Technical Specification Group Services and System Aspects
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Title: **CRs to 3G Performance Management (32.104)**

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Doc-1st-Level	Doc-2nd-Level	Spec	CR	Rev	Phase	Cat	Subject	Version-Current	Version-New
SP-000434	S5-000399	32.104	007		R99	F	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

3GPP TSG-SA5 (Telecom Management)
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SA5#14(00)0399
S5P000029

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

32.104	**CR**	**007**	Current Version:	V.3.2.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to: **SA#9** *list expected approval meeting # here ↑*	for approval	X	strategic		*(for SMG use only)*
	for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)*	(U)SIM		ME		UTRAN / Radio		Core Network	X

Source:	**SA5#14** (Performance Management)		**Date:**	Sept 2000	
Subject:	Clarification of the table oriented structure of the file format, and addition of ASN.1 example, according to annex D				
Work item:	Performance Management				

Category: *(only one category shall be marked with an X)*			**Release:**		
F	Correction	X		Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification			Release 99	
				Release 00	X

Reason for change:	Clarification				
Clauses affected:	Annex A, D.				
Other specs affected:	Other 3G core specifications		→	List of CRs:	
	Other GSM core specifications		→	List of CRs:	
	MS test specifications		→	List of CRs:	
	BSS test specifications		→	List of CRs:	
	O&M specifications		→	List of CRs:	
Other comments:	None				

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 ("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 "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 3G 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 "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") and the distinguished name ("nEDistinguishedName") of the NE.
nEUserName	neun	This is the user definable NE name, cf. 3G TS 32.106. The string may be empty (i.e. string size =0) if the "nEUserName" is not configured.
nEDistinguishedName	nedn	This is the distinguishedName defined for the NE in 3G TS 32.106. 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.
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 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 ("measObjInstId"), the list of measurement result values ("measResults") and a flag that indicates whether the data is reliable ("suspectFlag").
measObjInstId	moid	The "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
         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))
        }

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 (1..64))

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 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 MeasDataCollection 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

Annex B (normative): Measurement Report File Conventions and Transfer Procedure

This annex describes the conventions how files containing performance measurement results are generated in the network (EM or NEs) and the procedure to transfer these files from the network to the NM.

B.1 Conventions

The following subclauses define conventions for the generation and the naming of measurement-result files.

B.1.1 File generation

Since vendors may choose to implement the NM interface either in the NEs or the EM, the measurement result files for collection by the NM (push or pull transfer mechanism) may be provided by the NEs or the EM. Note that within one 3G network both possibilities may occur, since NEs of different types may use either one of the two possible approaches (NE based or EM based). This is particularly true in a multi-vendor network.

The procedures for the transfer of the files to the NM from either the NE or the EM are described in clause B.2 below.

B.1.1.1 NE based approach

The NE shall generate one file immediately at the end of each granularity period. This file shall contain all measurement results produced by the NE within that granularity period. For example, if a NodeB runs 10 measurements with a granularity period of 15 minutes and 5 measurements with a granularity period of 5 minutes, then it shall generate one file containing 10 results every 15 minutes, and one file containing 5 measurement results every five minutes. The NE and the granularity period shall be identified both in the file name and the file contents. NE identifiers (names) used for the files shall be in accordance with the NE naming conventions defined in 3G TS 32.106 [3]. The file shall be available for transfer to or collection by the NM as soon as all applicable results have been assembled.

Each NE is responsible for the generation and maintenance of the files pertaining to its own measurements (i.e. the measurements it executes). In particular, this implies that the RNC is not involved in the generation, provision or transfer of measurement result files of its controlled NodeBs, i.e. for the measurements defined for the NodeB in the present document, no results will be sent via the Iub interface. (Note that NodeB measurement results may be routed across the same physical interface as Iub, see 3G TS 25.442 [4] for details).

B.1.1.2 EM based approach

This approach requires that measurement results be forwarded to the EM according to the mechanisms described in subclause 4.2.4 of the present document. The EM may choose to provide measurement result files as described above for the NEs, however, additional flexibility may be offered. For example, measurement results from several granularity periods and/ or several NEs could be written into one single file. These NEs may be determined based on network hierarchy (e.g. all NodeBs controlled by the same RNC, all NEs controlled by the same EM), or management domains configured by the system operator (e.g. NodeBs belonging to a certain (management or geographical) area). In case such rules are applied by the EM for the routing of measurement results to specific files then they shall be operator configurable. If results from more than one NE are contained in a file, the NE identifier used for the file shall be the EM name as defined in 3G TS 32.106 [3], or a domain name configured by the system operator. If results from more than one granularity period are contained in the file then the beginning of the first and the end of the last granularity period shall be indicated in the file name.

The file shall be made available for transfer to or collection by the NM as soon as all applicable results have been assembled.

B.1.2. File naming

The following convention shall be applied for measurement result file naming:

<Type><Startdate>.<Starttime>-[<Enddate>.]<Endtime>_<UniqueId>[:<RC>]

1) The Type field indicates if the file contains measurement results for single or multiple NEs and/or granularity periods, where:

   - "A" means single NE, single granularity period,
   - "B" indicates multiple NEs, single granularity period,
   - "C" signifies single NE, multiple granularity periods,
   - "D" stands for multiple NEs, multiple granularity periods.

   Note that files generated by the NEs will always have the Type field set to "A".

2) The Startdate field indicates the date when the granularity period began if the Type field is set to A or B. If the Type field is either "C" or "D" then Startdate contains the date when the first granularity period of the measurement results contained in the file started. The Startdate field is of the form YYYYMMDD, where:

   - YYYY is the year in four-digit notation,
   - MM is the month in two digit notation (01 – 12),
   - DD is the day in two digit notation (01 – 31).

3) The Starttime field indicates the time when the granularity period began if the Type field is set to A or B. If the Type field is either "C" or "D" then Starttime contains the time when the first granularity period of the measurement results contained in the file began. The Starttime field is of the form HHMM, where:

   - HH is the two digit hour of the day, based on 24 hour clock (00 – 23),
   - MM is the two digit minute of the hour, possible values are 00, 05, 10, 15, 20, 25, 30, 35, 40, 45, 50, and 55.

4) The Enddate field shall only be included if the Type field is set to "C" or "D", i.e. measurement results for multiple granularity periods are contained in the file. It identifies the date when the last granularity period of these measurements ended, and its structure corresponds to the Startdate field.

5) The Endtime field indicates the time when the granularity period ended if the Type field is set to A or B. If the Type field is either "C" or "D" then Endtime contains the time when the last granularity period of the measurement results contained in the file ended. Its structure corresponds to the Starttime field, however, the allowed values for the minute of the hour are 05 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, and 00.

6) UniqueId. This is the name of the NE, EM or domain, as defined in subclauses B.1.1.1 and B.1.1.2 above.

7) The RC parameter is a running count, starting with the value of "1", and shall be appended only if the filename is otherwise not unanimous, i.e. more than one file is generated and all other parameters of the file name are identical. Therefore it may only be used by the EM, since the described situation can not occur with NE generated files.

Some examples describing file naming convention:

1) file name: A20000626.2315-2330_NodeBId,
   meaning: file produced by NodeB <NodeBId> on June 26, 2000, granularity period 15 minutes from 23:15 to 23:30.

2) file name: B20021224.1700-1705_EMId,
   meaning: file containing results for multiple NEs, produced by EM <EMId> on December 24, 2002, granularity period 5 minutes from 17:00 to 17:05.

3) file name: D20050907.1030-20050909.1500_DomainId:2,
meaning: file containing results for NEs belonging to domain <DomainId>, start of first granularity period 07 September 2005, 10:30, end of last granularity period 09 September 2005, 15:00. This file is produced by the EM managing the domain, and it is the second file for this domain/granularity periods combination.

B.2. File transfer procedure

Both push (i.e. triggered by the NE) and pull (triggered by the OS) transfer modes shall be supported on the NM interface. Implementation specific means may be employed for the administration and control of the file transfer, concerning

- the time of the transfer (in push mode);
- the routing of the transfer to one or more OS(s) (in push mode);
- the storage/deletion of the files in the NE, particularly when the EM based approach is chosen (cf. subclause B.1.1.1 above).

Measurement result files shall be retained by the file generator (i.e. NE or EM) at least until they have been successfully transferred to or collected by the NM. The storage capacity and the duration for which the data can be retained at the NE or the EM will be Operator and implementation dependent.

The file transfer procedure implemented in the system (NE or EM) shall ensure that no data can get lost under normal operating conditions. The procedure shall also ensure that the files will be deleted after successful transfer to the NM. Depending on the exact implementation of the procedure, the NM may be responsible for deleting those files, or older files will be eventually overwritten by new ones by the file generator in a round robin fashion.

Each implementation shall support all primitives of the selected protocol (e.g. put file, get file, inspect directory contents, delete file) which are needed by the NM. These primitives depend on the details of the procedure, as defined by the manufacturer.

Annex C (normative): Performance Measurement Requirements Summary

The present document shall be valid for all measurement types provided by an implementation of a 3G network. These may be measurement types defined within this annex, measurements defined within other standards bodies, or vendor specific measurement types.

Only measurement types that are specific to 3G networks are defined within this annex, i.e. vendor specific measurement types and measurements related to "external" technologies used in 3G networks, such as ATM or IP, will not be covered. Instead, these shall be applied as described by the other, "external" standards bodies (e.g. ITU-T or IETF) or according to the manufacturer documentation.

Following is the template used to describe the measurements contained in this annex.

C.x.y. Measurement Name (section header)

This is a descriptive name of the measurement type that is specified as clause C.x.y of the present document

a) **Description**

An explanation of the measurement operation;

b) **Collection Method**

The form in which this measurement data is obtained:

- CC (Cumulative Counter);
- GAUGE (dynamic variable), used when data being measured can vary up or down during the period of measurement;
- DER (Discrete Event Registration), when data related to a particular event are captured every nth event is registered, where n can be 1 or larger;
- SI (Status Inspection).

c) **Condition**

The condition which causes this measurement data to be updated. Where it is not possible to give a precise condition, then the conditional circumstances leading to the update is stated.

d) Measurement Result (measured value(s), Units)

A description of expected result value(s) (e.g. A single integer value).

e) Measurement Type

A short form of the measurement name specified in the header, which is used to identify the measurement type in the result files.

f) Measurement Object Instance

The “measObjInstId” field identifies the measured object class and its instance, e.g. trunk1 means object class is trunk and instance #1 is being measured.

g) Switching Technology

The Switching domain measurement is applicable to, i.e. Circuit Switched and / or Packet Switched.

C.1 Measurements related to The RNC

It should be investigated whether GSM BSC measurements can be re-used.

C.2 Measurements related to the NodeB

It should be investigated whether GSM BTS measurements can be re-used.

C.3 Measurements related to the MSC

It is expected that GSM measurements can be re-used to a large extent.

C.4 Measurements related to the HLR

It is expected that GSM measurements can be re-used to a large extent, especially those added for GPRS.

C.5 Measurements related to the VLR

It is expected that GSM measurements can be re-used to a great extent.

C.6 Measurements related to the EIR

Check if there is a similar functionality in 3G networks, possibly re-use GSM measurements.

C.7 Measurements related to the SMS IWMSC/GMSC

It is expected that GSM measurements can be re-used to a great extent.

C.8 Measurements related to the SGSN

It is expected that GSM GPRS measurements can be fully re-used (more to be added?).

C.9 Measurements related to the GGSN

It is expected that GSM GPRS measurements can be fully re-used (more to be added?).

Annex D (informative): The table oriented file format structure

Measurement Items (counters) are typically grouped according functionality (cfr GSM 12.04 Measurement Function). We use the term "measured object class" to identify such a group. The file format is based on the fact that the measurements are always collected in sets of one functional group.

The measInfo contains the sequence of measurements, values and related information, in a table oriented structure. It includes a list of measurement types ("measTypes") and the corresponding values ("measValues"), together with the time stamp ("measTimeStamp") and granularity period ("granularityPeriod") pertaining to these measurements. Whenever one of these 4 elements changes, then a new measInfo sequence is started. If the "measTypes" change, then also the "measValues" change, because these elements are connected in the following way : the "measTypes" correspond to a specific measurement object (NE, trunk, cell, …), of which one or more instances can exist inside the NE. Hence for one set of "measTypes", there can be one or more sets of "measValues", according to the "measObjInstId".

The above is best explained with an example : consider the CELL measurement function (GSM 12.04). Then the measured object class is Cell. The measInfo contains a "header" line defining which measurements related to Cell are collected (measTypes), and in which order. The subsequent "data" lines will then contain the values of the measurements for each specific cell which is measured, one data line per cell (measValues).

This format will generate a kind of table with as column headings the measurement names, and in the rows the corresponding measurement values per measured instance.

D.1 Graphical representation of the table structure

For clarity, the table in the example below only contains the measTypes and measValues (and suspectFlag), not the granularityPeriod and the measTimeStamp.

	attTCHSeizures	**succTCHSeizures**	**attImmediateAssignProcs**	**succImmediateAssignProcs**	
cell=997	234	345	567	789	false
cell=998	890	901	123	234	false
cell=999	456	567	678	789	false

D.2 Example of ASN.1 Measurement Report File

For readability, a kind of pseudo ASN.1 was used in stead of the BER encoding..

```
MeasDataCollection ::= {
    measFileHeader    {
        fileFormatVersion ::= 1,
        senderName ::= "System=UTRANNetwork,RNC=123" ,
        senderType  ::= "RNC",
        vendorName  ::= "Telecom corp.",
        collectionBeginTime  ::= 20000301140000
        },
    measData   {
        nEId {
            nEUserName  ::= "RNC Telecomville",
            nEDistinguishedName  ::= "System=UTRANNetwork,RNC=123"
        },
        measInfo {
            measTimeStamp ::= 20000301141430,
            granularityPeriod ::= 900,
            measTypes  {
```

```
                    "attTCHSeizures", "succTCHSeizures", "attImmediateAssignProcs", "succImmediateAssignProcs"
                    },
        measValues {
            {
                        measObjInstId ::= "Cell=997",
                        measResults { iValue ::= 234, iValue ::= 345, iValue ::= 567, iValue ::= 789},
                        suspectFlag ::= FALSE
                    },
            {
                        measObjInstId ::= "Cell=998",
                        measResults { iValue ::= 890, iValue ::= 901, iValue ::= 123, iValue ::= 234},
                        suspectFlag ::= FALSE
                    },
            {
                        measObjInstId ::= "Cell=999",
                        measResults { iValue ::= 456, iValue ::= 567, iValue ::= 678, iValue ::= 789},
                        suspectFlag ::= FALSE
                    }
                }
        }
    },
    measFileFooter ::= 20000301141500
}
```

D.3 Example of XML Measurement Report File

```
<?xml version="1.0"?>
<?xml-stylesheet type="text/xsl" href="MeasDataCollection.xsl" ?>
<!DOCTYPE MeasDataCollection SYSTEM "MeasDataCollection.dtd" >
<mdc xmlns:HTML="http://www.w3.org/TR/REC-xml">
<mfh>
<ffv>1</ffv>
<sn>System=UTRANNetwork,RNC=123</sn>
<st>RNC</st>
<vn>Telecom corp.</vn>
<cbt>20000301140000</cbt>
</mfh>
<md>
<neid>
<neun>RNC Telecomville</neun>
<nedn>System=UTRANNetwork,RNC=123</nedn>
</neid>
<mi>
<mts>20000301141430</mts>
<gp>900</gp>
<mt>attTCHSeizures</mt>
<mt>succTCHSeizures </mt>
<mt>attImmediateAssignProcs</mt>
<mt>succImmediateAssignProcs</mt>
<mv>
<moid>Cell=997</moid>
<r>234</r>
<r>345</r>
<r>567</r>
<r>789</r>
<sf>FALSE</sf>
</mv>
<mv>
<moid>Cell=998</moid>
<r>890</r>
<r>901</r>
<r>123</r>
<r>234</r>
<sf>FALSE</sf>
</mv>
<mv>
<moid>Cell=999</moid>
```

```
<r>456</r>
<r>567</r>
<r>678</r>
<r>789</r>
<sf>FALSE</sf>
</mv>
</mi>
</md>
<mff>20000301141500</mff>
</mdc >
```

Annex E (informative): Change history

This annex lists all change requests approved for this document since the specification was first approved by 3GPP TSG-SA.

Change history					
TSG SA#	Version	CR	Tdoc SA	New Version	Subject/Comment
S_06	-	-	SP-99579	3.0.0	Approved at TSG SA #6 and placed under Change Control
S_07	3.0.0	001	SP-000016	3.1.0	Reduction of measurement job advance period
S_07	3.0.0	002	SP-000016	3.1.0	PM file format - ASN.1 description
Mar 2000	3.1.0			3.1.1	Cosmetic
S_08	3.1.1	003	SP-000231	3.2.0	Measurement definition template
S_08	3.1.1	004	SP-000232	3.2.0	Inclusion of XML file format definition
S_08	3.1.1	005	SP-000233	3.2.0	Example of XML file format for PM result files
S_08	3.1.1	006	SP-000234	3.2.0	Addition of missing abbreviations