MANAGING THE INTERNET

TUTURIAL FOR THE
CENTRAL ORGANIZATION OF THE *TELEMATICA INSTITUUT*

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CONTENT

OVERVIEW OF INTERNET MANAGEMENT

- PRINCIPLE OPERATION
- NEW DEVELOPMENTS
- OTHER APPROACHES
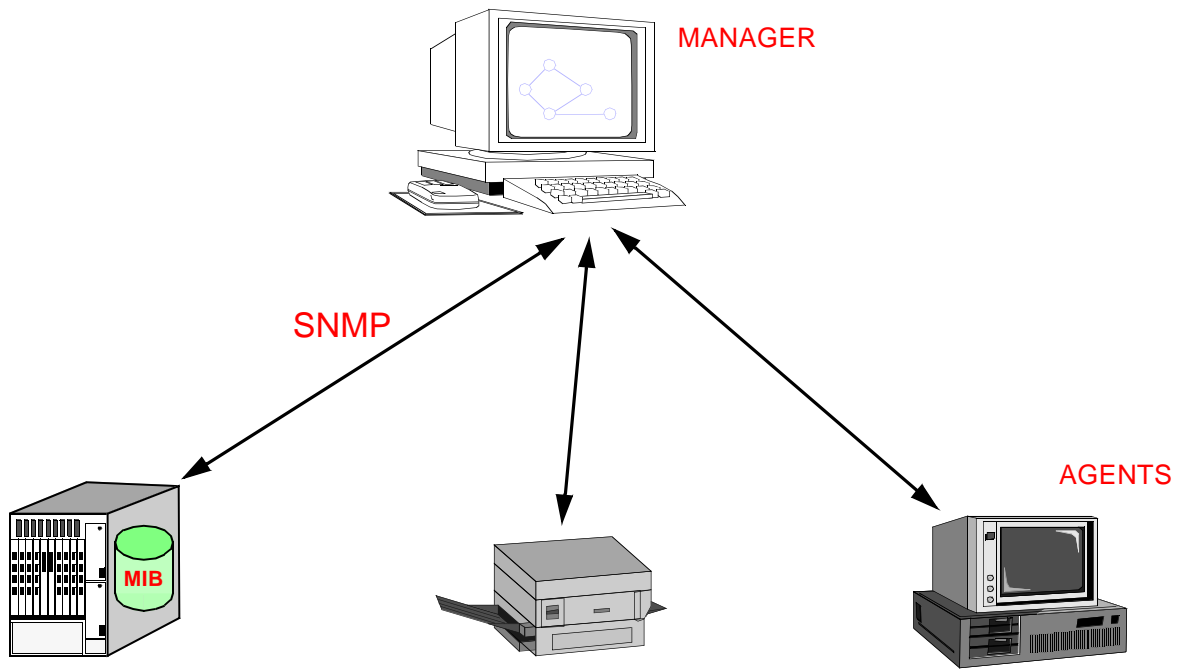 - ISO-ISO
  - ITU-T / TMN
  - DMTF / CIM

BREAK

TECHNICAL DETAILS
- SIMPLE NETWORK MANAGEMENT PROTOCOL
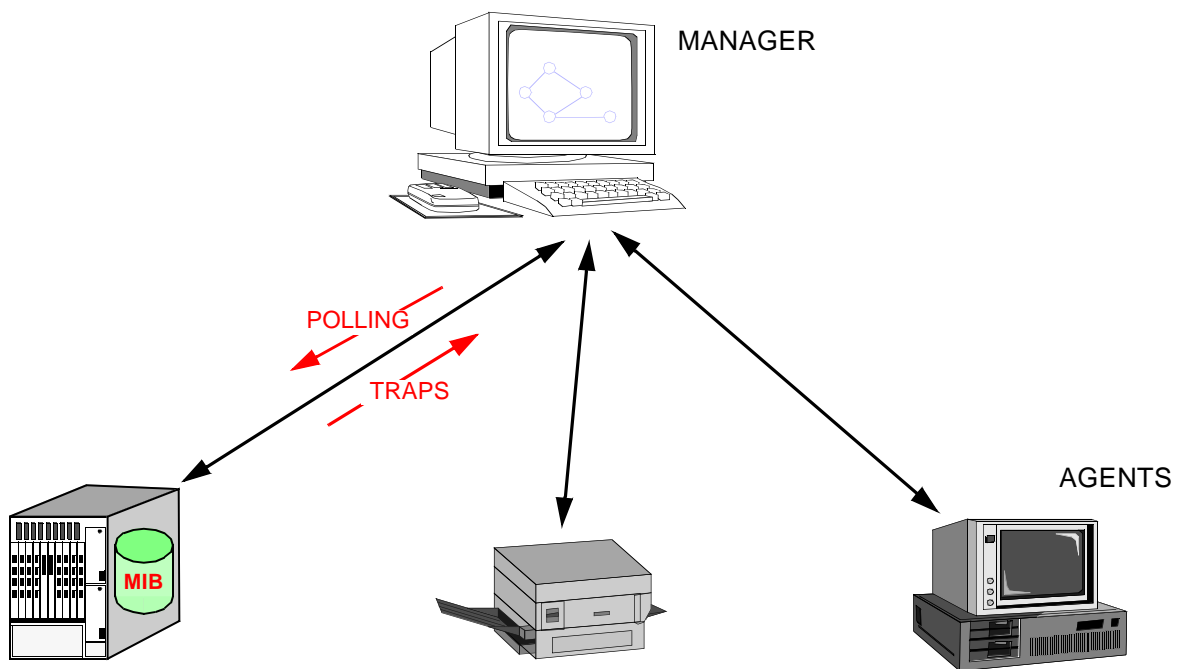- MANAGEMENT INFORMATION BASES
- FURTHER INFORMATION

PRINCIPLE OPERATION

MANAGER

SNMP

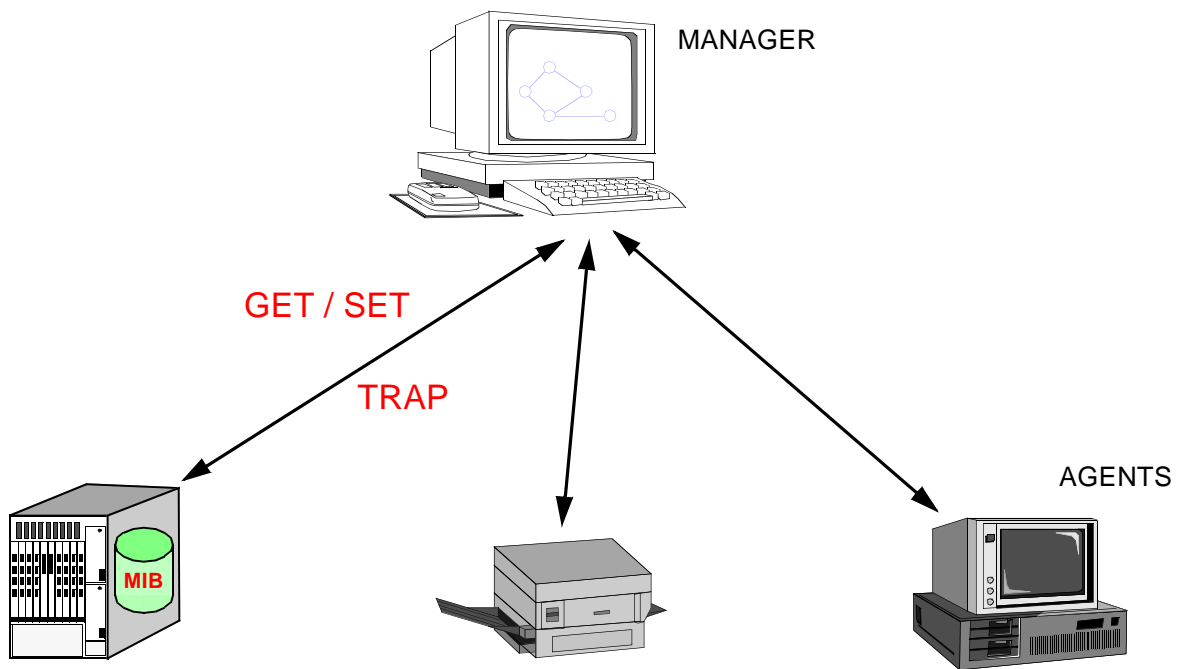AGENTS
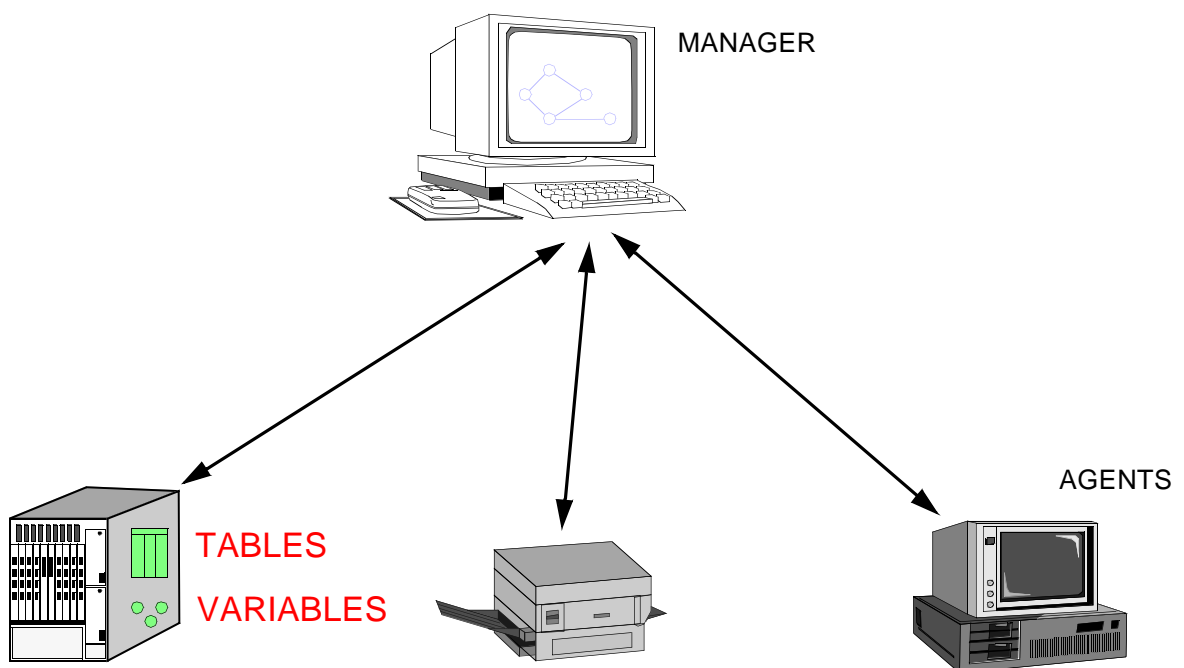
MIB

PRINCIPLE OPERATION

MANAGER

POLLING

TRAPS

AGENTS

MIB

PRINCIPLE OPERATION

MANAGER

GET / SET

TRAP

AGENTS

MIB

PRINCIPLE OPERATION

MANAGER

AGENTS

TABLES

VARIABLES

SNMPv3

ALLOWS SECURE COMMUNICATION

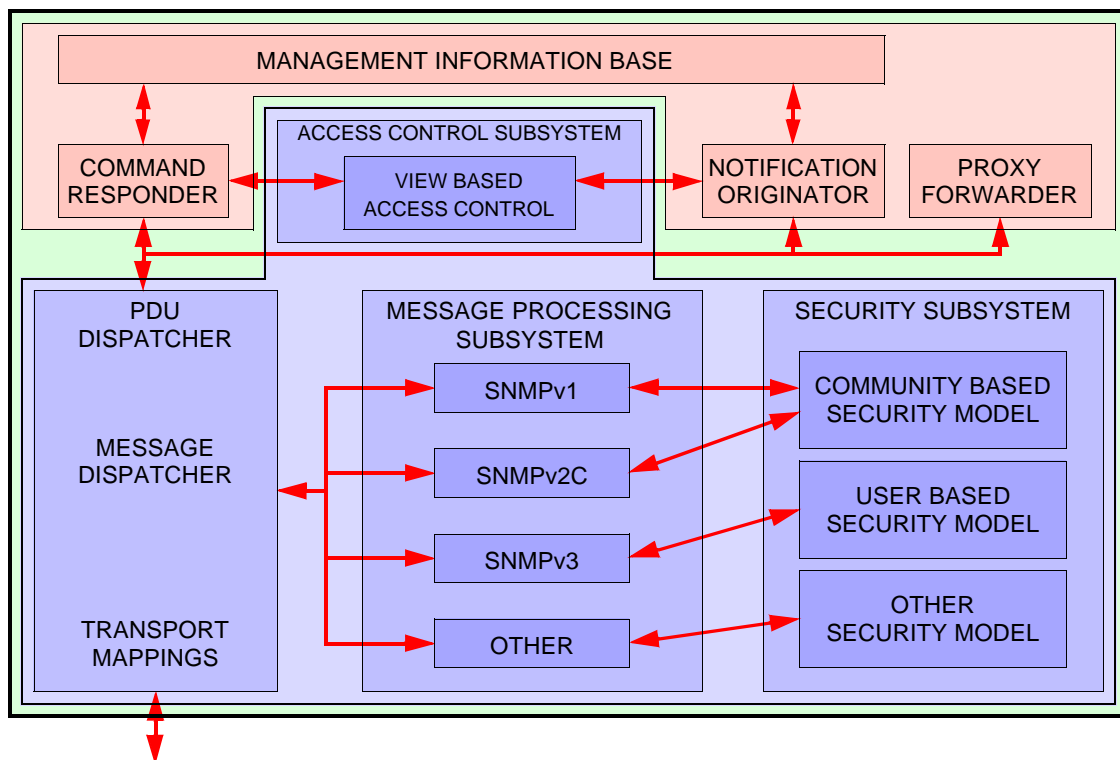| THREAT	ADDRESSED?	MECHANISM
MASQUERADE	YES	MD5 / SHA-1
REPLAY	YES	TIME STAMP
DISCLOSURE	YES	DES
INTEGRITY	YES	(MD5)
DENIAL OF SERVICE	NO	
TRAFFIC ANALYSIS	NO	

ALLOWS ACCESS CONTROL

HAS A MODULAR ARCHITECTURE
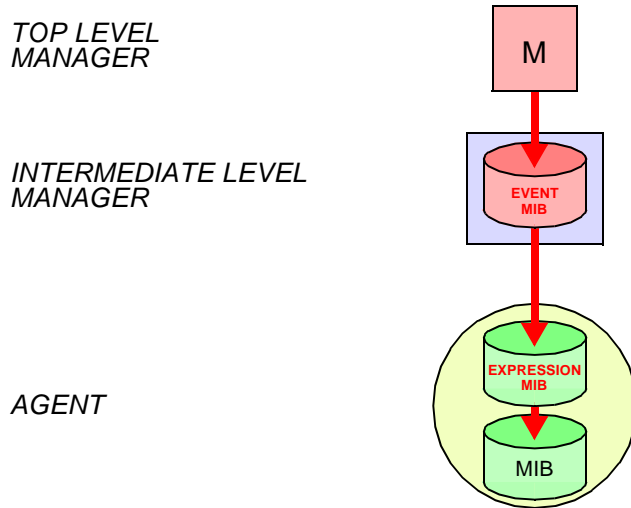
MANY IMPLEMENTATIONS

MODULAR SNMPv3 ARCHITECTURE: AGENT

NEW DEVELOPMENTS

DISTRIBUTED MANAGEMENT

EXPRESSION AND EVENT MIB

TOP LEVEL
MANAGER

M

INTERMEDIATE LEVEL
MANAGER

EVENT MIB

AGENT

EXPRESSION MIB

MIB

NEW DEVELOPMENTS

DISTRIBUTED MANAGEMENT

SCRIPT MIB

TOP LEVEL
MANAGER

M

SCRIPT REPOSITORY

INTERMEDIATE LEVEL
MANAGER

SNMP

HTTP

SCRIPT MIB

RUNTIME ENVIRONMENT

ICMP
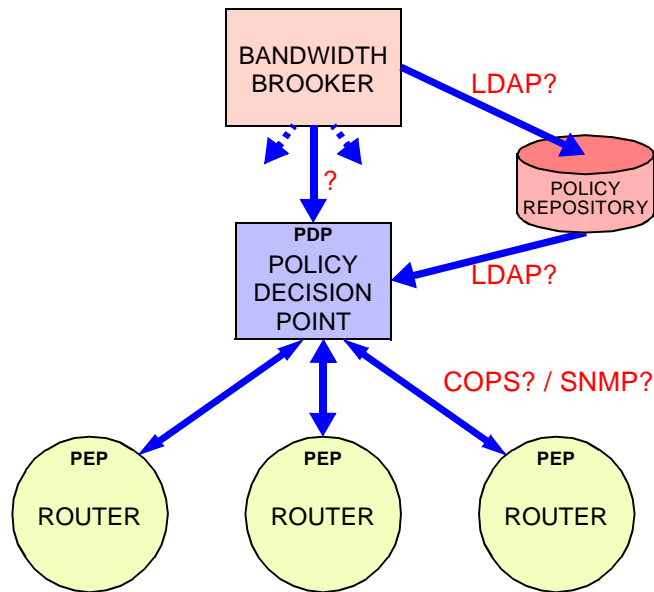
SNMP

AGENTS

A   A   A   A   A
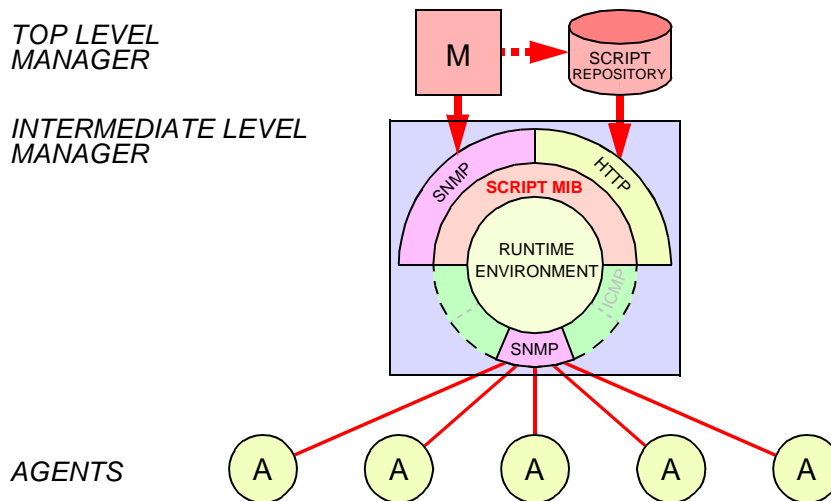
NEW DEVELOPMENTS

POLICY BASED MANAGEMENT

COPS VERSUS SNMP

COPS:
• DEDICATED "CONFIGURATION MANAGEMENT" PROTOCOL
• HIGHER LEVEL OBJECTS THAN USUAL WITH SNMP
• POLICY INFORMATION BASE (PIB)
• SINGLE OPERATION TO ADD OR DELETE TABLE ROWS
• RELIABLE COMMUNICATION BETWEEN PDP AND PEP (BECAUSE OF TCP)
• EACH PEP IS CONNECTED TO SINGLE PDP

SNMP:
• INTEGRATED APPROACH TO MANAGEMENT
• POLICIES CAN BE DEFINED WITHIN MIBs
• EACH PEP MAY BE CONNECTED TO MULTIPLE PDPs

NEW DEVELOPMENTS

IRTF NETWORK MANAGEMENT RESEARCH GROUP

EFFICIENT TRANSFER OF BULK MANAGEMENT DATA
- SNMP OVER TCP
- COMPRESSION
- GET-SUBTREE OPERATOR

SMI NEXT GENERATION
- INDEPENDENT FROM OTHER EXTERNAL STANDARDS
- BASED ON AUGMENTED BNF
- MORE DATA TYPES
- EASIER TO PARSE

ACTIVE MANAGEMENT
- ALLOW MANAGEMENT FUNCTIONS WITHIN MIBs
- CAN BE USED OVER SNMP OR COPS
- POWERFUL NEW IDEA!

OTHER APPROACHES: CMIP

	CMIP	SNMP
model	event based	polling based
information approach	object oriented	variable oriented
complexity	agent is complex	agent is simple
state information	kept by agent	kept by manager
underlying service	CO - reliable	CL - unreliable
implementation	difficult	simple *(V2& V3 are more difficult)*
retrieves	objects	scalars (tables)

OTHER APPROACHES: CMIP - 2

	CMIP	SNMP
actions	possible	via 'trick'
object selection	scoping & filtering	-
security	via underlying services	- *authentication / encryption / ACL-lists*
management functions	many	few
price	**high**	**low**
market acceptance	**no**	**yes**

OTHER APPROACHES: TMN

TELECOMMUNICATIONS MANAGEMENT NETWORK

ITU-T

DEFINITION STARTED 1985

DEFINED IN M-SERIES
• M.3010

USES OSI SYSTEMS MANAGEMENT
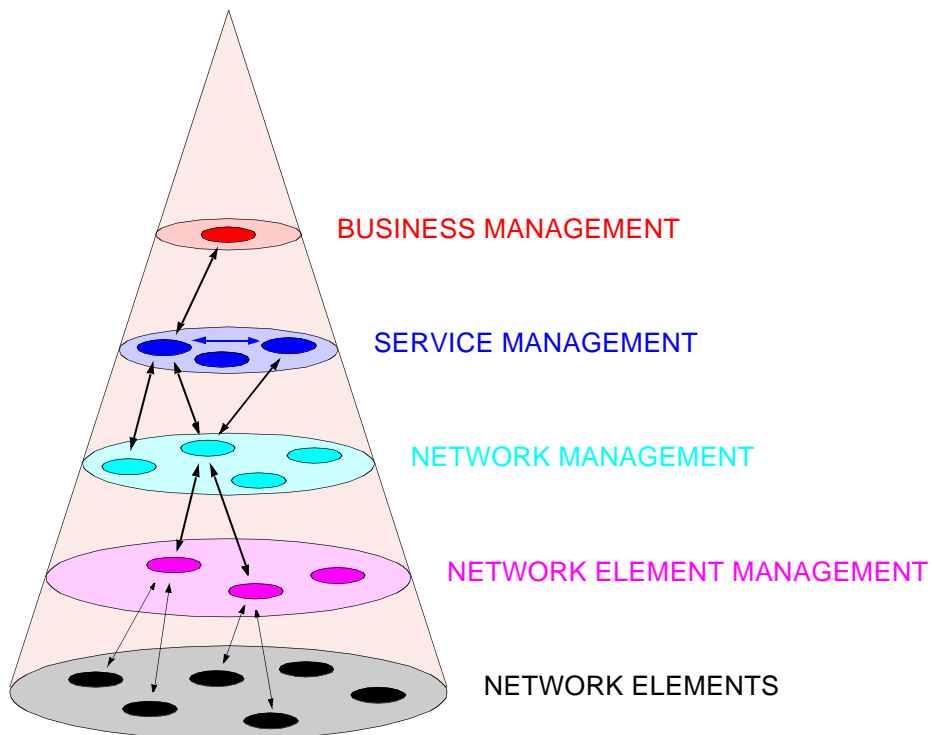
FAMOUS FOR ITS MANAGEMENT HIERARCHY CONCEPT

ARCHITECTURES
• FUNCTIONAL ARCHITECTURE
• PHYSICAL ARCHITECTURE
• INFORMATION ARCHITECTURE
• LOGICAL LAYERED ARCHITECTURE

TMN: RESPONSIBILITY MODEL

BUSINESS MANAGEMENT

SERVICE MANAGEMENT

NETWORK MANAGEMENT

NETWORK ELEMENT MANAGEMENT

NETWORK ELEMENTS

OTHER APPROACHES: DMTF

DISTRIBUTED MANAGEMENT TASK FORCE

WEBM:
WEB BASED ENTERPRISE MANAGEMENT

CIM:
COMMON INFORMATION MODEL

DOCUMENTS:
- CIM SCHEMA
- XML ENCODINGS FOR CIM
- CIM OPERATIONS OVER HTTP

FURTHER INFO: WWW SERVERS

- IETF
http://www.ietf.org/

- The SimpleWeb
http://www.simpleweb.org/

- The Simple Times
http://www.simple-times.org/

- The Smurfland NM Web Server
http://netman.cit.buffalo.edu/