

Simple Network Management Protocol

Abstract:

The Simple Network Management Protocol (SNMP) is a well-known Internet management framework and is an open industry standard. SNMP is widely deployed and available in almost every network device. The purpose of this document is to provide the casual user with an introduction to using SNMP with a Sixnet IPm. More experienced users will also benefit from this document as it contains important implementation information. It is expected that the user has version 3.0 or later Sixnet I/O Tool Kit, with the SNMP add-on registration and IPm firmware version 3.4 or later.

What is SNMP?

SNMP (Simple Network Management Protocol) is a protocol designed to give a user the capability to remotely manage a computer network. This management is accomplished by monitoring network events and reading and writing predefined values to the network nodes (Sixnet IPm, router, switch, etc).

How does SNMP work?

SNMP exchanges network information through messages. The SNMP protocol is UDP based. Each message is sent in one atomic UDP packet. A message consists of a version identifier, an SNMP community name, and a PDU (Protocol Data Unit). PDUs provide two fundamental actions: get a variable and set a variable. There are five basic messages, or PDUs, used with SNMP. This document will discuss three: read, write, and trap.

- **Read (GET)** A user issuing a read is actually reading information from the networked device. The end device is the slave.

i.e. A user queries a device in order to find out how many network collisions have occurred.
- **Write (SET)** A user issuing a write will send information to be written to a networked device. The end device is the slave.

i.e. A user tells a device to disable a network interface.
- **Trap** The networked device sends out (pushes) information (signal or alarm). The end device acts as a master. Traps are generally triggered by a specific event.

i.e. A trap is sent when a station comes back online after a power failure.
SNMP is composed of three elements: the MIB, the manager, and the agent.

What is a MIB?

The information that SNMP can attain from a network is defined as a MIB (Management Information Base). MIBs are structured like trees. At the top of the tree is the most general information available about a network. Each branch provides more details about specific network areas. The leaf, or end nodes, provide the most detailed information about the network and/or device. A MIB is often referred to as a database. A MIB is not a database. A MIB is a file, written in a specific language that lists variables. It assigns each variable a name, a number, and a set of permissions. It may also provide a description of what the variable is supposed to represent. Since everything in SNMP is an action on a variable, this is very important.

What is an agent?

An SNMP agent is a program which binds to a port and awaits requests from SNMP management software. Upon receiving a request, it processes the request(s), collects the requested information and/or performs the requested operation(s) and returns the information to the sender. The SNMP agent resides in the networked device to be monitored.

If a device is not running an SNMP agent, that device is referred to as *unmanageable*. Agents are also designed to be extensible. A user can write code (including scripts) to accomplish the specific needs of a network.

What is a manager?

In order for SNMP to be useful, a NMS (Network Management Station) must be present. The NMS collects data from the remote devices (agents) and may provide certain actions based on the received information. The manager is generally an application with a friendly graphical user interface (GUI). There are many management packages available (including shareware/freeware packages) and each is different in its own way. Assuming that the package is capable of talking standard SNMP, it should work fine with the Sixnet IPm.

Implementation

The Sixnet IPm (firmware v3.4) uses Net-SNMP v5.2.2. Net-SNMP is the successor to the well known UC Davis SNMP. The IPm is configured to act as an 'agent'. Additionally, an I/O subagent is supplied by Sixnet. This subagent allows the user to read and write to the Sixnet I/O database (I/O registers) in an IPm using standard `snmpget` and `snmpset` calls. If there are security concerns, refer to the security topics in the Sixnet I/O Tool Kit help.

The Sixnet I/O Tool Kit provides a window where a user can enter the following entries:

- **System Location**

- o This field describes the physical location of the station. The maximum length is 256 characters. i.e. 'Building 3, 2nd floor machine room'
- o Defaults to 'Station Location'

- **System Contact Information**

- o This field should be the system/network administrators contact information. The maximum length is 256 characters.
- o Defaults to 'root@mydomain'

- **Read-Only Community Name**

- o This field provides read-only authorization to the station. Only messages containing the correct “Read-Only Community” name will allow a user to retrieve information from the station. The maximum length is 32 characters.
- o This is more or less a password and should not be easily guessed. Users are encouraged to change the default community names.
- o Defaults to ‘public’

Additional support fields (may be empty)

- Network Access – can be a hostname, IP address, or network.
i.e. mystation, 10.1.0.1, or 10/24

- **Read-Write Community Name**

- o This field provides read-write authorization to the station. Only messages containing the correct “Read-Write Community” name will allow a user to retrieve and set variables in the station. The maximum length is 32 characters.
- o This is more or less a password and should not be easily guessed. Users are encouraged to change the default community names. Logically, the read-write community name should be more difficult to guess than the read-only community name.
- o Default to ‘private’

Additional support fields (may be empty)

- Network Access – can be a hostname, IP address, or network.
i.e. mystation, 10.1.0.1, or 10/24

- **Advanced SNMP**

- o The advanced SNMP window gives users the ability to manually enter SNMP specific commands.
The combinations of commands is infinite (adding extensions to the agent) and beyond the scope of this document. Please see the NET-SNMP manual pages and web page for more information.

Additional Documentation

- [RFC 1157 - SNMP](#)
- [comp.protocols.snmp FAQ](#)
- [NET-SNMP Homepage](#)
- NET-SNMP manual pages