SNMP Extended Protocol MIB

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Abstract

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it describes SNMP protocol operations supported by an SNMP entity.

Table of Contents

1. The SNMP Management Framework
2. Introduction
3. Extended Protocol Management
   3.1. SNMP Extensions
   3.2. Interoperability
   3.3. Relation to MAX-ACCESS clause
   3.4. Relation to Agent Capabilities
4. MIB Overview
5. IANA Considerations
6. Definitions
7. Security Considerations
8. Author’s Address
9. Acknowledgements
10. References
11. Full Copyright Statement
1. The SNMP Management Framework

The SNMP Management Framework presently consists of five major components:

- An overall architecture, described in RFC 2571 [RFC2571].

- Mechanisms for describing and naming objects and events for the purpose of management. The first version of this Structure of Management Information (SMI) is called SMIv1 and described in STD 16, RFC 1155 [RFC1155], STD 16, RFC 1212 [RFC1212] and RFC 1215 [RFC1215]. The second version, called SMIv2, is described in STD 58, RFC 2578 [RFC2578], STD 58, RFC 2579 [RFC2579] and STD 58, RFC 2580 [RFC2580].

- Message protocols for transferring management information. The first version of the SNMP message protocol is called SNMPv1 and described in STD 15, RFC 1157 [RFC1157]. A second version of the SNMP message protocol, which is not an Internet standards track protocol, is called SNMPv2c and described in RFC 1901 [RFC1901] and RFC 1906 [RFC1906]. The third version of the message protocol is called SNMPv3 and described in RFC 1906 [RFC1906], RFC 2572 [RFC2572] and RFC 2574 [RFC2574].

- Protocol operations for accessing management information. The first set of protocol operations and associated PDU formats is described in STD 15, RFC 1157 [RFC1157]. A second set of protocol operations and associated PDU formats is described in RFC 1905 [RFC1905].

- A set of fundamental applications described in RFC 2573 [RFC2573] and the view-based access control mechanism described in RFC 2575 [RFC2575].

A more detailed introduction to the current SNMP Management Framework can be found in RFC 2570 [RFC2570].

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. Objects in the MIB are defined using the mechanisms defined in the SMI.

This memo specifies a MIB module that is compliant to the SMIv2. A MIB conforming to the SMIv1 can be produced through the appropriate translations. The resulting translated MIB must be semantically equivalent, except where objects or events are omitted because no translation is possible (use of Counter64). Some machine readable information in SMIv2 will be converted into textual descriptions in SMIv1 during the translation process. However, this loss of machine readable information is not considered to change the semantics of the MIB.
2. Introduction

Traditionally, features have been added to SNMP by developing a new version of the protocol that supports these new features. Currently, SNMP entities that conform to [RFC 2571] are expected to implement all the protocol functionality defined by the standards.

The idea, moving forward, is to add features to SNMP in a more modular fashion and without necessarily increasing the version number. Since the protocol version number is no longer sufficient information to determine which protocol features an SNMP entity supports, another method is required. This memo defines a MIB to be used to determine the SNMP capabilities of an SNMP entity, independent of its protocol version.

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119.

3. Extended Protocol Management

3.1 SNMP Extensions

SNMP extensions are those standard protocol extensions that are developed within the IETF and published in standards track RFCs.

3.2 Interoperability
An SNMP entity that supports version 2 of the protocol operations [RFC1905] MUST be able to communicate with an SNMP entity supporting extended protocol operations. This communication MUST be in a manner consistent with communicating with an SNMP entity that supports version 2 of the protocol operations. Similarly, an SNMP entity that supports extended protocol operations MUST be able to communicate with SNMP entities which support version 2 of the protocol operations.

An SNMP entity that supports the extended protocol operations SHOULD support protocol operations as defined in version 2 of the protocol operations [RFC1905]. The get-request operation MUST be supported.

A command generator SHOULD query a command responder before issuing an extended protocol operation to determine if the command responder supports the operation.

An SNMP entity MUST only issue a response using an extended protocol feature if it received the request using the extended protocol feature.

If an SNMP entity receives an extended protocol feature it does not understand, it MUST follow the unknown PDU response mechanism as defined in [RFC2262] section 4.2.2.1.
3.3 Relation to MAX-ACCESS Clause

MAX-ACCESS, as defined in [RFC1902], indicates whether it makes "protocol sense" to read, write and/or create an instance of the object, or to include its value in a notification. It is useful for this discussion to term read, write, create and accessible for notify as different classes of access to MIB objects. In the case of the protocol operations defined in [RFC1905], the get-request, get-next-request, get-bulk-request would all belong to the read class. The set-request would belong to the write class and the create class. The inform-request and the snmpV2-trap would both belong to the accessible for notify class. The protocol capabilities identified using this memo indicate which specific protocol operations are supported on the object if the appropriate class of access is allowed.

If a protocol operation is not supported on a given object, it only affects the protocol capabilities statement, if its access class is supported for that object. For example, if an object is read-only and therefore does not support the write class, the system can still claim support of the set-request operation so long as all objects that do support the write class support the set-request. However, if the object does not support the get-bulk-request, the system cannot claim support of this protocol operation as this object supports the read class.

3.4 Relation to Agent Capabilities

Agent capability statements are used when describing capabilities of agents with respect to object definitions. The extended protocol MIB is used when describing the capabilities of agents with respect to protocol operations.

4. MIB Overview

The snmpXProtoSystem object indicates which protocol operations are supported by the entire SNMP entity. snmpXProtoSubTreeTable indicates additional protocol operations supported on particular MIB sub trees.

5. IANA Considerations

IANASnmpProtocol is a bitmap that indicates which standard SNMP operations an SNMP entity supports. New values for this bitmap may be given out for SNMP protocol extensions published as standards track RFCs.

The following shall be used as the initial values, but the latest values for these textual conventions should be obtained from IANA:

IANA-SNMP-PROTOCOL-TC DEFINITIONS ::= BEGIN
IMPORTS
MODULE-IDENTITY, mib-2 FROM SNMPv2-SMI
TEXTUAL-CONVENTION FROM SNMPv2-TC;

ianaSnmpProtoNumbers MODULE-IDENTITY
LAST-UPDATED "2002022000000Z"
ORGANIZATION "IANA"
CONTACT-INFO
"Postal:    Internet Assigned Numbers Authority
Internet Corporation for Assigned Names
and Numbers
4676 Admiralty Way, Suite 330
Marina del Rey, CA 90292-6601
USA
Tel:    +1 310-823-9358
E-Mail: iana@iana.org"
DESCRIPTION
"The MIB module defines textual conventions for use
in identifying SNMP protocol operations."
::= { mib-2 xx }

-- IANA IANASnmpProtocol ::= TEXTUAL-CONVENTION
STATUS current
DESCRIPTION
"Standard SNMP protocol operations."
SYNTAX BITS
{ getRequest (0), getNextRequest (1),
  getBulkRequest (2), response (3),
  setRequest (4), informRequest (5),
  snmpV2Trap (6),
  report (7) }

6. Definitions

SNMP-EXTENDED-PROTOCOL-MIB DEFINITIONS ::= BEGIN

IMPORTS
MODULE-IDENTITY, OBJECT-TYPE,
Unsigned32, mib-2 FROM SNMPv2-SMI
IANASnmpProtocol FROM IANA-SNMP-PROTOCOL-TC
MODULE-COMPLIANCE, OBJECT-GROUP FROM SNMPv2-CONF;

snmpXProtoMIB MODULE-IDENTITY
LAST-UPDATED "2002022000000Z"
ORGANIZATION "IETF Evolution of SNMP Working Group"
CONTACT-INFO
   "Sharon Chisholm
   Nortel Networks
   PO Box 3511 Station C
   Ottawa, Ont. K1Y 4H7
   Canada
   schishol@nortelnetworks.com"

DESCRIPTION
   "The MIB module describes the SNMP protocol
   operations supported by this SNMP entity."

REVISION    "2002022200000Z"

DESCRIPTION
   "Initial version, published as RFC XXXX."

::= { mib-2 xx }

snmpXProtoObjects OBJECT IDENTIFIER ::= { snmpXProtoMIB 1 }

snmpXProtoConformance OBJECT IDENTIFIER ::= { snmpXProtoMIB 3 }

snmpXProtoCompliances OBJECT IDENTIFIER ::= { snmpXProtoConformance 1 }

snmpXProtoSystem OBJECT-TYPE
   SYNTAX        IANASnmpProtocol
   MAX-ACCESS    read-only
   STATUS        current
   DESCRIPTION   "The standard SNMP protocol operations supported
                  by this SNMP entity on all objects with appropriate
                  access permissions. For example, SNMP sets may be
                  included in this list, even if the MAX-ACCESS of
                  some objects is read-only."
   ::= { snmpXProtoObjects 1 }

-- Extra Protocol Support per SubTree

snmpXProtoSubTreeTable OBJECT-TYPE
   SYNTAX        SEQUENCE OF SnmpXProtoSubTreeEntry
   MAX-ACCESS    not-accessible
   STATUS        current
   DESCRIPTION   "A table of additional SNMP protocol operations
                  supported on objects in the specific subTrees."
   ::= { snmpXProtoObjects 2 }

snmpXProtoSubTreeEntry OBJECT-TYPE
   SYNTAX        SnmpXProtoSubTreeEntry
   MAX-ACCESS    not-accessible
   STATUS        current
   DESCRIPTION   "A MIB subtree that supports additional
protocol operations above that specified
in snmpXProtoSystem."
INDEX { snmpXProtoSubTreeIndex }
::= { snmpXProtoSubTreeTable 1 }

SnmpXProtoSubTreeEntry ::= SEQUENCE {
  snmpXProtoSubTreeIndex Unsigned32,
  snmpXProtoSubTreeBranch OBJECT IDENTIFIER,
  snmpXProtoSubTreeFeature IANASnmpProtocol
}

snmpXProtoSubTreeIndex OBJECT-TYPE
SYNTAX Unsigned32(1..4294967295)
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "An arbitrary index into this table."
::= { snmpXProtoSubTreeEntry 1 }

snmpXProtoSubTreeBranch OBJECT-TYPE
SYNTAX OBJECT IDENTIFIER
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The OID that identifies this MIB SubTree."
::= { snmpXProtoSubTreeEntry 2 }

snmpXProtoSubTreeFeature OBJECT-TYPE
SYNTAX IANASnmpProtocol
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The standard SNMP protocol operations supported
by this subTree above and beyond protocol
support as indicated by snmpXProtoSystem."
::= { snmpXProtoSubTreeEntry 3 }

snmpXProtoCompliance MODULE-COMPLIANCE
STATUS current
DESCRIPTION "The compliance statement for systems supporting
the snmpXProto MIB."
MODULE -- this module
MANDATORY-GROUPS {
  snmpXProtoGroup
}
::= { snmpXProtoCompliances 1 }

snmpXProtoGroups OBJECT IDENTIFIER ::= { snmpXProtoConformance 2 }

snmpXProtoGroup OBJECT-GROUP
OBJECTS {

Chisholm Standards Track [Page 9]
snmpXProtoSystem
}
STATUS   current
DESCRIPTION
"Standard snmpXProto group."
::= { snmpXProtoGroups 1}

snmpXProtoSubTreeGroup OBJECT-GROUP
OBJECTS {
    snmpXProtoSubTreeFeature,
    snmpXProtoSubTreeBranch
}
STATUS   current
DESCRIPTION
"SubTree specific snmpXProto group."
::= { snmpXProtoGroups 2}

END

7. Security Considerations

There are no management objects defined in this MIB that have a
MAX-ACCESS clause of read-write and/or read-create. So, if this MIB
is implemented correctly, then there is no risk that an intruder can
alter or create any management objects of this MIB via direct SNMP
SET operations.

8. Author’s Address

Sharon Chisholm
Nortel Networks
PO Box 3511, Station C
Ottawa, Ontario, K1Y 4H7
Canada
Email: schishol@nortelnetworks.com

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10. References

Architecture for Describing SNMP Management Frameworks",
RFC 2571, April 41999.

of Management Information for TCP/IP-based Internets", STD


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