                   Introduction to Community-based SNMPv2

Status of this Memo

   This document specifies an Experimental protocol for the Internet
   community. This memo does not specify an Internet standard of any
   kind. Discussion and suggestions for improvement are requested.
   Distribution of this memo is unlimited.

Table of Contents

1. Introduction

   The purpose of this document is to define the Community-based
   Administrative Framework for the SNMP version 2 framework (SNMPv2).
   The SNMPv2 framework is fully described in [1-6]. This framework is
   derived from the original Internet-standard Network Management
   Framework (SNMPv1), which consists of these three documents:

      STD 16, RFC 1155 [7] which defines the Structure of Management
      Information (SMI), the mechanisms used for describing and naming
      objects for the purpose of management.

    STD 16, RFC 1212 [8] which defines a more concise description
    mechanism, which is wholly consistent with the SMI.

    STD 15, RFC 1157 [9] which defines the Simple Network Management
    Protocol (SNMP), the protocol used for network access to managed
    objects.

  For information on coexistence between SNMPv1 and SNMPv2, consult
  [10].

2. Components of the SNMPv2 Framework

  A management system contains: several (potentially many) nodes, each
  with a processing entity, termed an agent, which has access to
  management instrumentation; at least one management station; and, a
  management protocol, used to convey management information between
  the agents and management stations. Operations of the protocol are
  carried out under an administrative framework which defines
  authentication, authorization, access control, and privacy policies.

  Management stations execute management applications which monitor and
  control managed elements. Managed elements are devices such as
  hosts, routers, terminal servers, etc., which are monitored and
  controlled via access to their management information.

2.1. Structure of Management Information

  Management information is viewed as a collection of managed objects,
  residing in a virtual information store, termed the Management
  Information Base (MIB). Collections of related objects are defined
  in MIB modules. These modules are written using a subset of OSI's
  Abstract Syntax Notation One (ASN.1) [11]. It is the purpose of the
  Structure of Management Information for SNMPv2 document [1] to define
  that subset.

  The SMI is divided into three parts: module definitions, object
  definitions, and, trap definitions.

  (1) Module definitions are used when describing information modules.
       An ASN.1 macro, MODULE-IDENTITY, is used to concisely convey the
       semantics of an information module.

  (2) Object definitions are used when describing managed objects. An
       ASN.1 macro, OBJECT-TYPE, is used to concisely convey the syntax
       and semantics of a managed object.

  (3) Notification definitions are used when describing unsolicited
       transmissions of management information. An ASN.1 macro,

NOTIFICATION-TYPE, is used to concisely convey the syntax and
semantics of a notification.

2.2. Textual Conventions

When designing a MIB module, it is often useful to define new types
similar to those defined in the SMI. In comparison to a type defined
in the SMI, each of these new types has a different name, a similar
syntax, but a more precise semantics. These newly defined types are
termed textual conventions, and are used for the convenience of
humans reading the MIB module. It is the purpose of the Textual
Conventions for SNMPv2 document [2] to define the initial set of
textual conventions available to all MIB modules.

Objects defined using a textual convention are always encoded by
means of the rules that define their primitive type. However,
textual conventions often have special semantics associated with
them. As such, an ASN.1 macro, TEXTUAL-CONVENTION, is used to
concisely convey the syntax and semantics of a textual convention.

2.3. Conformance Statements

It may be useful to define the acceptable lower-bounds of
implementation, along with the actual level of implementation
achieved. It is the purpose of the Conformance Statements for SNMPv2
document [3] to define the notation used for these purposes. There
are two kinds of notations:

(1) Compliance statements are used when describing requirements for
     agents with respect to object definitions. An ASN.1 macro,
     MODULE-COMPLIANCE, is used to concisely convey such requirements.

(2) Capability statements are used when describing capabilities of
     agents with respect to object definitions. An ASN.1 macro, AGENT-
     CAPABILITIES, is used to concisely convey such capabilities.

Finally, collections of related objects are grouped together to form
a unit of conformance. An ASN.1 macro, OBJECT-GROUP, is used to
concisely convey the syntax and semantics of a group.

2.4. Protocol Operations

The management protocol provides for the exchange of messages which
convey management information between the agents and the management
stations. The form of these messages is a message "wrapper" which
encapsulates a Protocol Data Unit (PDU).

It is the purpose of the Protocol Operations for SNMPv2 document [4]
to define the operations of the protocol with respect to the sending
and receiving of the PDUs.

2.5. Transport Mappings

The management protocol, version 2 of the Simple Network Management
Protocol, may be used over a variety of protocol suites. It is the
purpose of the Transport Mappings for SNMPv2 document [5] to define
how the SNMPv2 maps onto an initial set of transport domains. Other
mappings may be defined in the future.

Although several mappings are defined, the mapping onto UDP is the
preferred mapping. As such, to provide for the greatest level of
interoperability, systems which choose to deploy other mappings
should also provide for proxy service to the UDP mapping.

2.6. Protocol Instrumentation

It is the purpose of the Management Information Base for SNMPv2
document [6] to define managed objects which describe the behavior of
a SNMPv2 entity.

3. The Community-based Administrative Framework

It is the purpose of an administrative framework to define an
infrastructure through which effective management can be realized in
a variety of configurations and environments. Specified as a part
of, or as extensions of, an administrative framework are security
mechanisms used to achieve an administratively-defined level of
security for protocol interactions.

The administrative framework for SNMPv2 identified in this document
is the same framework as was defined for SNMPv1 [9]. This
administrative framework associates each message with a "community"
as defined in [9]. Use of this administrative framework with SNMP
Version 2 is commonly known as "Community-based SNMPv2 (SNMPv2C)."

Specifically, Section 3.2.5 of [9] defines the concept of a
community, and Section 4.1 of [9] defines the Elements of Procedure
for generating and receiving messages. The following updates apply:

(1) The types of access defined in Section 3.2.5 of [9] are updated
     by [1].

(2) The Elements of Procedure defined in Section 4.1 of [9] are
     updated with the additional requirement of incrementing the
     relevant statistics counter as defined in [6].

(3) The requirement in the Elements of Procedure in Section 4.1 of
     [9] that the "the source transport address that a response
     message is sent from shall be identical to the destination
     transport address that the original request message was sent to"
     is deleted, i.e., the source transport address of a response
     message can be any transport address belonging to the agent.

The form of a message is also taken from [9], with the exception that
a new version number is used in the message "wrapper". Use of a new
version number is necessary because of SNMPv2's new PDU types [4],
error codes [4], etc. With this one change, the wrapper becomes:

```
 COMMUNITY-BASED-SNMPv2 DEFINITIONS ::= BEGIN

 -- top-level message

     Message ::=
             SEQUENCE {
                 version
                    INTEGER {
                        version(1)  -- modified from RFC 1157
                    },

                 community            -- community name
                    OCTET STRING,

                 data                 -- PDUs as defined in [4]
                    ANY
             }
     }

  END
```

Note that with this administrative framework, the
'authorizationError(16)' value defined for the error-status component
of an SNMPv2 PDU [4] is unused. It may, however, be used with future
administrative frameworks.

4. Security Considerations

Security issues are not discussed in this memo.

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