



**The ATM Forum
Technical Committee
Network Management**

**ATM Performance
Management Bulk
Data File Structure**

AF-NM-0194.000

April, 2003

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1. Introduction

This specification defines a structure for ATM bulk file performance monitoring statistics that is aligned with the ITU-T Q.822.1 [1] file structure. The generation of PM bulk data files provides an alternative to the bulk retrieval methods currently defined within the CORBA MIB (af-nm-0166.000 [2] and af-nm-0185.000 [3]), as the performance monitoring data is stored in files rather than transported over CORBA. The PM bulk file is independent of the network management protocol used by an NMS, EMS or NE. It is expected that the PM bulk data file will be generated via a network management request, as in the CORBA MIB, or automatically. The performance monitoring data files may be retrieved by an NMS using a separate bulk file transfer mechanism (e.g., FTP).

2. Approach

The M4 CORBA MIB and Q.822.1 provide mechanisms to support requests for generating bulk performance monitoring information directly to bulk data files. Once generated, these bulk data files may be retrieved from the agent by the manager outside the CORBA interface (or CMIP or SNMP interface) using a bulk file transfer mechanism, such as FTP. Q.822.1 Annex A defines a bulk file that may be used to for ATM performance data. This specification defines conventions for applying the Q.822.1 file format to ATM. This approach is extensible and allows the counters supported in each data set to be identified within the bulk PM data file.

3. ITU-T Q.822.1 Performance Data File Structure

The following is extracted from Annex A of ITU-T Q.822.1

3.1 Text File Format BNF

The BNF in this annex defines the format of performance measurement data file, named "q822d1FileText".

```

<File> := #file <FD> <FileType> <Newline>
        <Nodes> #endfile <Newline>

<FileType> := <FileFormat> <FD> <FormatVersion> <FD> <ModelParadigm>

<FileFormat> := <String>

<FormatVersion> := <String>

<ModelParadigm> := <String>

<Nodes> := <Node> <Nodes>
        | <Node>

<Node> := #node <FD> <NodeID> <FD> <MeasuredObjectIDPrefix> <Newline>
        <Tables> #endnode <Newline>

<NodeID> := <String>

<MeasuredObjectIDPrefix> := <ID>
        | <Empty>

<Tables> := <MeasuredObjectIDAliases> <Table> <Tables>

```

```

| <MeasuredObjectIDAliases> <Table>

<MeasuredObjectIDAliases> := <MeasuredObjectIDAlias> <MeasuredObjectIDAliases>
| <MeasuredObjectIDAlias>
| <Empty>

<MeasuredObjectIDAlias> := #idalias <FD> <ShortID> <FD> <LongID> <Newline>

<ShortID> := <ID>

<LongID> := <ID>

<Table> := #table <FD> <Header> <RecordGroups> #endtable <Newline>

<Header> := #header <FD> <MeasuredObjectType> <FD> <GranularityPeriod>
<Newline> <DataSetTypes> #endheader <Newline>

<MeasuredObjectType> := <String>

<GranularityPeriod> := <TimePeriodValue>

<DataSetTypes> := <DataSetType> <DataSetTypes>
| <DataSetType>

<DataSetType> := #dataset <FD> <DataSetTypeName> <FD> <DataSetTypeIndex>
<Newline> suspect <FD> <ParameterTypes> <Newline>
#enddataset <Newline>

<DataSetTypeName> := <String>

<DataSetTypeIndex> := <IntegerString>

<ParameterTypes> := <ParameterType> <ParameterTypes>
| <ParameterType>

<ParameterType> := <String> <FieldSeparator>

<RecordGroups> := <RecordGroup> <RecordGroups>
| <RecordGroup>

<RecordGroup> := #period <FD> <PeriodEndTime> <Newline>
<Records> #endperiod <NewLine>

<PeriodEndTime> := <TimeValue>

<Records> := <Record> <Records>
| <Record>

<Record> := <MeasuredObjectID> <FD> <DataSetValues> <Newline>

<MeasuredObjectID> := <ID> // can be aliased and prefixed

<DataSetValues> := <DataSetValue> <DataSetValues>
| <DataSetValue>

<DataSetValue> := <DataSetTypeIndex> <FD> <Suspect> <FD> <ParameterValues>
<Newline>

<Suspect> := <BooleanValue>

<ParameterValues> := <ParameterValue> <ParameterValues>
| <ParameterValue>

```

```

<ParameterValue> := <Value> <FD>

<Value> := <CounterValue>
| <GaugeValue>
| <TidemarkValue>
| <BooleanValue>
| <EnumValue>
| <TimeValue>
| <TimePeriodValue>

<FD> := : // field delimiter

<EscapeCharacter> := \

<Newline> := '\n' // line delimiter

<ID> := <String>

<CounterValue> := <IntegerString>

<GaugeValue> := <FloatString>

<TidemarkValue> := <FloatString>

<BooleanValue> := <BooleanString>

<EnumValue> := <IntegerString>

<TimeValue> := <String> // UTC in format "YYYYMMDDHHMMSS.fffZ"

<TimePeriodValue> := <IntegerString> <TimePeriodType>

<BooleanString> := T | F // true or false

<TimePeriodType> := days | hours | minutes | seconds

<String> := {ISO 8859-1(Latin-1) characters}

<IntegerString> := <IntegerString> <Digit>
| <Digit>

<Digit> := 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0

<FloatString> := <Mantissa> | <Mantissa> <Exponent>

<Mantissa> := <IntegerString> | <IntegerString> . | . <IntegerString>
| <IntegerString> . <IntegerString>

<Exponent> := <Exp> <Sign> <IntegerString>

<Sign> := + | -

<Exp> := E | e

```

Notes:

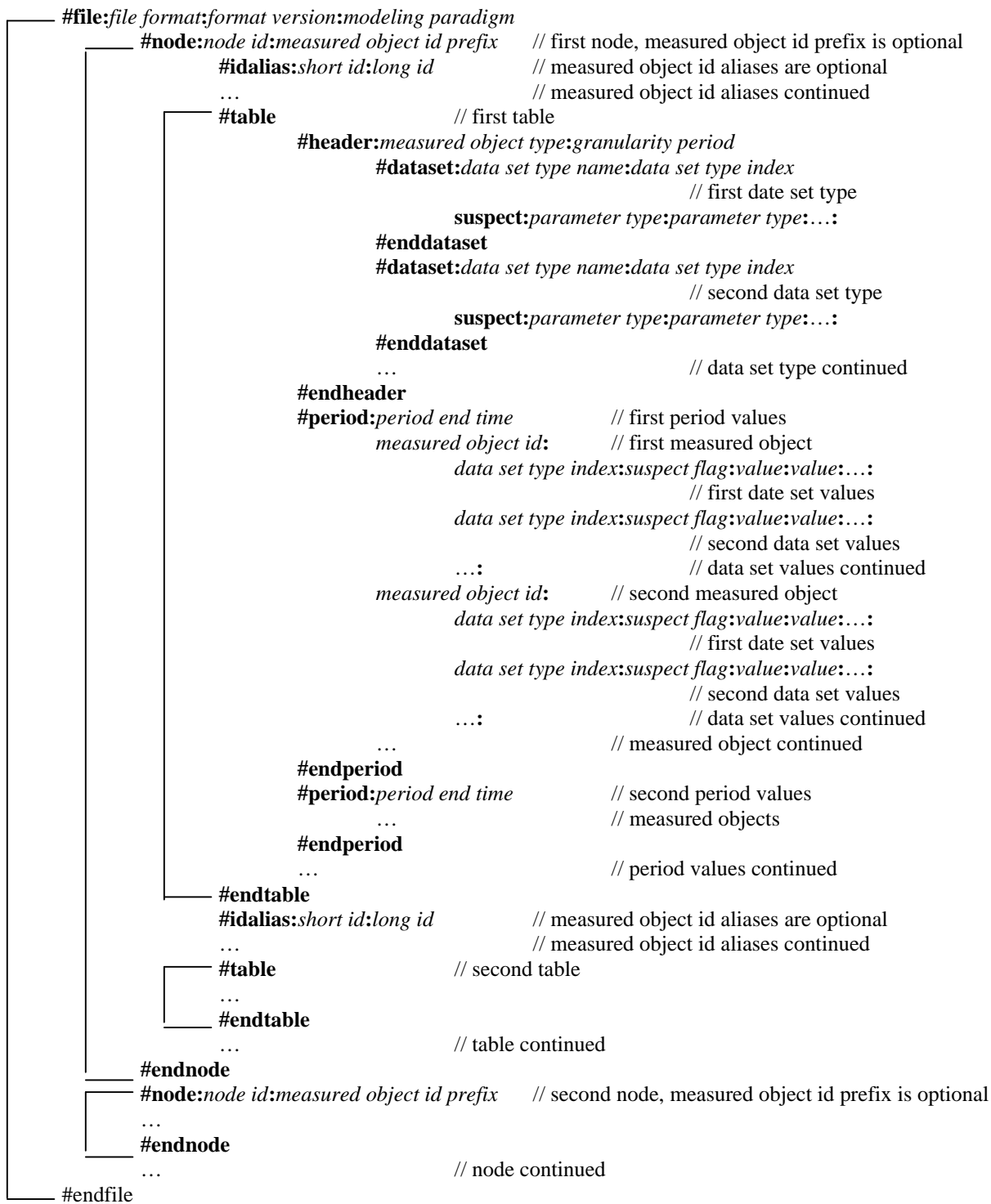
1. White space in the file is meaningless. File generator shall not put white space into the file. File parser shall skip and ignore any white space encountered in the file.
2. A backward compatible file parser shall skip and ignore any data between unknown #<tag> and #end<tag>.
3. Extension to this file format shall require new #<tag> definitions.

3.2 Text File Format Description

The history data are contained in a performance measurement file. The file consists of a file type definition and a set of measurement data. The order of the data is insignificant. There shall be at least one set of data in the file. Otherwise, the file shall not be created.

The performance measurement file shall follow these rules for file generating. (See the figure below which depicts the file structure):

1. The file type is defined by its file format, format version, and modeling paradigm. FileFormat indicates which file format this file follows. FormatVersion specifies a version of particular file format. The value for FileFormat of this recommendation is "q822d1FileText", and FormatVersion is "version1".
2. The modeling paradigm is modeling paradigm of management system that generates the file. If the file is generated from a CORBA management system compliant with ITU-T CORBA framework, the value for ModelParadigm shall be "ITUTCORBA". Otherwise, an appropriate value shall be provided, for instance, "CMIP", "SNMP", "TL1", "abcCORBA", etc.
3. The performance management specification for a specific information modeling domain shall specify the semantics and naming convention of ModelParadigm, NodeID, MeasuredObjectType, DataSetTypeName, ParameterType, ID, MeasuredObjectIDPrefix, MeasuredObjectID.
4. MeasuredObjectIDPrefix defines the common prefix for MeasuredObjectID in a node section.
5. MeasuredObjectIDAlias defines the short alias MeasuredObjectID for long FDN MeasuredObjectID. The scope of an alias definition extends to end of file unless re-defined by another MeasuredObjectIDAlias.
6. DataSetTypeIndex of a DataSetValue indicates the corresponding data set type as defined in the table header.
7. All the measurement data within a table have same granularity period and represent measurements for the same measured object type.
8. If there is no data for a particular period, the file shall still contain #period and #endperiod with empty information for that period.



Q.822.1 Figure 1. Illustration of PM File Format

4. ATM PM Bulk Data Conventions

4.1 Information Model Paradigm Name (*ModelParadigm*)

The information model paradigm name is a string value included in the header section of a bulk performance data file. The information model paradigm name sets the context for the constant values (data set types and performance parameter types) used in the bulk performance data file.

*R-BULK-CONV-1 For bulk performance data files subscribing to the ATM Forum's conventions the information model paradigm (*ModelParadigm*) name in the header section shall be set to "atmf_pm_v1".*

4.2 Data Set Types

The performance data set represents a grouping of ATM performance counters that are commonly gathered together. For ATM, performance data sets include: cell protocol monitoring, traffic load, congestion discards, TC adaptor protocol monitoring, UPC/NPC disagreements, and PM OAM cell monitoring.

Within a bulk performance data file, data sets are identified by a data set name (*DataSetTypeName*) and a corresponding integer identifier or index (*DataSetTypeIndex*). For ATM performance data, the each performance data set will be assigned a short text name and an integer identifier.

R-BULK-CONV-2 For bulk performance data files subscribing to the ATM Forum's conventions the individual data sets shall use the assigned **data set type name** and **data set type index**:

Performance Data Set Description	DataSetTypeName	DataSetType Index
Cell Protocol Monitoring Performance Data	"CellProtocolMonCD"	1
Traffic Load Performance Data	"AtmTrafficLoadCD"	2
Congestion Discards Performance Data	"CongDiscardCD"	3
TC Adaptor Protocol Monitoring Performance Data	"TcAdaptProtMonCD"	4
UPC and NPC Disagreements Performance Data	"UpcNpcDisagreementsCD"	5
PM OAM Cell Performance Data Monitoring	"PmOamCD"	6
Generic Transport Performance Data	"GenericTransportPmCD"	7

4.3 Measured Object Types

The measured object type describes the class or type of the containing entity relative to the performance data represented in a table. For ATM, measured object types include: VP Connection Termination Point, VC Connection Termination Point, VP Trail Termination Point, VC Trail Termination Point, VP Link End, VC Link End, VP Subnetwork, and VC Subnetwork.

Within a bulk performance data file, measured object types are represented in the table header by a string (MeasuredObjectType). For ATM performance data, the each measured object type is assigned a short text name.

R-BULK-CONV-3 For bulk performance data files subscribing to the ATM Forum's conventions the table header shall use the following **measured object types** to describe the type of containing entity for the performance data in the table.

Container Entity Description	MeasuredObjectType
ATM Line End Phy	"lePhy"
Physical Transport TTP	"phyTTP"
VP Connection Termination Point	"vpCTP"
VC Connection Termination Point	"vcCTP"
VP Trail Termination Point	"vpTTP"
VC Trail Termination Point	"vcTTP"
VP Link End	"vpLE"
VC Link End	"vcLE"
VP Subnetwork	"vpSN"
VC Subnetwork	"vcSN"

4.4 Parameter Types

The parameter types describe the individual types of measurements that may be members of a specific performance data set. For example, unavailable seconds.

Within a bulk performance data file, parameter types are represented in the data set description by a string (ParameterType). For ATM performance data, the each parameter type is assigned a short text name.

R-BULK-CONV-4 For bulk performance data files subscribing to the ATM Forum's conventions each parameter type within the data set description shall use one of the following strings to represent the **parameter type**.

Parameter Type Description	ParameterType
Count of cells discarded due to protocol errors	"numberDiscCellsProtErr"
Count of the number of received OAM Cells	"numberRecvOAMCells"
Number of cells received	"numberCellsRecvd"
Number of cells transmitted	"numberCellsTrnsd"
Count of cells discarded due to congestion	"numberCellsDiscCong"
Count of high priority cells discarded due to congestion	"numberCLP0CellsDisc"
Count of cells discarded due to HEC Violations	"numberDiscCellsHECViolat"
Number of cells discarded due to policing (UPC/NPC)	"numberDiscardUpcNpcCells"
Number of cells marked by UPC/NPC that are passed	"numberSuccessfullyPassedUpcNpcCells"
Number of CLP=0 cells discarded due to policing	"numberDiscardCLP0UpcNpcCells"
Number of CLP=0 cells marked by UPC/NPC that are passed	"numberSuccessfullyPassedCLP0UpcNpcCells"
Number of lost cells measured by PM OAM	"numberPmOamLostCells"
Number of misinserted cells measured by PM OAM	"numberPmOamMisinsertedCells"
Number of user cells measured by PM OAM	"numberPmOamUserCells"
Number of Far-End Lost cells measured by PM OAM	"numberPmOamFarEndLostCells"
Number of Far End Misinserted cells measured by PM OAM	"numberPmOamFarEndMisinsertedCells"
Number of Far End User cells measured by PM OAM	"numberPmOamFarEndUserCells"
The codingViolationsPath parameter is used	"codingViolationsPath"

as a count of certain error events occurring in the accumulation period. Sample error events include Frame Synchronization and CRC errors for DS1 links, or P-bit and CP-bit parity errors for DS3 links.	
The erroredSecondsPath parameter is a count of 1-second intervals containing path errors. Sample path errors include CRC-6 errors (DS1), Severely-Errored Frame defects (DS1/DS3), and P-bit Parity errors (DS3).	“erroredSecondsPath”
The severelyErroredSecondspath parameter is a count of 1-second intervals with X or more path eooor events, or one or more Loss of Signal defect.	“severelyErroredSecondsPath”
The unavailableSecondsPath parameter is a count of 1-second intervals during which the path is unavailable.	“unavailableSecondsPath”
Count of path failure events	“failureCounterPath”
Count of far end path coding violations	“farEndCodingViolationsPath”
Count of far end errored seconds on the path	“farEndErroredSecondsPath”
Count of far end severely errored seconds on the path	“farEndSeverelyErroredSecondsPath”
Count of far end unavailable secons on the path	“farEndUnavailableSecondsPath”
Count of far end path failure events	“farEndFailureCounterPath”
The codingViolationsLine parameter is count of certain error events occurring in the accumulation period. Sample error events include Bipolar Violations (BPVs) and Excessive Zeros (EXZs) occurring over a DS1/Ds3 link.	“codingViolationsLine”
A erroredSecondsLine is a count of 1-second intervals in which one or more Line Coding Violation error events were detected	“erroredSecondsLine”
severelyErroredSecondsLine is a count of 1-second intervals with X or more BPVs plus EXZs, or one or more Loss of Signal defect.	“severelyErroredSecondsLine”
The lossOfSignalLine parameter is a count of 1-second intervals containing one or more Loss of Signal defects.	“lossOfSignalLine”

Count of line failure events	“failureCounterLine”
Count of far end coding violations on the line	“farEndCodingViolationsLine”
Count of far end errored seconds on the line	“farEndErroredSecondsLine”
Count of far end severely errored seconds on the line	“farEndSeverelyErroredSecondsLine”
Count of far end loss of signal on the line	“farEndlossOfSignalLine”
Count of far end line failure events	“farEndFailureCounterLine”
The codingViolationsSection parameter is coding violation error events occurring in the accumulation period.	“codingViolationsSection”
A erroredSecondsSection is a count of 1-second intervals in which one or more Section Coding Violation error events were detected	“erroredSecondsSection”
severelyErroredSecondsSection is a count of 1-second intervals with severe defects	“severelyErroredSecondsSection”
The lossOfSignalSection parameter is a count of 1-second intervals containing one or more Loss of Signal defects.	“lossOfSignalSection”
Count of Section failure events	“failureCounterSection”
Count of far end coding violations on the Section	“farEndCodingViolationsSection”
Count of far end errored seconds on the Section	“farEndErroredSecondsSection”
Count of far end severely errored seconds on the Section	“farEndSeverelyErroredSecondsSection”
Count of far end loss of signal on the Section	“farEndlossOfSignalSection”
Count of far end Section failure events	“farEndFailureCounterSection”

4.5 Performance Data Set and Parameter Types Relationship

The parameter types describe the individual types of measurements that may be members of a specific performance data set. The following requirement describes the relationship between performance data sets and parameter types.

R-BULK-CONV-5 For bulk performance data files subscribing to the ATM Forum's conventions each performance data set shall provide support for the corresponding parameter types identified in the table below.

DataSetTypeName	Member ParameterTypes
"CellProtocolMonCD" (Data Set Type = 1)	"numberDiscCellsProtErr"
	"numberRecvOAMCells"
"AtmTrafficLoadCD" (Data Set Type = 2)	"numberCellsRecvd"
	"numberCellsTrnsd"
"CongDiscardCD" (Data Set Type = 3)	"numberCellsDiscCong"
	"numberCLP0CellsDisc"
"TcAdaptProtMonCD" (Data Set Type = 4)	"numberDiscCellsHECViolat"
"UpcNpcDisagreementsCD" (Data Set Type = 5)	"numberDiscardUpcNpcCells"
	"numberSuccessfullyPassedUpcNpcCells"
	"numberDiscardCLP0UpcNpcCells"
	"numberSuccessfullyPassedCLP0UpcNpcCells"
"PmOamCD" (Data Set Type = 6)	"numberPmOamLostCells"
	"numberPmOamMisinsertedCells"
	"numberPmOamUserCells"
	"numberPmOamFarEndLostCells"
	"numberPmOamFarEndMisinsertedCells"
	"numberPmOamFarEndUserCells"
"GenericTransportPmCD" (Data Set Type = 7)	"codingViolationsPath"
	"erroredSecondsPath"
	"severelyErroredSecondsPath"
	"unavailableSecondsPath"
	"failureCounterPath"
	"farEndCodingViolationsPath"

	“farEndErroredSecondsPath”
	“farEndSeverelyErroredSecondsPath”
	“farEndUnavailableSecondsPath”
	“farEndFailureCounterPath”
	“codingViolationsLine”
	“erroredSecondsLine”
	“severelyErroredSecondsLine”
	“lossOfSignalLine”
	“failureCounterLine”
	“farEndCodingViolationsLine”
	“farEndErroredSecondsLine”
	“farEndSeverelyErroredSecondsLine”
	“farEndlossOfSignalLine”
	“farEndFailureCounterLine”
	“codingViolationsSection”
	“erroredSecondsSection”
	“severelyErroredSecondsSection”
	“lossOfSignalSection”
	“failureCounterSection”
	“farEndCodingViolationsSection”
	“farEndErroredSecondsSection”
	“farEndSeverelyErroredSecondsSection”
	“farEndlossOfSignalSection”
	“farEndFailureCounterSection”

5. ATM Specific Bulk PM Data File Example

The following is an example of a simple instance of a PM bulk data file following the proposed ATM Forum Conventions.

```

#file: q822d1FileText: version1:atmf_pm_v1
#node:BLTMM018BB1:node1 // first node, measured object id prefix is optional
#table // first table
#header: vpLE:15 minutes
#dataset: CellProtocolMonCurrentData:1
#suspect: numberDiscCellsProtErr: numberRecvOAMCells:
#enddataset
#dataset: AtmTrafficLoadCurrentData:2
#suspect: numberCellsRecvd: numberCellsTrnsd:
#enddataset
#dataset: CongDiscardCurrentData:3
#suspect: numberCellsDiscCong: numberCLPOCellsDisc:
#enddataset

#endheader
#period: 20010723091500.000Z // first period values
ManagedElementId=Node1*Bay=B*Shelf=C*CircuitPack=D*Port=E:
// first measured object
1:F: 3:20: // first data set values
2:F:34258:51273: // second data set values
3:F: 9: 2: // third data set values

ManagedElementId=Node1*Bay=B*Shelf=C*CircuitPack=D*Port=G
// second measured object
1:F: 0:25: // first data set values
2:F:42558:75273: // second data set values
3:F: 4: 0: // third data set values
... // measured object continued
#endperiod
#endtable
#endnode
#endfile

```

6. References

- [1] ITU-T, SG4, RECOMMENDATION Q.822.1, "CORBA-based TMN Performance Management Service", October 2001.
- [2] The ATM Forum (ATMF), "M4 Network View CORBA Specification", ATMF Specification: AF-NM-0166.000, August 2001.
- [3] The ATM Forum (ATMF), "CORBA Specification version 2 for M4 Interface: Network View", ATMF Specification: AF-NM-0185.000, August 2002.