </complexType>
</element>
</sequence>
</complexType>
</element>
</sequence>
</complexType>
</element>
<element name="fileFooter">
  <complexType>
    <sequence>
      <element name="measCollec">
        <complexType>
          <attribute name="endTime" type="dateTime" use="required"/>
        </complexType>
      </element>
    </sequence>
  </complexType>
</element>
</sequence>
</complexType>
</element>

```

```

<simpleType name="measResultType">
  <union memberTypes="decimal">
    <simpleType>
      <restriction base="string">
        <enumeration value="NIL"/>
      </restriction>
    </simpleType>
  </union>
</simpleType>
</schema>

```

### A.4.3 Measurement collection data file XML header

The following header shall be used in actual XML measurement result files (cf. annex D for examples):

```

<?xml version="1.0" encoding="UTF-8"?>
<?xml-stylesheet type="text/xsl" href="MeasDataCollection.xsl"?>
<measCollecFile
  xmlns=
"http://www.3gpp.org/ftp/specs/latest/rel-5/32\_series/32401-530.zip#measCollec"
>

```

**End of Change in Annex A  
End of Document**

## Annex D (informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
June 2001	S_12	SP-010237	--	--	Submitted to TSG SA #12 for Information.	--	1.0.0
June 2001	--	--	--	--	MCC editorials	1.0.0	1.0.1
Sep 2001	S_13	SP-010467	--	--	Submitted to TSG SA #13 for Approval	2.0.0	4.0.0
Dec 2001	S_14	SP-010638	001	--	Correction of declaration in XML header	4.0.0	4.1.0
Mar 2002	S_15	--	--	--	Automatic upgrade to Rel-5 (no Rel-5 CR)	4.1.0	5.0.0
Sep 2002	S_17	SP-020502	003	--	Description of Alarm IRP usage for performance alarms	5.0.0	5.1.0
Sep 2002	S_17	SP-020502	004	--	Addition of measurement file XML schema and miscellaneous alignments with CM	5.0.0	5.1.0
Jun 2003	S_20	SP-030291	006	--	Clarification of NE file generation behaviour in case of multiple granularity periods	5.1.0	5.2.0
Jun 2003	S_20	SP-030291	008		Correction of Measurement Result File Name Definition for alignment with Windows based systems	5.1.0	5.2.0
Jun 2004	S_24	SP-040265	014	--	Correction in requirement for granularity periods	5.2.0	5.3.0

## CHANGE REQUEST

⌘ **32.401 CR 018** ⌘ rev - ⌘ **Current vers 6.2.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

**Proposed change affects:** | UICC apps  ME  Radio Access Network  Core Network

<b>Title:</b>	⌘ Correction of measObjInstId and measType length limitations in the Measurement Report File Format		
<b>Source:</b>	⌘ SA5 (Ulf H. binette, <a href="mailto:ulf.hubINETTE@ericsson.com">ulf.hubINETTE@ericsson.com</a> )		
<b>Work item code:</b>	⌘ OAM-PM	<b>Date:</b>	⌘ 20/08/2004
<b>Category:</b>	⌘ <b>A</b>	<b>Release:</b>	⌘ Rel-6
	Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP <a href="#">TR 21.900</a> .	Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) Rel-4 (Release 4) Rel-5 (Release 5) Rel-6 (Release 6)	

<b>Reason for change:</b>	⌘	a) The length limitation of measObjInstId is not aligned with the specification of LDN (Local Distinguished Name) and neDistinguishedName of TS 32.300 (Name Convention for Managed Objects). b) The length limitation of measType is not aligned with TS 32.403 (Performance Measurements for UMTS and combined UMTS/GSM).
<b>Summary of change:</b>	⌘	Correct the max lengths specified for measObjInstId and measType.
<b>Consequences if not approved:</b>	⌘	a) The measurement report file format would not allow measurement files of objects whose LDN is greater than 64 characters. b) The measurement report file format would not allow measurement files with measurement types currently specified in TS 32.403, [i.e., measurement template item e)], which have a length exceeding 32 characters.

<b>Clauses affected:</b>	⌘ Annex A								
<b>Other specs affected:</b>	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> </table> Other core specifications <input type="checkbox"/> Test specifications <input type="checkbox"/> O&M Specifications <input type="checkbox"/>	Y	N	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Y	N								
<input type="checkbox"/>	<input checked="" type="checkbox"/>								
<input type="checkbox"/>	<input checked="" type="checkbox"/>								
<input type="checkbox"/>	<input checked="" type="checkbox"/>								
<b>Other comments:</b>	⌘ Rel-6 Mirror CR of S5-048677.								

## Change in Clause Annex A

# Annex A (normative): Measurement Report File Format

This annex describes the format of measurement result files that can be transferred from the network (NEs or EM) to the NM. Three alternative format definitions are specified, one using ASN.1 with binary encoding (BER), the two others applying XML (see [25]), which is ASCII based. Of the two alternative XML format definitions, one is based on DTD, while the other is based on XML schema (see [26], [27] and [28]). Each 3G-system implementation complying with the present document shall support at least one of the three alternatives.

**NOTE:** It is not intended to have the DTD based XML format from Release 6 onwards defined as one of the alternate valid file formats for measurement result files.

Both the ASN.1 and XML file format definitions implement the measurement result structure and parameters defined in clauses 5.2 and 5.3 of the present document. The three defined file format definitions correspond to each other (except with some minor XML specific optimisations). This implies that the value ranges and size constraints defined in the ASN.1 definition shall also be valid for implementations of the XML format definition. From that perspective, the three format definitions can be regarded as three different instances of the same single format.

The following conditions have been considered in defining this file format:

- Since the files are transferred via a machine-machine interface, the files applying the format definitions should be machine-readable using standard tools.
- The file format should be independent of the data transfer protocol used to carry the file from one system to another.
- The file format should be generic across 3G systems.
- The file format should be flexible enough to include all possible measurement types, i.e. those specified within annex C as well as measurements defined within other standards bodies, or vendor specific measurement types.
- The file format should not impose any dependency between granularity periods for the generation of measurement results and file upload cycles for the file transfer from the network to the NM.
- The file format should be flexible enough to support both the NE-based and the EM-based approaches, as discussed in annex B, clause B.1.1 of the present document.
- The file format should be usable for other interfaces than Itf-N if required. The measurement file header could be augmented to indicate this other usage, however this would be a non-standard extension. In the ASN.1 file format definition, this is accommodated by the use of the ellipsis notation. XML allows such additions through extra DTDs, provided by the definer of the non-standard extension.

## A.1 Parameter description and mapping table

Table A.1 maps the tags defined in the ASN.1 file format definition to those used in the XML file format definitions, DTD based and XML schema based. It also provides an explanation of the individual parameters. The XML tags defined in the DTD (see clause A.3.1) have been kept as short as possible in order to minimise the size of the XML measurement result files. XML tag attributes are useful where data values bind tightly to its parent element. They have been used where appropriate.

**Table A.1 Mapping of ASN.1 Measurement Report File Format tags to XML tags**

ASN.1 Tag	DTD based XML tag	XML schema based XML tag	Description
MeasDataCollection	mdc	measCollecFile	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	mfh	fileHeader	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	md	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	mff	fileFooter	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	ffv	fileHeader 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) for XML formats and the ASN.1 format alike. The abridged number and version of a 3GPP document is constructed from its version specific full reference "3GPP [Ö] (yyyy-mm)" by: <ul style="list-style-type: none"> <li>- removing the leading "3GPP TS"</li> <li>- removing everything including and after the version third digit, representing editorial only changes, together with its preceding dot character</li> <li>- 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.</li> </ul>
SenderName	sn	fileHeader dnPrefix and fileSender localDn	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 [10]. In the case of the NE-based approach, it is identical to the sender's "nEDistinguishedName". For ASN.1 and DTD based XML format, the string may be empty (i.e. string size =0) in case the DN is not configured in the sender. For the XML schema based XML format, the DN is split into the DN prefix and the Local DN (LDN) (see 3GPP TS 32.300 [10]). XML attribute specification "dnPrefix" may be absent in case the DN prefix is not configured in the sender. XML attribute specification "localDn" may be absent in case the LDN is not configured in the sender.
SenderType	st	fileSender elementType	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. For the XML schema based XML format, XML attribute specification "elementType" may be absent in case the "senderType" is not configured in the sender.
VendorName	vn	fileHeader 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. For the XML schema based XML format, XML attribute specification "vendorName" may be absent in case the "vendorName" is not configured in the sender.

ASN.1 Tag	DTD based XML tag	XML schema based XML tag	Description
CollectionBeginTime	cbt	measCollec beginTime	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	neid	managedElement	The unique identification of the NE in the system. It includes the user name ("nUserName"), the distinguished name ("nEDistinguishedName") and the software version ("nESoftwareVersion") of the NE.
NEUserName	neun	managedElement userLabel	This is the user definable name ("userLabel") defined for the NE in 3GPP TS 32.622 [24]. The string may be empty (i.e. string size =0) if the "nUserName" is not configured in the CM applications. For the XML schema based XML format, XML attribute specification "userLabel" may be absent in case the "nUserName" is not configured in the CM applications.
NEDistinguishedName	nedn	fileHeader dnPrefix and managedElement localDn	This is the Distinguished Name (DN) defined for the NE in 3GPP TS 32.300 [10]. It is unique across an operator's 3G network. The string may be empty (i.e. string size =0) if the "nEDistinguishedName" is not configured in the CM applications. For the XML schema based XML format, the DN is split into the DN prefix and the Local DN (LDN) (see 3GPP TS 32.300 [10]). XML attribute specification "localDn" may be absent in case the LDN is not configured in the CM applications.
NESoftwareVersion	nesw	managedElement swVersion	This is the software version ("swVersion") defined for the NE in 3GPP TS 32.622 [24]. This is an optional parameter which allows post-processing systems to take care of vendor specific measurements modified between software versions. For the XML schema based XML format, XML attribute specification "swVersion" may be absent in case the "nESoftwareVersion" is not configured in the CM applications.
MeasInfo	mi	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.
MeasTimeStamp	mts	granPeriod endTime	Time stamp referring to the end of the granularity period.
JobId	jobid	job 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	gp	granPeriod duration	Granularity period of the measurement(s) in seconds. For the XML schema based XML format, the value of XML attribute specification "duration" shall use the truncated representation "PTnS" (see [28]).
ReportingPeriod	rp	repPeriod duration	Reporting period of the measurement(s) in seconds. For the XML schema based XML format, the value of XML attribute specification "duration" shall use the truncated representation "PTnS" (see [28]). The "reportingPeriod" is mandatory when PMIRP is supported.
MeasTypes	mt	measTypes or measType	This is the list of measurement types for which the following, analogous list of measurement values ("measValues") pertains. The GSM only measurement types are defined in TS 52.402 [22]. The measurement types for UMTS and combined UMTS/GSM implementations are specified in TS 32.403 [23]. For the XML schema based XML format, depending on sender's choice for optional positioning presence, either XML element "measTypes" or XML elements "measType" will be used.
MeasValues	mv	measValue	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") and a flag that indicates whether the data is reliable ("suspectFlag").

ASN.1 Tag	DTD based XML tag	XML schema based XML tag	Description
MeasObjInstId	moid	measValue measObjLdn	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 [10]). 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	r	measResults or r	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. For the XML schema based XML format, depending on sender's choice for optional positioning presence, either XML element "measResults" or XML elements "r" will be used.
SuspectFlag	sf	suspect	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	ts	measCollec endTime	ASN.1 GeneralizedTime format. The minimum required information within timestamp is year, month, day, hour, minute, and second.
Not Required	mt p	measType p	An optional positioning XML attribute specification of XML elements "mt" (DTD based) and "measType" (XML schema based), used to identify a measurement type for the purpose of correlation to a result. The value of this XML attribute specification is expected to be a non-zero, non-negative integer value that is unique for each instance of XML element "mt" or "measType" that is contained within the measurement data collection file.
Not Required	r p	r p	An optional positioning XML attribute specification of XML element "r", used to correlate a result to a measurement type. The value of this XML attribute specification should match the value of XML attribute specification "p" of corresponding XML element "mt" (DTD based) or "measType" (XML schema based).

The measInfo contains the sequence of measurements, values and related information, in a table-oriented structure. A graphical representation of this structure, together with an ASN.1 and a XML example, can be found in annex C.

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. This requirement will eventually be reflected in TS 52.402 [22] and TS 32.403 [23], which specify the performance measurements for GSM (TS 52.402 [22]) and UMTS and combined UMTS/GSM systems (TS 32.403 [23]).



## A.2 ASN.1 file format definition

For ASN.1 formatted files, BER encoding rules shall apply. Embedded comments are integral parts of the standard format; i.e. any implementation-claiming conformance to this annex shall also conform to the comments.

PM-File-Description

DEFINITIONS AUTOMATIC TAGS ::= BEGIN

```
MeasDataCollection ::= SEQUENCE
{
  measFileHeader    MeasFileHeader,
  measData          SEQUENCE OF MeasData,
  measFileFooter    MeasFileFooter
}
```

```
MeasFileHeader ::= SEQUENCE
{
  fileFormatVersion    PrintableString (SIZE (0..15)),
  senderName           PrintableString (SIZE (0..400)),
  senderType           SenderType,
  vendorName           PrintableString (SIZE (0..32)),
  collectionBeginTime  TimeStamp,
  ...
}
```

-- The sole purpose of the ellipsis notation used in the file header is to facilitate inter-release compatibility, vendor specific additions are not allowed in implementations claiming conformance to the TS. However, it is acknowledged that this feature does enable the use of non-standard extensions to the file header without loosing compatibility to the file format specified in the present document.

```
SenderType ::= PrintableString (SIZE (0..8))
```

```
TimeStamp ::= GeneralizedTime
```

```
MeasData ::= SEQUENCE
{
  nEId      NEId,
  measInfo  SEQUENCE OF MeasInfo
}
```

```
NEId ::= SEQUENCE
{
  nEUserName           PrintableString (SIZE (0..64)),
  nEDistinguishedName PrintableString (SIZE (0..400)),
  nESoftwareVersion    PrintableString (SIZE (0..64)) OPTIONAL
}
```

```
MeasInfo ::= SEQUENCE
{
  measTimeStamp      TimeStamp,
  jobId              [1] INTEGER OPTIONAL,
  granularityPeriod  [2] INTEGER,
  reportingPeriod    [3] INTEGER OPTIONAL,
  measTypes          [4] SEQUENCE OF MeasType,
  measValues         SEQUENCE OF MeasValue
}
```

```
| MeasType ::= PrintableString (SIZE (1..6432))
```

```
MeasValue ::= SEQUENCE
{
  measObjInstId      MeasObjInstId,
  measResults        SEQUENCE OF MeasResult,
}
```

```
suspectFlag      BOOLEAN DEFAULT FALSE
}
```

```
MeasObjInstId ::= PrintableString (SIZE (0..40064))
```

-- The size of the concatenated measObjInstId and neDistinguishedName must not exceed 400.

```
MeasResult ::= CHOICE
{
  iValue INTEGER,
  rValue REAL,
  noValue NULL,
  ...
}
```

-- 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. The sole purpose of the ellipsis notation used in the MeasResult choice is to facilitate inter-release compatibility in case the choice needs to be extended in future releases.

```
MeasFileFooter ::= TimeStamp
```

```
END
```

---

## A.3 DTD based XML file format definition

The character encoding shall be a subset of UTF-8. The characters in the ASN.1 type PrintableString are allowed, i.e.:

- A-Z;
- a-z;
- 0-9;
- <space>'(+, - . / : = ?)'

For encoding of the information content, XML (see Extensible Markup Language (XML) 1.0, W3C Recommendation 10-Feb-98) will be used. The XML **document type definition** contains the mark-up declarations that provide a grammar for the measurement file format. This grammar is known as a Document Type Definition (DTD). The DTD to be used is defined below. The type definitions and constraints for data types and values defined in the ASN.1 format, such as string sizes, shall implicitly be applied to the XML result files also. The representation of the timestamps within the XML file shall follow the "GeneralizedTime" ASN.1 type.

```
<!-- MeasDataCollection.dtd version 2.0-->
<?xml version="1.0" encoding="UTF-8"?>
<!ELEMENT mdc (mfh, md*, mff)>
<!ELEMENT mfh (ffv, sn, st, vn, cbt)>
<!ELEMENT md (neid, mi*)>
<!ELEMENT neid (neun, nedn, nesw?)>
<!ELEMENT mi (mts, jobid?, gp, rp?, mt*, mv*)>
<!ELEMENT mv (moid, r*, sf?)>
<!ELEMENT mff (ts)>
<!ELEMENT jobid (#PCDATA)>
<!ELEMENT rp (#PCDATA)>
<!ELEMENT ts (#PCDATA)>
<!ELEMENT sf (#PCDATA)>
<!ELEMENT r (#PCDATA)>
<!ATTLIST r p CDATA "">
<!ELEMENT mt (#PCDATA)>
<!ATTLIST mt p CDATA "">
<!ELEMENT moid (#PCDATA)>
<!ELEMENT gp (#PCDATA)>
```

```

<!ELEMENT mts (#PCDATA)>
<!ELEMENT nedn (#PCDATA)>
<!ELEMENT neun (#PCDATA)>
<!ELEMENT nesw (#PCDATA)>
<!ELEMENT cbt (#PCDATA)>
<!ELEMENT vn (#PCDATA)>
<!ELEMENT st (#PCDATA)>
<!ELEMENT sn (#PCDATA)>
<!ELEMENT ffv (#PCDATA)>
<!-- end of MeasDataCollection.dtd -->

```

The number of Measurement Result tags (r) per observed object instance tags (moid) shall always equal the number of Measurement Types (mt) tags. In case the result is a REAL value the decimal separator shall be ".". In case the result is "NULL" then the "r" mark-up shall be empty.

The following header shall be used in actual XML measurement result files (cf. annex D for an example):

```

<?xml version="1.0" encoding="UTF-8"?>
<?xml-stylesheet type="text/xsl" href="MeasDataCollection.xsl"?>
<!DOCTYPE mdc SYSTEM "MeasDataCollection.dtd">
<mdc xmlns:HTML="http://www.w3.org/TR/REC-xml">

```

- Line 1: xml version number 1 shall be used.
- The reference to an XSL (Extensible Stylesheet Language) or CSS (Cascading Style Sheet) file in line 2 of the header is optional. It may be configured by the operator to be inserted for the purpose of presenting the XML file in a web browser GUI. It is up to the receiver of the file to decide on the usage of this stylesheet reference, e.g. ignore it if not needed or choosing a configured default if no style sheet reference is supplied in the file.
- Line 4: A reference to the W3C Recommendation web page for XML.

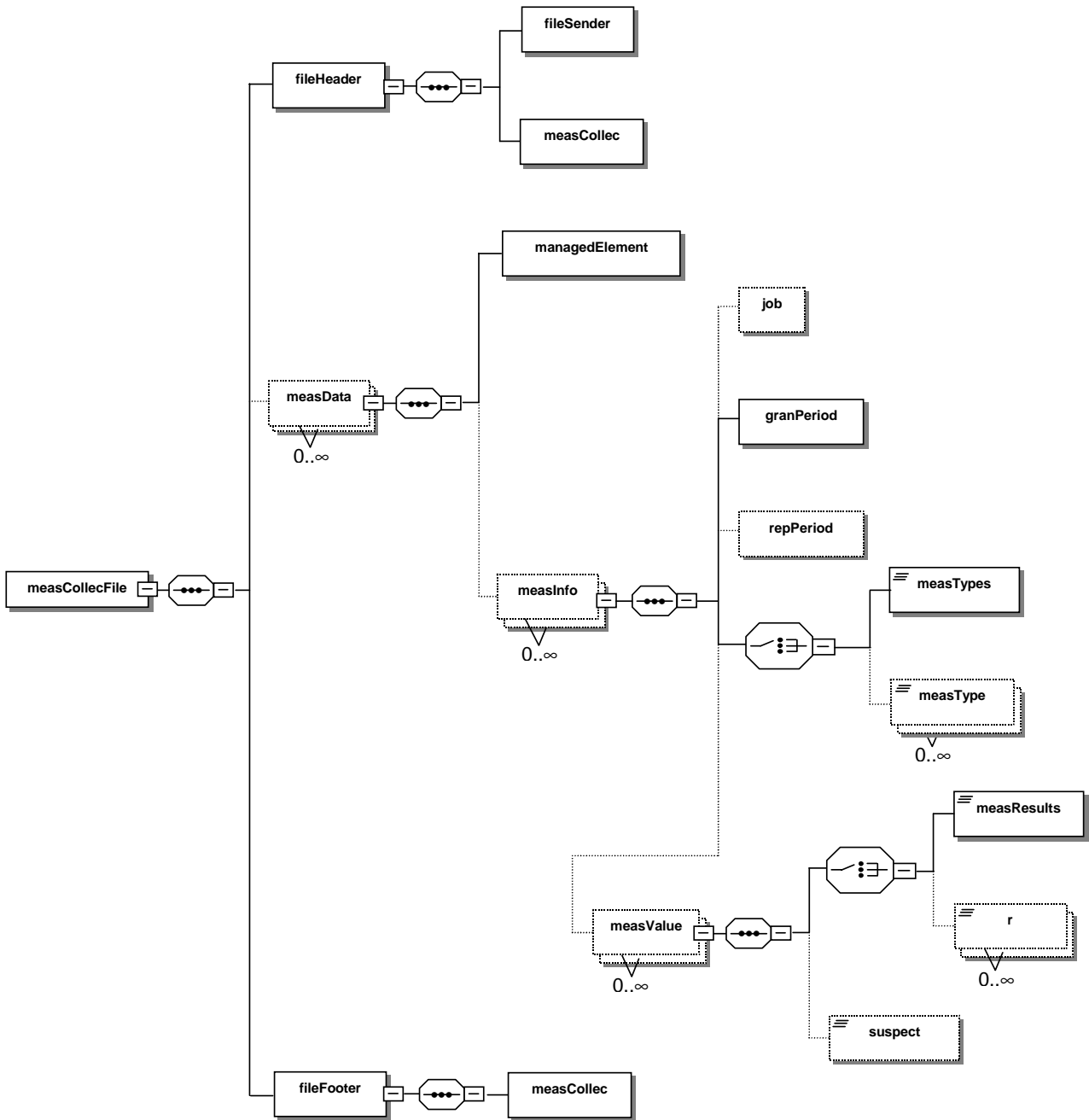
Quick guide to XML notation: ? zero or one occurrence  
+ one or more occurrences  
\* zero or more occurrences  
#PCDATA parsed character data

---

## A.4 XML schema based XML file format definition

### A.4.1 Measurement collection data file XML diagram

Figure A.1 describes the XML element structure of the measurement collection data file.



- |  |  |  |                             |
|--|--|--|-----------------------------|
|  | Element named xxx. The maximum number of occurrence is 1.                                      |  | Optional element            |
|  | Element named xxx. The maximum number of occurrences is unbounded. There may be no occurrence. |  | Sequence                    |
|  | Required element   |  | Choice                      |
|  |  |  | Element with a data content |

**Figure A.1: XML diagram of the measurement collection data file**

## A.4.2 Measurement collection data file XML schema

The following XML schema `measCollec.xsd` is the schema for measurement collection data XML files:

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

<!--
  3GPP TS 32.401 PM Concept and Requirements
  Measurement collection data file XML schema
  measCollec.xsd
-->

<schema
  targetNamespace=
"http://www.3gpp.org/ftp/specs/latest/rel-6/32_series/32401-620.zip#measCollec"
  elementFormDefault="qualified"
  xmlns="http://www.w3.org/2001/XMLSchema"
  xmlns:mc=
"http://www.3gpp.org/ftp/specs/latest/rel-6/32_series/32401-620.zip#measCollec"
>

  <!-- Measurement collection data file root XML element -->

  <element name="measCollecFile">
    <complexType>
      <sequence>
        <element name="fileHeader">
          <complexType>
            <sequence>
              <element name="fileSender">
                <complexType>
                  <attribute name="localDn" type="string" use="optional"/>
                  <attribute name="elementType" type="string" use="optional"/>
                </complexType>
              </element>
              <element name="measCollec">
                <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="managedElement">
                <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="mc:measResultType"/>
            </simpleType>
          </element>
          <element name="r"
            minOccurs="0" maxOccurs="unbounded">
            <complexType>
              <simpleContent>
                <extension base="mc:measResultType">
                  <attribute name="p" type="positiveInteger"
                    use="required"/>
                </extension>
              </simpleContent>
            </complexType>
          </element>
        </choice>
        <element name="suspect" type="boolean" minOccurs="0"/>
      </sequence>
      <attribute name="measObjLdn"
        type="string" use="required"/>
    </complexType>
  </element>
</sequence>

```

```

        </complexType>
      </element>
    </sequence>
  </complexType>
</element>
<element name="fileFooter">
  <complexType>
    <sequence>
      <element name="measCollec">
        <complexType>
          <attribute name="endTime" type="dateTime" use="required"/>
        </complexType>
      </element>
    </sequence>
  </complexType>
</element>
</sequence>
</complexType>
</element>

<simpleType name="measResultType">
  <union memberTypes="decimal">
    <simpleType>
      <restriction base="string">
        <enumeration value="NIL"/>
      </restriction>
    </simpleType>
  </union>
</simpleType>

</schema>

```

### A.4.3 Measurement collection data file XML header

The following header shall be used in actual XML measurement result files (cf. annex D for examples):

```

<?xml version="1.0" encoding="UTF-8"?>
<?xml-stylesheet type="text/xsl" href="MeasDataCollection.xsl"?>
<measCollecFile
  xmlns=
"http://www.3gpp.org/ftp/specs/latest/rel-6/32_series/32401-620.zip#measCollec"
>

```

**End of Change in Annex A**  
**End of Document**

## Annex D (informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
Dec 2003	S_22	SP-030755	012	1	Add requirements for Measurement Job overload management	6.0.0	6.1.0
Jun 2004	S_24	SP-040265	015	--	Correction in requirement for granularity periods	6.1.0	6.2.0