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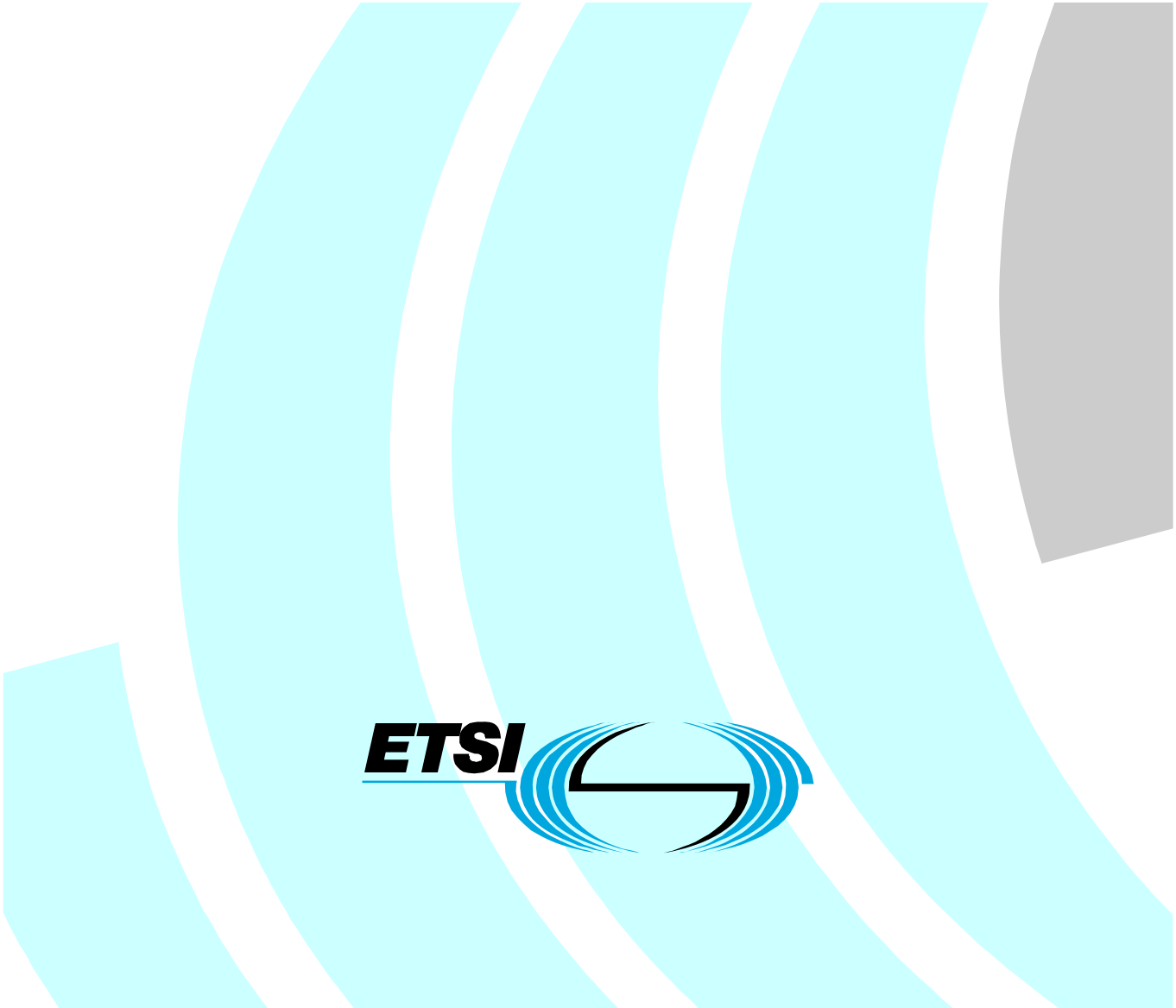
Technical Specification

Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia (BSM); Part 2: Performance Management Information Base



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ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
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Contents

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Satellite Earth Stations and Systems (SES).

The present document is part 2 of a multi-part deliverable covering Performance Management aspects in "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia (BSM)", as identified below:

Part 1: "Performance Management at the SI-SAP";

Part 2: "Performance Management Information Base".

Introduction

The ETSI BSM Technical Reports [i.1], [i.2] and [i.3] outlined the general requirements for performance. Technical Specifications [1], [2] and [3] have subsequently defined the BSM Management Functional Architecture, the BSM Performance Parameters and Performance Management respectively.

As a result of these documents, the focus of the present document is on the definition of a set of performance-related managed objects that can be used to manage a BSM sub-network.

1 Scope

The present document defines the requirements for management interfaces relating to Performance Management in BSM networks, by providing an overview and guidelines for deriving a formal set of parameters (or managed objects) for one or more databases or MIB modules. These requirements are based on the concepts defined in [3].

These parameters may be applied to one or more SNMP MIBs, for example.

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

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2.1 Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

[1] ETSI TS 102 672: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia (BSM); Management Functional Architecture".

[2] ETSI TS 102 673: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia (BSM); Performance Parameters".

[3] ETSI TS 102 675-1: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia (BSM); Performance Management at the SI-SAP".

[4] IETF RFC 2578: "Structure of Management Information Version 2 (SMIv2)".

[5] IETF RFC 2579: "Textual Conventions for SMIv2".

[6] IETF RFC 2213: "Integrated Services Management Information Base using SMIv2".

2.2 Informative references

The following referenced documents are not essential to the use of the present document but they assist the user with regard to a particular subject area. For non-specific references, the latest version of the referenced document (including any amendments) applies.

[i.1] ETSI TR 101 984: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia (BSM); Services and architectures".

[i.2] ETSI TR 101 985: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia; IP over Satellite".

[i.3] ETSI TR 102 157: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia; IP Interworking over satellite; Performance, Availability and Quality of Service".

[i.4] ITU-T Recommendation M.3400: "TMN management functions".

[i.5] IETF RFC 4181: "Guidelines for Authors and Reviewers of MIB Documents".

[i.6] SatLabs System Recommendations Part 3 - Management & Control Planes Specifications v2.

[i.7] ITU-T Recommendation Y.1540: "Internet protocol data communication service - IP Packet Transfer and Availability Performance Parameters", November 2007.

NOTE: Former ITU-T Recommendation I.380.

[i.8] IETF RFC 3444: "On the Difference between Information Models and Data Models".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

control plane: the control plane has a layered structure and performs the call control and connection control functions; it deals with the signalling necessary to set up, supervise and release calls and connections

data model: description of a specific data structure, with the way the data elements (in the structure) are defined and the relationship to each other

NOTE: It is normally used in software engineering to describe how data is represented and accessed (see also RFC 3444 [i.8]).

information model: formal representation of real-world objects and concepts, with associated relationships, constraints, rules, and operations, used to specify semantics in a given domain

NOTE: It includes things of interest (entities), relationships between these entities (associations), and details/characteristics of these entities (attributes). An information model provides formalism to the description of a problem domain without constraining how that description is mapped to an actual implementation in software. The possible mappings of the information model are the data models (see also RFC 3444 [i.8]).

management plane: this provides two types of functions, namely layer management and plane management functions:

- **plane Management functions:** performs management functions related to a system as a whole and provides co-ordination between all the planes

NOTE: Plane management has no layered structure.

- **layer Management functions:** performs management functions (e.g. meta-signalling) relating to resources and parameters residing in its protocol entities

NOTE: Layer Management handles the Operation And Maintenance (OAM) of information flows specific to the layer concerned.

Management Information Base (MIB): virtual information store containing managed objects

NOTE: Objects in the MIB (identified by their OIDs) are essentially variables, and are defined using the mechanisms defined in the SMI [4], typically using Abstract Syntax Notation One format (ASN.1).

network control centre: equipment at OSI Layer 2 that controls the access of terminals to a satellite network, including element management and resource management functionality

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

BNMS	BSM Network Management System
B-NMS	BSM Network Management System
BSM	Broadband Satellite Multimedia
IP	Internet Protocol
IPFIX	IP Flow Information Export
ITU	International Telecommunications Union
MIB	Management Information Base
NMC	Network Management Centre
OAM	Operation And Maintenance
OID	Object Identification
OSI	Open Standards Institute
QID	Queue Identifier
QoS	Quality of Service
RFC	Request For Comments
RMON	Remote Network Monitoring
SI-SAP	Satellite Independent-Service Access Point
SLA	Service Level Agreement
SMIv2	Structure of Management Information version 2
SNMP	Simple Network Management Protocol
ST	Satellite Terminal

4 Background

BSM performance parameters have been defined in [2] and these are used as the basis for the database objects defined in the present document. The performance parameters identified in [2] need to be calculated, in some cases, from QID elementary attributes, as it was described in [3].

The location of BSM databases and the way in which they may be accessed is described in [1] and [3]. Figure 1 shows the overall management architecture.

A database (MIB) in the ST stores parameter values as objects. Typically the BNMS would use SNMPv2c commands to obtain the parameter values from the ST MIB. An SNMP agent in the ST responds to commands from an SNMP client in the BNMS.

The ST MIB should support local management (through typically a user Ethernet interface) and remote management via the satellite.

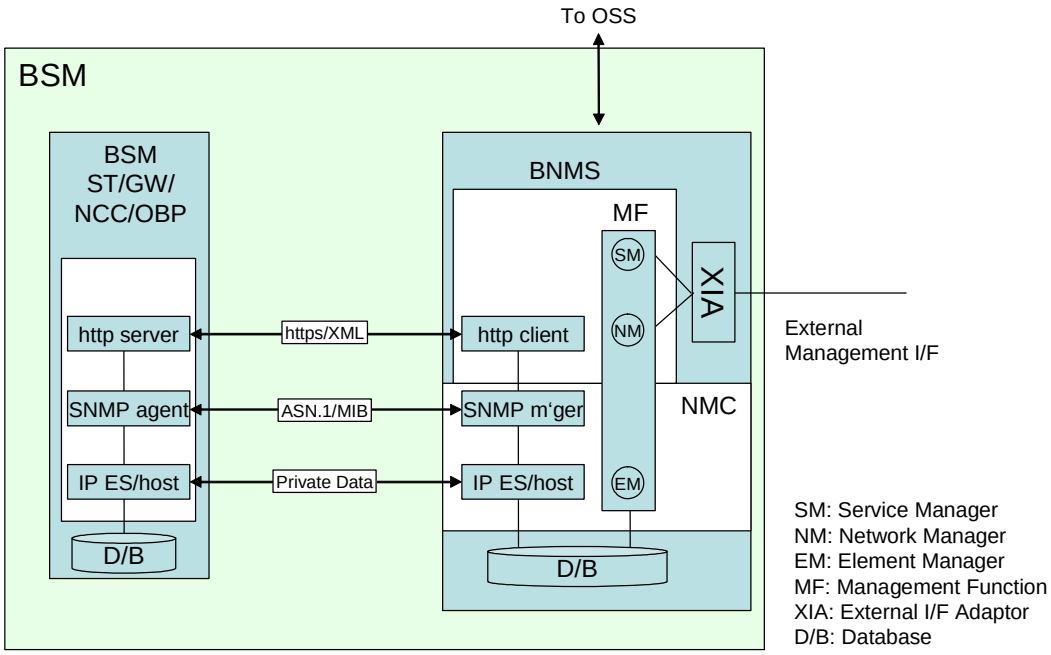

Figure 1: BSM Management Functional Architecture

A BSM Performance database (e.g. one or more MIBs) will allow:

1) Performance of individual STs to be monitored by accessing their MIBs.

2) Performance of the BSM from end-to-end to be monitored by accessing MIB parameters available in a central location such as the B-NMS (BSM Network Management System), and for these BSM performance MIB objects to be made available to other systems.

The QID elementary attributes and the BSM performance parameters are further described below.

4.1 QID elementary attributes

These are very basic QID attributes (such as packet counters and queue lengths) which can be used in practice to compute the QID-level and SI-SAP-level parameters, as described in [3].

4.2 QID-level Parameters (at an ST)

These are the basic parameters which are related to the virtual queues at an SI-SAP, and can be extracted directly from measurements thereon or used to control them. Some of these parameters can be measured directly, some of them can be derived from more elementary QID attributes (described above).

4.3 SI-SAP-level Performance parameters (at an ST)

These are parameters referring to the complete interface. Some of them need to be extracted from local measurements, some of them may be derived locally or remotely form the QID-level parameters.

4.4 IP-level Performance parameters (BSM-wide)

The BNMS may also create a database for access by other or higher level systems. This database contains end-to-end performance parameters derived from ST measurement parameters. These are termed IP performance parameters below.

The way in which these end-to-end BSM parameters may be measured and calculated is described in [3] and for example, could use IPFIX or RMON protocols.

5 BSM MIB Definition

5.1 MIB Structure and groups

The MIB-II [3] definition is taken as the basis for a BSM MIB.

For BSM, two different MIB modules could be considered for location of the OIDs:

- A private MIB module (under iso.org.dod.internet.private.enterprises branch).
- MIB-II standard "interfaces" module (under iso.org.dod.internet.mgnt.mib-2.interfaces branch).

In MIB-II the 'interfaces' group defines a generic set of managed objects such that any lower-layer network interface to IP can be managed in an interface-independent manner through these managed objects. The 'interfaces' group provides the means for additional managed objects specific to particular types of network interface (e.g. the BSM SISAP) to be defined as extensions to the ' interfaces' group for media-specific management.

At this stage in the BSM specification, a private MIB only is considered, but it should be capable of compatibility with an interface MIB module.

The location of the BSM vendor-specific MIB (vendor-specific RFC) within the MIB-II is shown diagrammatically as follows.

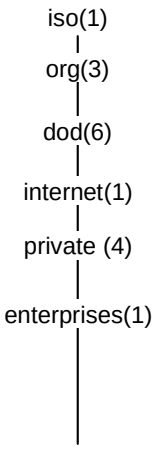

Figure 2: Private MIB location (OIDs in brackets)

Four sub-groups, system, interfaces and ifMIB, will be used to identify the BSM interface objects. New ifType labels will be defined for BSM interface.

The first sub-group is represented by the following QID elementary attributes (as explained in [3]):

- QID octets counter [*QidOctetsCounter*] (counter).
- QID packets counter [*QidPktsCounter*] (counter).
- QID queue length in packets [*QidQPktsLen*] (32 bit integer).
- QID queue length in bytes [*QidQOctetsLen*] (32 bit integer).
- Minimum-size IP packet transmitted [*QidMinPktSize*] (32 bit integer), measured as gauge in bytes of IP packet including header, this is needed to estimate the parameter *m* of the Traffic Pattern.
- Maximum-size IP packet transmitted [*QidMaxPktSize*] (32 bit integer), measured in bytes of IP packet including header, this is needed to estimate the parameter *M* of the Traffic Pattern.

The second and third sub-group relationships for BSM objects are shown diagrammatically in figure 3. The Entity Relationship Diagram below summarizes the BSM SI-SAP performance parameters both at SI-SAP and at QID level.

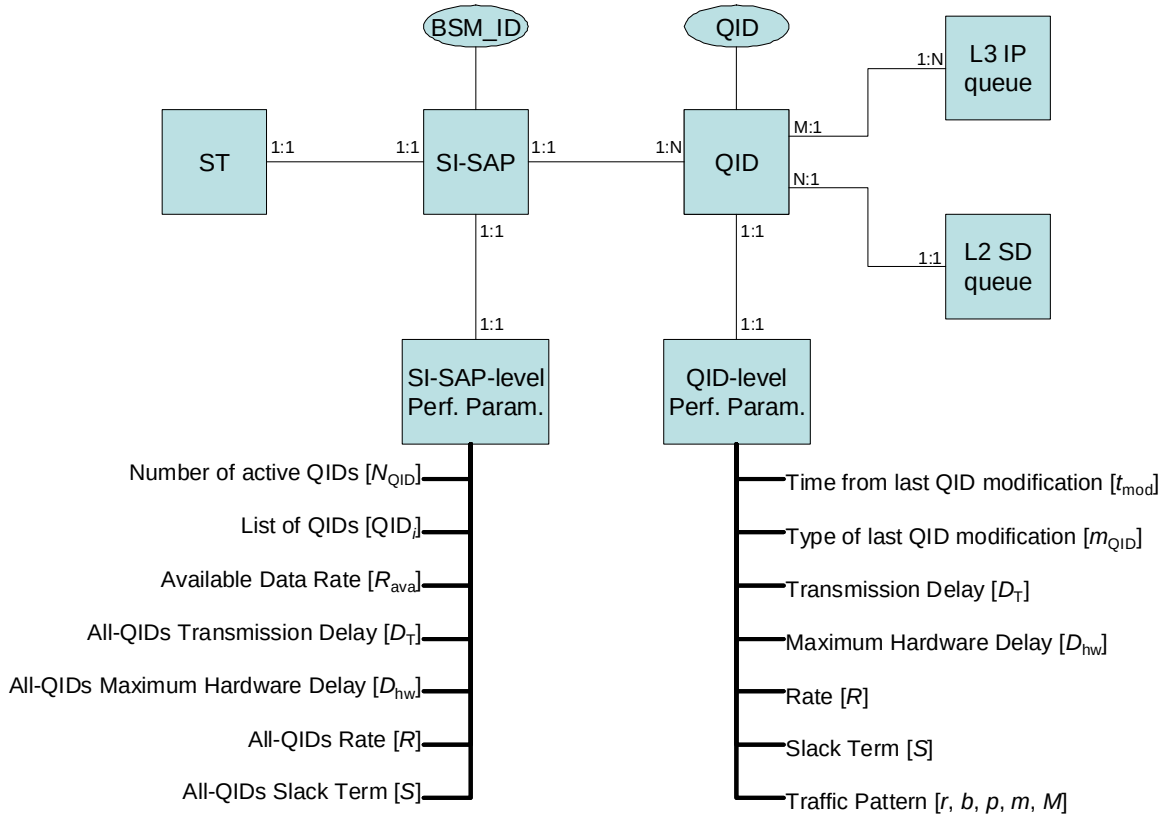

Figure 3: Entity Relationship Diagram for the BSM SI-SAP performance parameters in an ST

The last and highest-level sub-group is represented in figure 4.

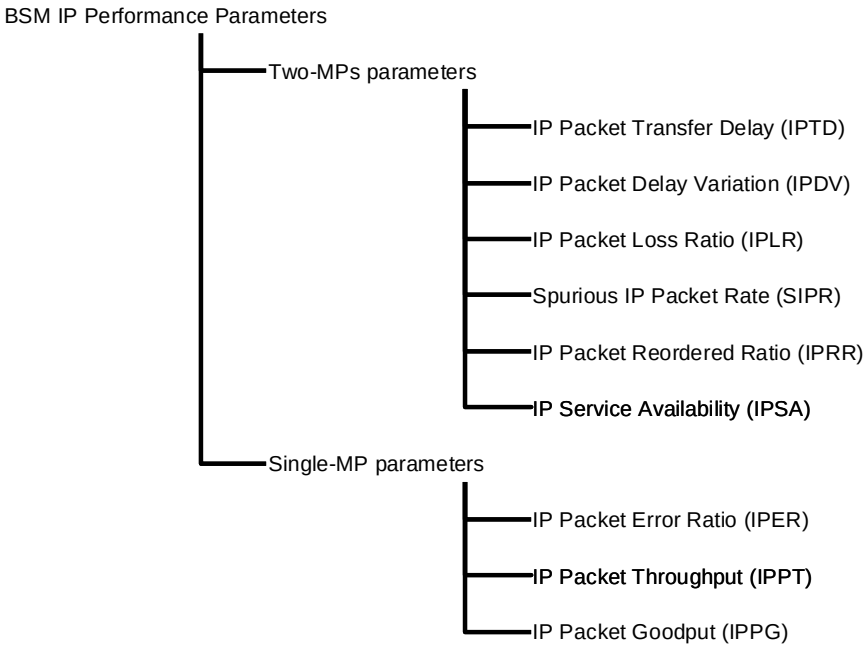

Figure 4: BSM IP performance parameters

5.2 Database parameters

The Parameters listed in this clause fall into four levels as indicated in clause 5.1 and are described separately:

1) QID elementary attributes;

2) QID-level Performance Parameters;

3) SI-SAP-level Performance Parameters;

4) BSM IP Performance Parameters.

For use in a formal MIB all variable names would need to be prefixed by a suitable prefix such as "BSMparam".

These parameter levels may be represented in up to four database (or MIB) modules (e.g. BSMparam1, BSMparam2, BSMparam3, BSMparam4).

5.2.1 QID Elementary Attributes

Table 1: QID Elementary Attributes

OID	Name	Syntax	Access	Description / Definition
1	QidOctetsCounter	Counter32	$R_{AIB}W_{IB}$	The total number of bytes of IP datagrams (including headers) which are transmitted from a given QID.
2	QidPktsCounter	Counter32	$R_{AIB}W_{IB}$	The total number of IP datagrams which are transmitted from a given QID.
3	QidQPktsLen	Gauge32	$R_{AIB}W_{IB}$	The maximum length of the output packet queue (in packets) identified by a given QID.
4	QidQOctetsLen	Gauge32	$R_{AIB}W_{IB}$	The maximum length of the output packet queue (in bytes) identified by a given QID.
5	QidMinPktSize	Unsigned32	$R_{AIB}W_{AIB}$	The length (in bytes, including header) of the minimum-size IP packet transmitted through a given QID. When resetting it should be set to the value $FFFFFFFF_{hex}$.
6	QidMaxPktSize	Unsigned32	$R_{AIB}W_{AIB}$	The length (in bytes, including header) of the maximum-size IP packet transmitted through a given QID. When resetting it should be set to 0_{hex}.

5.2.2 QID-level Performance Parameters

Table 2: QID-level Performance Parameters

OID	Name	Syntax	Access	Description / Definition
1	Qid	Unsigned32	$R_{AIB}W_{IB}$	24-bit queue identifier (QID) for the first active QID.
2	QidLastChanged	TimeTicks	$R_{AIB}W_{IB}$	The value of sysUpTime (in hundredths of a second, see [3]) at the time the QID entered its current operational state. If the current state was entered prior to the last re-initialization of the local network management subsystem, then this object contains a zero value.
3	QidLastModification	Enumerated	$R_{AIB}W_{IB}$	Last QID modification: 0_{hex}: undefined (information not available), 1_{hex}: creation (OPEN), 2_{hex}: modification (MODIFY), 3_{hex}: release (CLOSE).
4	QidTransDelay	Unsigned32	$R_{AIB}W_{IB}$	the next-hop transmission delay in "microseconds", i.e. the time needed to transmit 1 bit over the SI-SAP across the BSM system up to the egress ST; the value represents the propagation delay, and it does not include the IP queuing delay in the ingress ST.
5	QidHdwDelay	Gauge32	$R_{AIB}W_{IB}$	the maximum (worst case) deviation between the time a packet is selected for transmission over the SI-SAP and the time its transmission over the satellite air interface starts; it is measured in "microseconds".
6	QidRate	BitRate	$R_{AIB}W_{IB}$	the currently provided transmission rate at the SD layer; it is measured in bits of IP datagram per second.
7	QidSlackTerm	Unsigned32	$R_{AIB}W_{IB}$	the packet queuing delay associated with a QID, i.e. the time a packet spends in the ST at the outgoing satellite interface waiting for being selected for transmission, this includes all components such as buffering delay, delay due to header processing, delay due to competition with other traffic classes, etc.; it is measured in "microseconds".
8	QidTokenBucketRate	Unsigned32	$R_{AIB}W_{IB}$	Parameter *Token Bucket Rate* of a token bucket model; measured in bytes of IP datagram per second.
9	QidTokenBucketSize	Unsigned32	$R_{AIB}W_{IB}$	Parameter *Token Bucket Size* of a token bucket model; measured in bytes of IP datagram.
10	QidPeakDataRate	Unsigned32	$R_{AIB}W_{IB}$	Parameter *Peak Data Rate* of a token bucket model; measured in bytes of IP datagram per second.
11	QidMinPolicedUnit	Unsigned32	$R_{AIB}W_{IB}$	Parameter *Minimum Policed Unit* of a token bucket model; measured in bytes of IP datagram (including header).
12	QidMaxPacketSize	Unsigned32	$R_{AIB}W_{IB}$	Parameter *Maximum Packet Size* of a token bucket model; measured in bytes of IP datagram (including header).

5.2.3 SI-SAP-level Performance Parameters

Table 3: SI-SAP-level Performance Parameters

OID	Name	Syntax	Access	Description / Definition
1	Nqids	Unsigned32	$R_{AIB}W_{IB}$	the number of active QIDs in an ST
2	QidsList	VariablePointer	$R_{AIB}W_{IB}$	This is a list of *Nqids* pointers to *Nqids* QID tables; each QID table contains the QID-level parameters listed in clause 5.2.2, one table for each of the *Nqids* QIDs currently active at the ST (see example in figure 5).
3	AllQidsAvaRate	BitRate	$R_{AIB}W_{IB}$	satellite capacity available for resource allocation to a specific ST; measured in bits of IP datagram per second.
4	AllQidsTransDelay	Gauge32	$R_{AIB}W_{IB}$	Maximum (highest value) next-hop transmission delay (*QidTransDelay*) among all QIDs; it is measured in "microseconds".
5	AllQidsHdwDelay	Gauge32	$R_{AIB}W_{IB}$	Maximum (highest value) hardware delay (*QidHdwDelay*) among all QIDs; it is measured in "microseconds".
6	AllQidsRate	BitRate	$R_{AIB}W_{IB}$	the currently provided transmission rate over all QIDs (sum of the all *QidRate* values of all QIDs); it is measured in bits of IP datagram per second.
7	AllQidsSlackTerm	Gauge32	$R_{AIB}W_{IB}$	Maximum (highest value) Slack Term, i.e. highest packet queuing delay (*QidSlackTerm*) among all QIDs; it is measured in "microseconds".

Figure 5: Database Organization of SI-SAP-level and QID-level performance parameters (example)

5.2.4 BSM IP Performance Parameters

5.2.4.1 Two-MPs BSM IP Performance Parameters

The parameters in the following cannot be measured locally at the ST and thus should be stored at the PM server.

Table 4: Two-MPs BSM IP Performance Parameters

OID	Name	Syntax	Access	Description / Definition
1	Iptd	Unsigned32	$R_{AIB}W_{IB}$	transit time of a packet between the ingress and egress MP, i.e. normally between ingress und egress SI-SAP, or equivalently across a portion of the BSM network section; it is measured in "microseconds".
2	Ipdv	Unsigned32	$R_{AIB}W_{IB}$	delay jitter across the BSM network; it is measured in "microseconds".
3	Iplr	Unsigned32	$R_{AIB}W_{IB}$	ratio of total lost IP packet outcomes (namely packets which traverse an ingress MP, but not the corresponding egress one) to total transmitted IP packets; it is measured in -0,01 dB units.
4	Sipr	Unsigned32	$R_{AIB}W_{IB}$	Rate of packets which cross an egress MP, without having traversed the corresponding ingress MP; it is measured in packets per hour.
5	Iprr	Unsigned32	$R_{AIB}W_{IB}$	ratio of the total reordered packet outcomes to the total of successful IP packet transfer outcomes in a population of interest; it is measured in -0,01 dB units.
6	Ipsa	Unsigned32	$R_{AIB}W_{IB}$	See definition in [2]: the share of total scheduled IP service time (the percentage of time intervals) that is (are) categorized as available, i.e. for which the outage criterion is not satisfied; it is measured in 1 / (2^{32} - 1)units.

5.2.4.2 Single-MP BSM IP Performance Parameters

The parameters in the following can be measured locally at the ST and thus they may also be stored at the ST itself.

Table 5: One-MP BSM IP Performance Parameters

OID	Name	Syntax	Access	Description / Definition
1	Iper	Unsigned32	$R_{AIB}W_{IB}$	ratio of total errored IP packet outcomes (failing the IP header checksum) to the total of successful IP packet transfer outcomes plus errored IP packet outcomes; it is measured in -0,01 dB units.
2	Ippt	BitRate	$R_{AIB}W_{IB}$	the total number of bits in IP packets (including IP headers) that were successfully received at an egress MP, both for successful and errored packets, during a specified time interval, divided by the time interval duration; it is measured in bits of IP datagram per second.
3	Ippg	BitRate	$R_{AIB}W_{IB}$	the total number of bits in IP packets (including IP headers) that were successfully transmitted at an egress MP, excluding errored packets, during a specified time interval, divided by the time interval duration; it is measured in bits of IP datagram per second.

6 Access policy

When the database objects defined herein are accessed via SNMP (i.e. as MIB OIDs), the validity of the packet's source IP address and community name should be checked. This community name together with the object ID(s) in the SNMP request determine the access rights to the information being requested.

The process that the ST shall follow when receiving an SNMP set/get message is based on the following steps:

- Check that SNMP is enabled for the interface via which the request is received.
- Check in the bsmstConfigAccessPolicyTable table if the SNMP request is coming from a valid IP subnet (note that the network mask can be set to 255.255.255.255 so that it maps to a unique IP address) and if this subnet is associated with the given community string.
- Check that the request type (GET/SET) match the permission assigned to the community (using the corresponding MIB view to the community name defined in the bsmstConfigAccessPolMibViewTable).
- Request performed calling the correct low level SNMP request handler. Note that if MAX_ACCESS for the object is READ-ONLY there will be no SET function to call and the response will be an error message.

The process that shall be followed by the ST when sending a trap is the following:

- Parses the bsmstLifeTrapDest table based on the trap OID. A "Trap Destination Management Entity" is associated to each occurrence (in the bsmstLifeTrapDestTable) of this trap OID.
- Parses the bsmstConfigAccessPolicyTable based on the "Trap Destination Management Entities" ("Management Entity Name"). A bsmstConfigAccessPolicyIpAddr is associated to each occurrence (in the bsmstConfigAccessPolicyTable) of these "Trap Destination Management Entities" ("Management Entity Name").
- Traps are sent to these IP addresses.

Further definitions of Access rights terms are given in clause A.2.

Table 6: bsmstConfigAccessPolicyTable

BSMSTConfigAccessPolicyIndex	BSMSTConfigAccessPolicyIpAddr	BSMSTConfigAccessPolicyCommunityName
1	Primary BNMS IP address	NMC_Manager
2	Backup BNMS IP address	NMC_Manager
3	Primary SMS IP address	SuperUser
4	Backup SMS IP address	Installer
5	BSMST IP address	Public
6	Service Station IP Address	Service
7	Installer host IP address	Installer
8	Other IP address	Public

Table 7: bsmstConfigAccessPolMibViewTable

BSMSTConfigAccessPolMibViewIndex	BSMSTConfigAccessPolMibViewCommunityName	BSMSTConfigAccessPolMibViewPrefix	BSMSTConfigAccessPolMibViewAccessRight
1	NMC_Manager	BSMSTSysInstall	read-only
2	SuperUser	BSMSTSysInstall	read-only
3	Installer	BSMSTSysInstall	read-write
4	Service	BSMSTSysInstall	read-write
5	Public	BSMSTSysInstall	not-accessible
6	NMC_Manager	BSMSTSysIdu	read-write
7	SuperUser	BSMSTSysIdu	read-only
8	Installer	BSMSTSysIdu	read-write
9	Service	BSMSTSysIdu	read-write
10	Public	BSMSTSysIdu	not-accessible
11	NMC_Manager	BSMSTConfigNetwork	read-write
12	SuperUser	BSMSTConfigNetwork	read-only
13	Installer	BSMSTConfigNetwork	read-write
14	Service	BSMSTConfigNetwork	read-write
15	Public	BSMSTConfigNetwork	not-accessible
16	NMC_Manager	BSMSTAccessPol	read-write
17	SuperUser	BSMSTAccessPol	read-only
18	Installer	BSMSTAccessPol	read-write
19	Service	BSMSTAccessPol	read-write
20	Public	BSMSTAccessPol	not-accessible
21	NMC_Manager	BSMSTConfigLinesAirIfRtnLk	read-write
22	SuperUser	BSMSTConfigLinesAirIfRtnLk	not-accessible
23	Installer	BSMSTConfigLinesAirIfRtnLk	read-write
24	Service	BSMSTConfigLinesAirIfRtnLk	read-write
25	Public	BSMSTConfigLinesAirIfRtnLk	not-accessible
26	NMC_Manager	BSMSTConfigLinesAirIfAccess	read-write
27	SuperUser	BSMSTConfigLinesAirIfAccess	read-only
28	Installer	BSMSTConfigLinesAirIfAccess	read-write
29	Service	BSMSTConfigLinesAirIfAccess	read-write
30	Public	BSMSTConfigLinesAirIfAccess	not-accessible
31	NMC_Manager	BSMSTLifeBSMSTStatus	read-only
32	SuperUser	BSMSTLifeBSMSTStatus	read-only
33	Installer	BSMSTLifeBSMSTStatus	read-only
34	Service	BSMSTLifeBSMSTStatus	read-only
35	Public	BSMSTLifeBSMSTStatus	not-accessible
36	NMC_Manager	BSMSTLifeTrapLog	read-only
37	SuperUser	BSMSTLifeTrapLog	read-only
38	Installer	BSMSTLifeTrapLog	read-only
39	Service	BSMSTLifeTrapLog	read-only
40	Public	BSMSTLifeTrapLog	not-accessible
41	ISP_SSP	BSMSTLifeTrapLog	not-accessible
42	NMC_Manager	BSMSTLifeTrapDest	read-write
43	SuperUser	BSMSTLifeTrapDest	read-write
44	Installer	BSMSTLifeTrapDest	read-write
45	Service	BSMSTLifeTrapDest	read-write
46	Public	BSMSTLifeTrapDest	not-accessible
47	ISP_SSP	BSMSTLifeTrapDest	not-accessible
48	NMC_Manager	BSMSTLifeTrap	not-accessible
49	SuperUser	BSMSTLifeTrap	not-accessible
50	Installer	BSMSTLifeTrap	not-accessible
51	Service	BSMSTLifeTrap	not-accessible
52	Public	BSMSTLifeTrap	not-accessible
53	ISP_SSP	BSMSTLifeTrap	not-accessible
54	NMC_Manager	BSMSTAct	read-write
55	SuperUser	BSMSTAct	read-write
56	Installer	BSMSTAct	read-write
57	Service	BSMSTAct	read-write
58	Public	BSMSTAct	not-accessible
59	NMC_Manager	BSMSTCallCntl	read-write
60	SuperUser	BSMSTCallCntl	read-only
61	Installer	BSMSTCallCntl	read-only

BSMSTConfigAccessPolMibViewIndex	BSMSTConfigAccessPolMibViewCommunityName	BSMSTConfigAccessPolMibViewPrefix	BSMSTConfigAccessPolMibViewAccessRight
62	Service	BSMSTCallCntl	read-only
63	Public	BSMSTCallCntl	not-accessible
64	NMC_Manager	BSMSTCallCntlTrap	not-accessible
65	SuperUser	BSMSTCallCntlTrap	not-accessible
66	Installer	BSMSTCallCntlTrap	not-accessible
67	Service	BSMSTCallCntlTrap	not-accessible
68	Public	BSMSTCallCntlTrap	not-accessible
69	NMC_Manager	BSMSTCallCntlMpeg	read-write
70	SuperUser	BSMSTCallCntlMpeg	read-only
71	Installer	BSMSTCallCntlMpeg	read-only
72	Service	BSMSTCallCntlMpeg	read-only
73	Public	BSMSTCallCntlMpeg	not-accessible
74	NMC_Manager	BSMSTCallCntlTrapMpeg	not-accessible
75	SuperUser	BSMSTCallCntlTrapMpeg	not-accessible
76	Installer	BSMSTCallCntlTrapMpeg	not-accessible
77	Service	BSMSTCallCntlTrapMpeg	not-accessible
78	Public	BSMSTCallCntlTrapMpeg	not-accessible
79	NMC_Manager	BSMSTSysCapability	read-write
80	SuperUser	BSMSTSysCapability	not-accessible
81	Installer	BSMSTSysCapability	read-write
82	Service	BSMSTSysCapability	read-write
83	Public	BSMSTSysCapability	not-accessible
84	NMC_Manager	BSMSTRsmBNetwork	read-write
85	SuperUser	BSMSTRsmBNetwork	read-only
86	Installer	BSMSTRsmBNetwork	read-write
87	Service	BSMSTRsmBNetwork	not-accessible
88	Public	BSMSTRsmBNetwork	not-accessible
89	NMC_Manager	BSMSTRsmBMulticast	read-write
90	SuperUser	BSMSTRsmBMulticast	read-only
91	Installer	BSMSTRsmBMulticast	read-write
92	Service	BSMSTRsmBMulticast	not-accessible
93	Public	BSMSTRsmBMulticast	not-accessible
94	NMC_Manager	BSMSTRsmBConfigSLA	read-write
95	SuperUser	BSMSTRsmBConfigSLA	read-only
96	Installer	BSMSTRsmBConfigSLA	read-write
97	Service	BSMSTRsmBConfigSLA	not-accessible
98	Public	BSMSTRsmBConfigSLA	not-accessible
99	NMC_Manager	BSMSTRsmBPhysicalLayer	read-write
100	SuperUser	BSMSTRsmBPhysicalLayer	read-only
101	Installer	BSMSTRsmBPhysicalLayer	read-write
102	Service	BSMSTRsmBPhysicalLayer	not-accessible
	Public	BSMSTRsmBPhysicalLayer	not-accessible

Annex A (informative): MIB Syntax

Table A.1: Relevant SNMP Object Types

SNMP Object Type	Description
Unsigned32	The Unsigned32 type represents integer-valued information between 0 and 2^32 - 1 inclusive (0 to 4 294 967 295 decimal).
Counter32	A non-negative integer whose value increases monotonically from 0 to 2^32 - 1, and then wraps back to 0.
Enumerated	A non-negative integer that is used to represent information as a named number enumeration. Only those named-numbers so enumerated may be present as a value.
Gauge32	A non-negative integer whose value lies between 0 and 2^32 - 1. The value of Gauge32 is equal to the maximum value of the information being modelled over a specified measurement interval.
TimeTicks	Non-negative integer which represents the time, modulo 2^32 (4 294 967 296 decimal), in hundredths of a second between two epochs.
VariablePointer	Textual convention defined in RFC 2579 [5], it represents a pointer to a specific object instance, used as the value of the SYNTAX clause.
BitRate	Textual convention defined in RFC 2213 [6], it represents the rate, in bits/second, that data may move in the context. Applicable contexts minimally include the speed of an interface or virtual circuit, the data rate of a (potentially aggregated) data flow, or the data rate to be allocated for use by a flow.

Annex B (informative): Access rights

The write and read access rights of any SNMP object are defined/identified according to the different users/entities. In the BSM MIB definition within the present document, the following notations are used in the scope of the access rights.

Table B.1: SNMP access rights

Notations	Access Right
"W"	Write access
"R"	Read access
"C"	Create access
"NA"	Not Accessible
"A"	Local Administrator
"I"	Installer
"B"	B-NMS

The access rights to a particular SNMP object are defined cross-checking both the maximum level of access of that SNMP object and the access rights granted to the entity according to its community name.

Table B.2: Relationship between SNMPv2 MIB MAX-ACCESS value and protocol access mode

SNMPv2 Protocol Operation		
MAX-ACCESS Value	READ-ONLY	READ-WRITE
read-only	Available for get and trap operations	
read-write	for get and trap operations	Available for get, set, and trap operations
read-create	Available for get and trap operations	Available for get, set, create, and trap operations
accessible-for-notify	Available for trap operations	
not-accessible	Unavailable	

Annex C (informative): Bibliography

IETF RFC 1213: "Management Information Base for Network Management of TCP/IP-based internets:MIB-II".

IETF RFC 2863: "The Interfaces Group MIB".

IETF RFC 4293: "Management Information Base for the Internet Protocol (IP)".

History

Document history		
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