Simple Network Management Protocol (SNMP)
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Introduction

The Internet is:

- a world-wide network of networks

- with gateways linking organizations in North and South America, and Europe

The networks all use a common suite of networking protocols, Transmission Control Protocol/Internet Protocol (TCP/IP).
As MU-SPIN schools' networks grow in scale, two facts will become painfully evident:

- The network and its associated resources become indispensable to the organization; and
- Many things can go wrong, thereby disabling the network or a portion of it, or degrading performance to an unacceptable level.

SNMP is a key Internet Standard
NETWORK MANAGEMENT MODEL

SNMP  Simple Network Management Protocol
MN    Managed Node (SNMP agent)
NMS   Network Management Station

Router

HUB

(Network Management Protocol NMP)
The agent is responsible for the following duties:

- collecting and maintaining information about itself and its local environment;
- responding to manager commands to alter the local configuration or operating parameters.
SNMP ARCHITECTURE

Network Management Station

Text-based User Interface

SNMX (snmp application)

SNMP Agent

MIB

SNMP

Get/Set

Trap

SNMP Agent

MIB

Get/Set

SNMP

Trap

Slide Number 7
MIB-I was designed to include the minimal number of managed objects.

For an object to be included, it had to meet these criteria:

- object must be essential for either fault or configuration analysis.
- control objects must have limited properties.
- The object must have evidenced utility.

- To make MIB-I attractive to vendors, a limit was set to ~ 100 objects.

- The object must not be easily derivable from other objects.

- The object must be sufficiently general in nature.
MIB-I evolved into MIB-II.

MIB-II was to maintain compatibility with MIB-I, with three areas to be addressed:

- incremental additions to reflect new operational requirements;
- improved support for multi-protocol devices; and,
- textual clean-up to improve clarity.

• MIB-II's managed object count grew to ~ 171; most vendors now implement MIB-II.
SNMP messages contain two parts:

- a community name, along with authentication information and,

- data, containing an SNMP operation and associated operands.
SNMP FUNCTIONS

• **Get**, which is used by a manager to retrieve an item from an agent's MIB;

• **Set**, which is used by a manager to set a value in an agent's MIB; and

• **Trap**, which is used by an agent to send an alert to a manager.
function gateway-name community-name object-identifier [object-identifier ..]
SNMP Variables

- **sysDescr** - A textual description of the entity, including hardware and software version.

- **sysUpTime** - The time since the network management portion of the system was last re-initialized.
SNMP Variables Cont’d

• a command similar to:
  
  ```
  get rtr-magic public sysDescr sysUpTime
  ```

• yields results similar to:

  ```
  Name:  system.sysDescr.0
  ```

  ```
  OCTET STRING- (ascii):  GS Software  
  (GS3-K0, Version 9.1(4) [fc1],  
  SOFTWARE Copyright (c) 1986-1993 by  
  Cisco Systems, Inc. Compiled Thu  
  25-Mar-93 09:49
  ```

  ```
  Name:  system.sysUpTime.0
  ```

  ```
  Timeticks:  (33029963) 3 days, 
  19:44:59
  ```
1. People in the organization depend on the system being reliable; and

2. LANs, routers, lines, and other communications resources have costs.

The ultimate goal to provide:

- a consistent, predictable, acceptable level of service from the available network resources.
SYSTEM MONITORING Example

Execute the following command every hour:

- `get rtr-magic public ifInUcastPkts ifInNUcastPkts`
Execute the following command every hour;

- `get rtr-magic public ifInErrors ifOutErrors`
- `plot output.`
Fault Detection

- develop source/destination matrix
- query MIB variables
Configuration Management

Is the setting, collecting and storing of:

- the state and parameters of network resources.
The goal is to:

- measure system and component utilization
- locate bottlenecks.
• Commercial and Non-commercial products
Commercial Product

- GUI with visual layout of network
- public domain Vs Commercial products
Conclusion and Recommendations

• SNMX is currently available for the following platforms:
  • SunOS
  • Sun Solaris
  • Linux
  • Silicon Graphics, Inc.
  • IBM AIX
  • SCO Release 3
  • BSDI BSD/OS
  • DECStation Ultrix
  • Harris Night Hawk
  • HP Apollo
  • HP 9000 HP-UX
  • MIPS