SIMPLE NETWORK MANAGEMENT PROTOCOL (SNMP)

What SNMP is all about???

- **SNMP** is an "Internet-standard protocol for managing devices on IP networks.
- It provides a set of fundamental operations for monitoring and maintaining an internet
- SNMP is a component of the Internet Protocol Suite as defined by the Internet Engineering Task Force (IETF).
- It consists of a set of standards for network management, including an application layer protocol, a database schema, and a set of data objects.

CONCEPT

- It uses the concept of MANAGER and a set of AGENTS.
- Manager ,genarally a host controls and monitors a set of agents,usually routers,switches,etc.
- The protocol is designed at the application level so that it can monitor devices made by different manufacturers.
- Used in heterogeneous internet made of different LAN's and WAN's.

MANAGERS AND AGENTS

- A MANAGEMENT station is called a manager and a MANAGED station is called an agent.
- Manager runs the SNMP client program ,agent runs the SNMP server program.

- Agent keeps performance information in a database
- The manager has access to these values .
- router----->no.of packets receivedand forwarded
- This hepls the manager to determine if the router is congested or not
- Manager can also make the router perform certain actions
- Eg:When the router should reboot itself

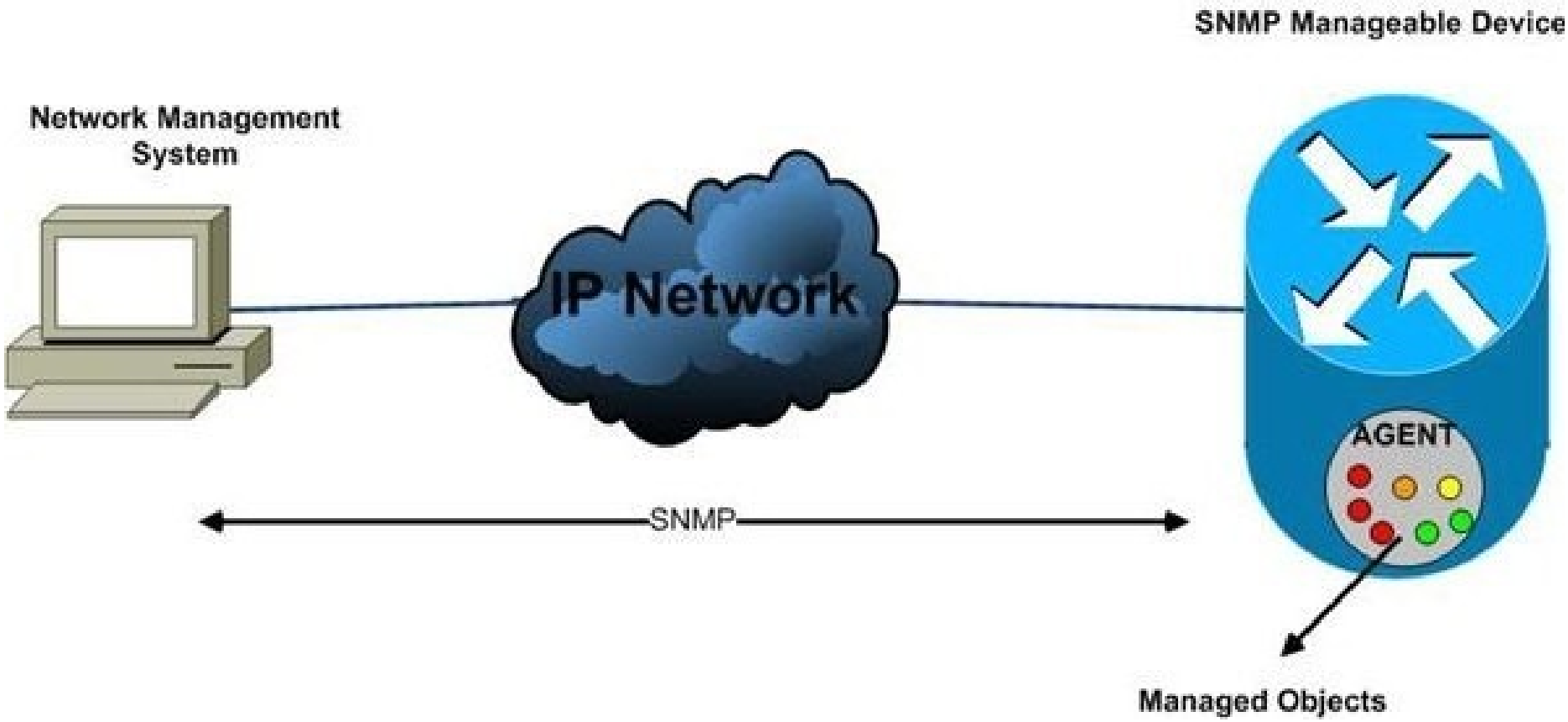
- Agents also contribute to the management process
- The server program running on the agents ,reports anything that is unusual via a warning msg(TRAP) to the manager.
- Management with SNMP involves 3 basic ideas

  1.manager checks agent—reflects the behaviour of the agent

  2.manager forces the agent to perform a task

  3.agent contributes by warning messages

SNMP Concept



COMPONENTS

- SMI-Structure of Management Information
- MIB-Management Information Base
- SNMP uses services provided by these two protocols to do its job

SMI

- Its functions are to name objects,to define the type of data that can be stored in the object and to show how to encode data for transmission over the network
- Basically ensures a well defined syntax and semantics of data required for n/w management

SMI Base Data Types

SMI Base Data Types

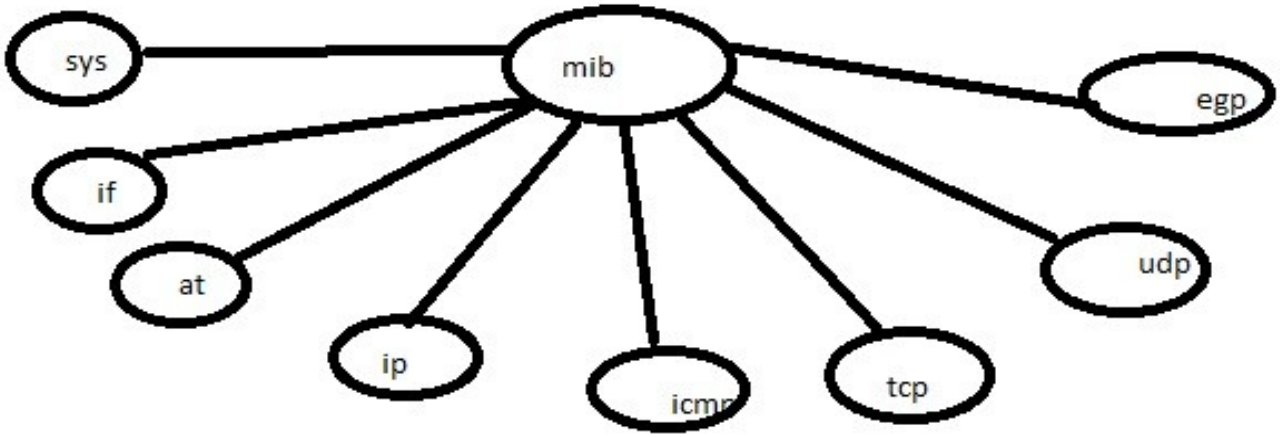
Data Type	Description
INTEGER	ASN.1 32-bit integer between -2^{31} and $2^{31}-1$
Integer32	32-bit integer between -2^{31} and $2^{31}-1$
Unsigned32	Unsigned 32-bit integer between 0 and $2^{32}-1$
OCTET STRING	ASN.1 byte string for binary or text up to 65,535 bytes long
OBJECT IDENTIFER	ASN.1 format administratively assigned object identifier
IPaddress	32-bit Internet address in network-byte order
Counter32	32-bit counter that increases from 0 to $2^{32}-1$ and wraps to 0
Counter64	64-bit counter
Gauge32	32-bit integer that does not count above $2^{32}-1$ or below 0
TimeTicks	Time interval measured in $1/100^{th}$ of a second
Opaque	Uninterpreted ASN.1 string (needed for backward compantibility)

MIB

- Can be thought of as a virtual information store, holding managed objects whose values collectively reflect the current "state" of the network.
- These values may be queried and/or set by a managing entity by sending SNMP messages to the agent that is executing in a managed node on behalf of the managing entity

- Each agent has its own MIB,which is a collection of all objects that the manager can manage.
- Objects are categorised under 8 groups
- Each group has defined variables or tables

MIB Tree Structure



SNMP Protocol Operations

- SNMP defines five messages
  1. GetRequest
  2. GetNextRequest
  3. SetRequest
  4. GetResponse
  5. Trap
- These messages are also known as Physical Data Units(PDU's)

- **GET:** It's a message from the manager towards the agent requesting to get the current value of a MIB object.

- **GETNEXT:** It's a SNMP request from the manager towards the agent for obtaining the current value of the next MIB object. (Followed the GET request).

- **SET:** The SNMP manager uses the set request for updating the current value of the SNMP agents MIB object.

- **GET-RESPONSE:** The agent uses a GET-RESPONSE message when answering to a GET, GETNEXT or SET request in order to provide specific requested information or provide feedback about the process- results of the SET REQUEST.

- **TRAP:** The TRAP message is the only SNMP message initiated by the agent and it is used to inform about errors abnormal events regarding the objects that it manages.

Higher versions

- SNMPV2 defines two more PDUs
  - SNMPV2-Trap
  - GetBulkRequest

SNMP Message Format

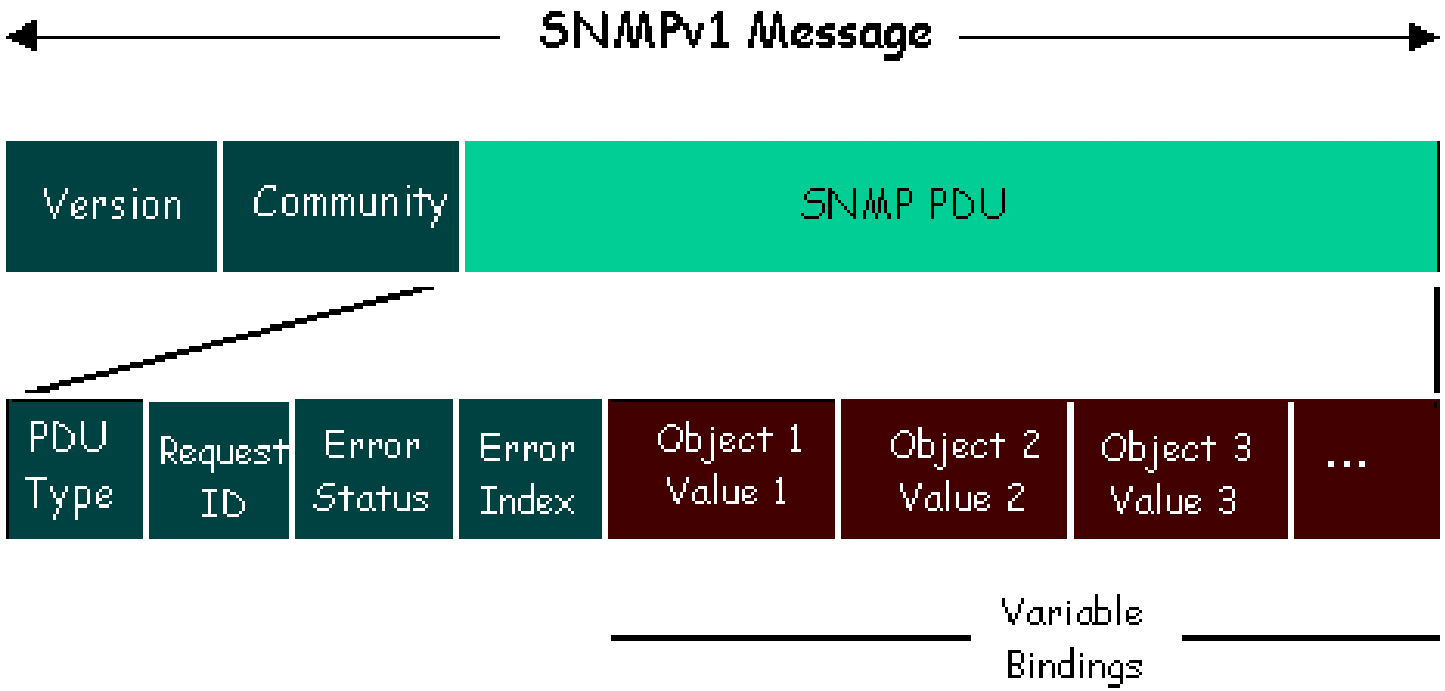
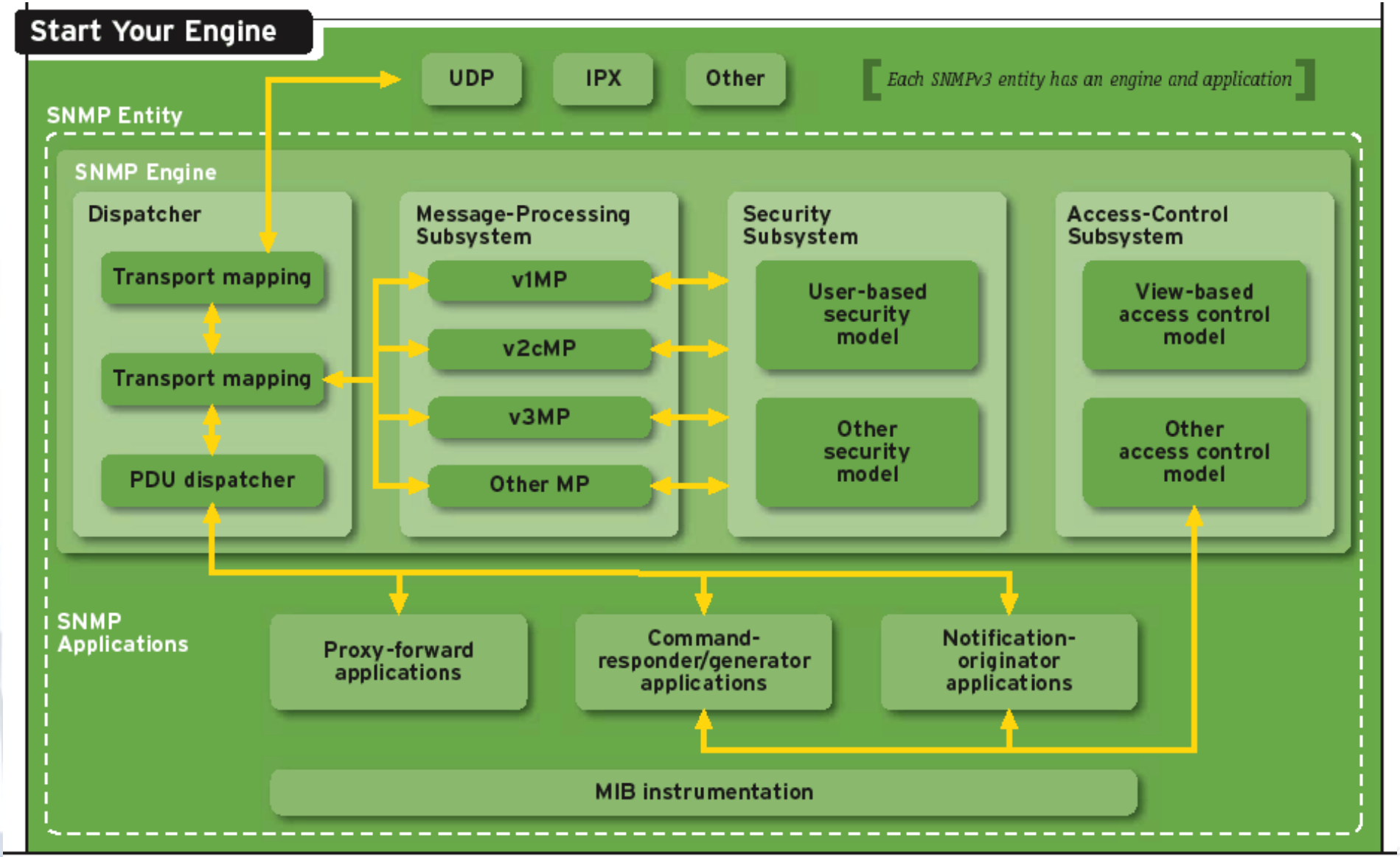


Figure 2: SNMPv1 Message Format

SNMPV3 Engine



MERITS

- Simple to implement
- Robust and extensible
- Meets critical needs
- Agent level overhead is minimal
- Offers the best direct manager agent interface.
- Polling approach is good for LAN based managed object

DEMERITS

- Its too simple and does not scale well
- There is no object oriented data view
- It has no standard control definition
- It has many implementation specific extensions
- It has high communication overhead due to polling

THANK YOU!