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## **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.

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## 1. The SNMP Management Framework

The SNMP Management Framework presently consists of five major components:

- o An overall architecture, described in [RFC 2571](#) [[RFC2571](#)].
- o 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](#)].
- o 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](#)].
- o 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](#)].
- o 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**

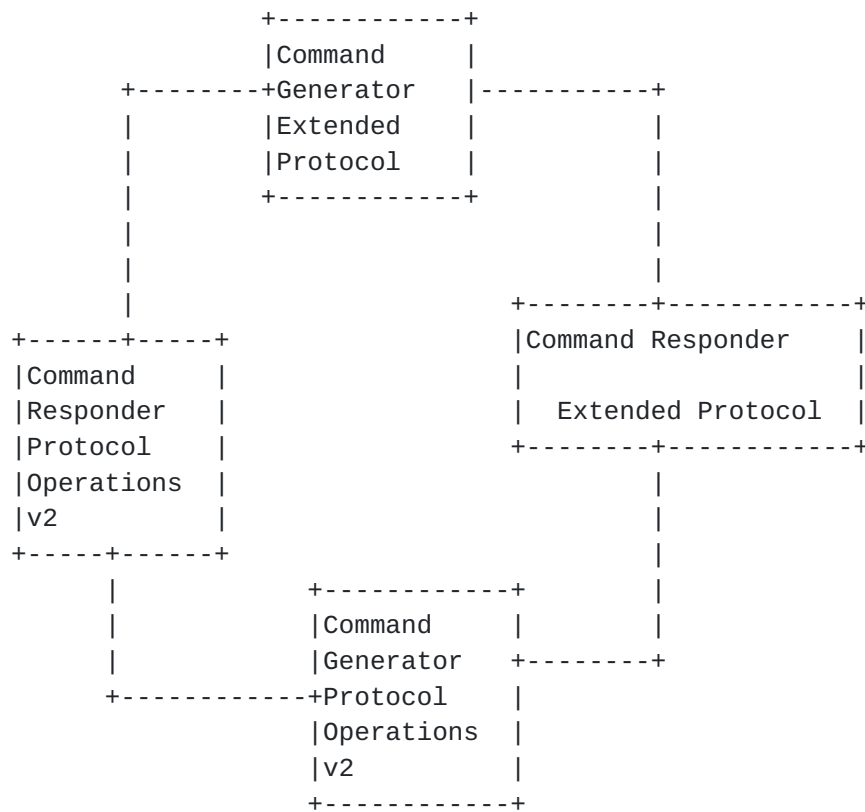
### **3.1 SNMP Extensions**

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;
```

```
ianaSnmProtoNumbers MODULE-IDENTITY
```

```
    LAST-UPDATED "200202200000Z"
```

```
    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 IANASnmProtocol ::= 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)
        } END
```

## 6. Definitions

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

## IMPORTS

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

snmpXProtoMIB MODULE-IDENTITY

LAST-UPDATED "200202200000Z"

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 "200202200000Z"

## 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 {

```
        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**

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## **9. Acknowledgments**

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