



# INTERNET MANAGEMENT WHERE WE ARE AND WHERE WE GO

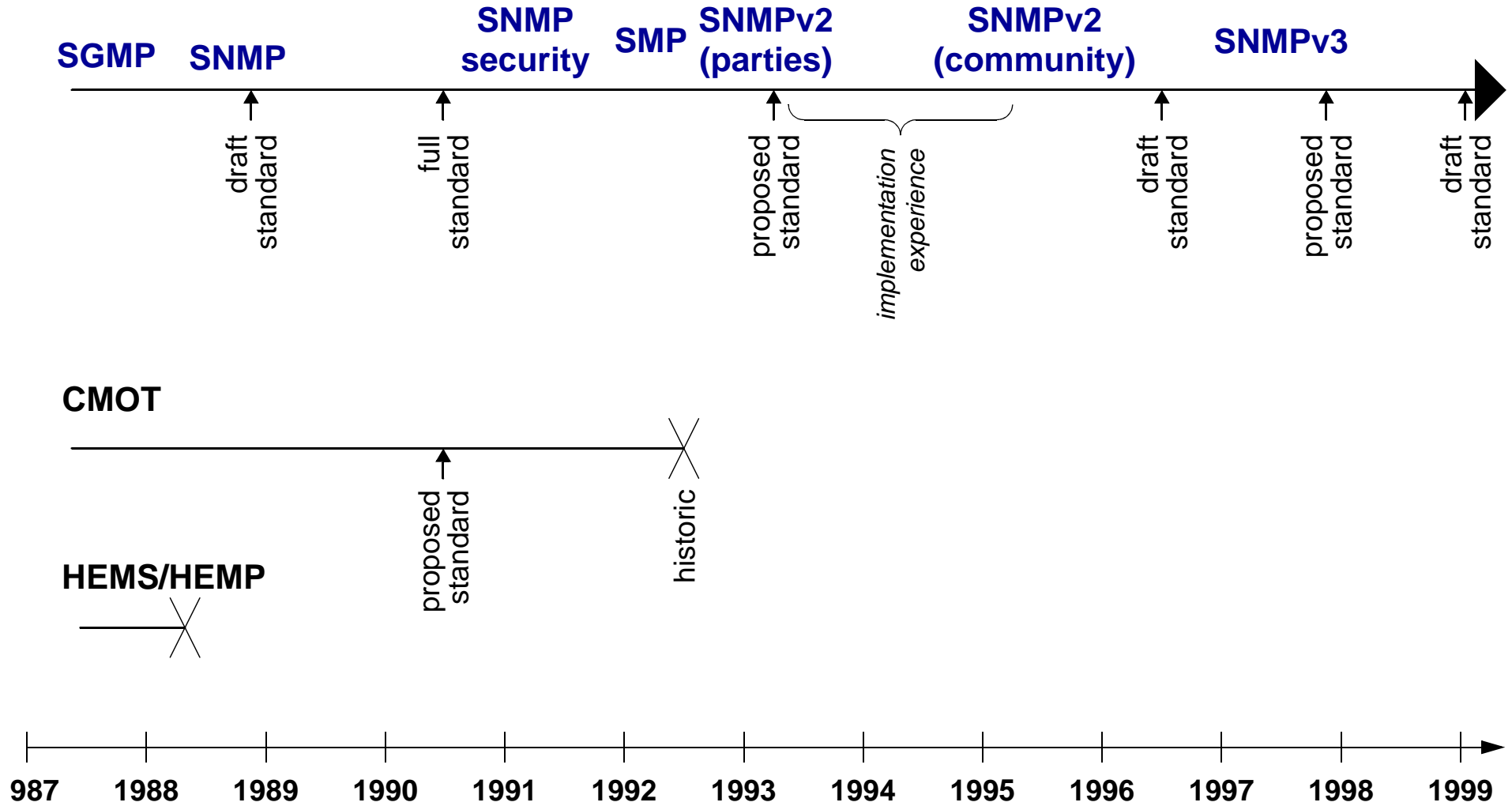
PRESENTATION  
AT THE *HIGH SPEED NETWORKING 2000* WORKSHOP  
BALATONFÜRED, HUNGARY  
MAY 22, 2000

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# SNMP HISTORY





# DISTRIBUTED MANAGEMENT

THREE APPROACHES ARE BEING DEFINED

MIB BASED

- EXPRESSION MIB
- EVENT MIB
- NOTIFICATION LOG MIB

SCRIPT BASED

- SCRIPT MIB
- SCHEDULE MIB

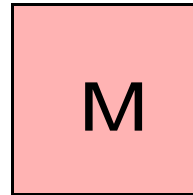
REMOTE OPERATIONS BASED

- REMOTE OPERATIONS MIB

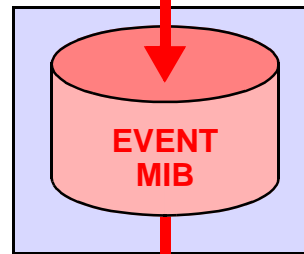


# EXPRESSION AND EVENT MIB

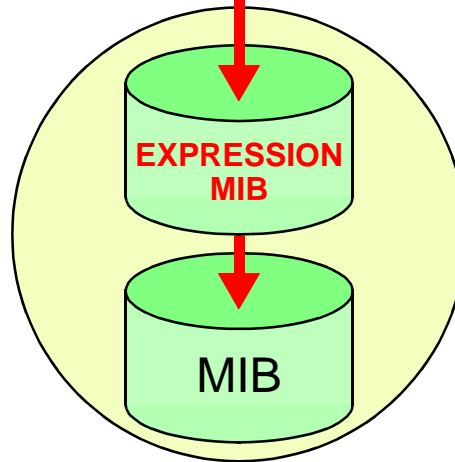
*TOP LEVEL  
MANAGER*



*INTERMEDIATE LEVEL  
MANAGER*



*AGENT*





## EXPRESSION AND EVENT MIB: CHARACTERISTICS

- STANDARD MIB APPROACH
- RESEMBLES THE OLD SNMPv2 M2M MIB

### EXPRESSION MIB:

- INPUT ARE (WILDCARDED) VARIABLES OF A (LOCAL) MIB
- OPERATES ON ABSOLUTE AS WELL AS DELTA VALUES
  - RICH SET OF EXPRESSIONS
  - THE OUTPUT IS STORED IN THE *VALUE TABLE*
- THIS TABLE MAY SERVE AS INPUT FOR OTHER EXPRESSIONS

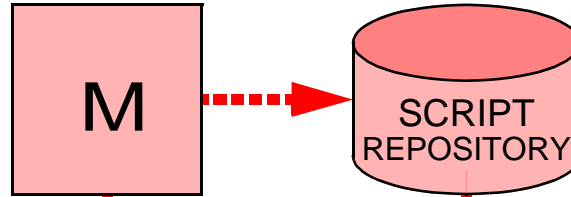
### EVENT MIB:

- INPUT ARE VARIABLES OF A (REMOTE) MIB
- TRIGGERS ON CHANGES, OR TRESHOLD CROSSING
- GENERATES A NOTIFICATION OR SET OPERATION

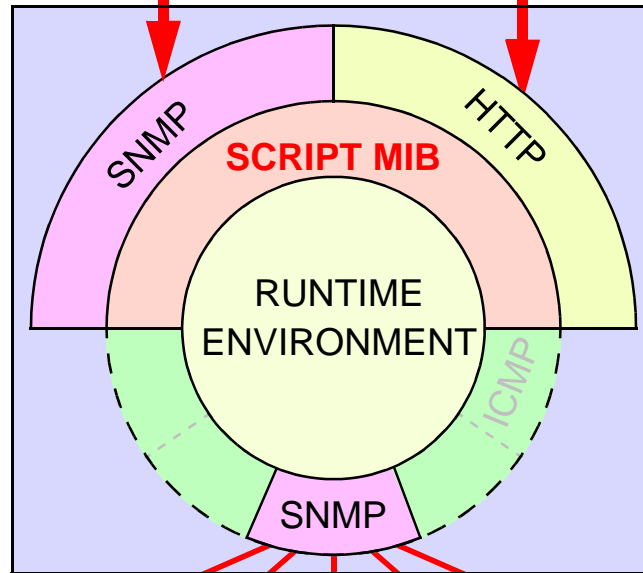


# SCRIPT MIB

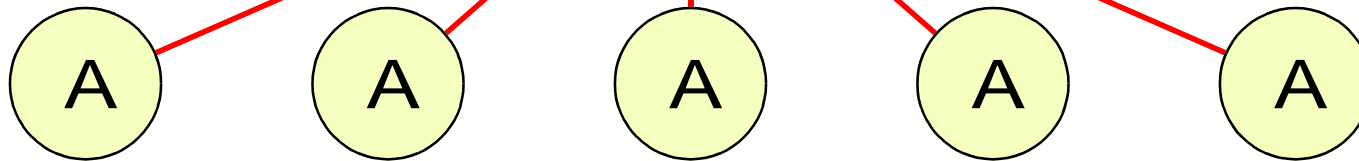
**TOP LEVEL  
MANAGER**



**INTERMEDIATE LEVEL  
MANAGER**



**AGENTS**





## SCRIPT MIB: CHARACTERISTICS

- FUNCTIONALITY CAN BE DEFINED AT RUN-TIME
  - POWERFUL AUTONOMOUS ACTIONS
- MAY BE EASIER TO OPERATE FOR THE TOP-LEVEL MANAGER
  - PROTECTION MECHANISMS NECESSARY
    - DIFFERENT SCRIPT LANGUAGES



## REMOTE OPERATIONS MIB

### PING MIB

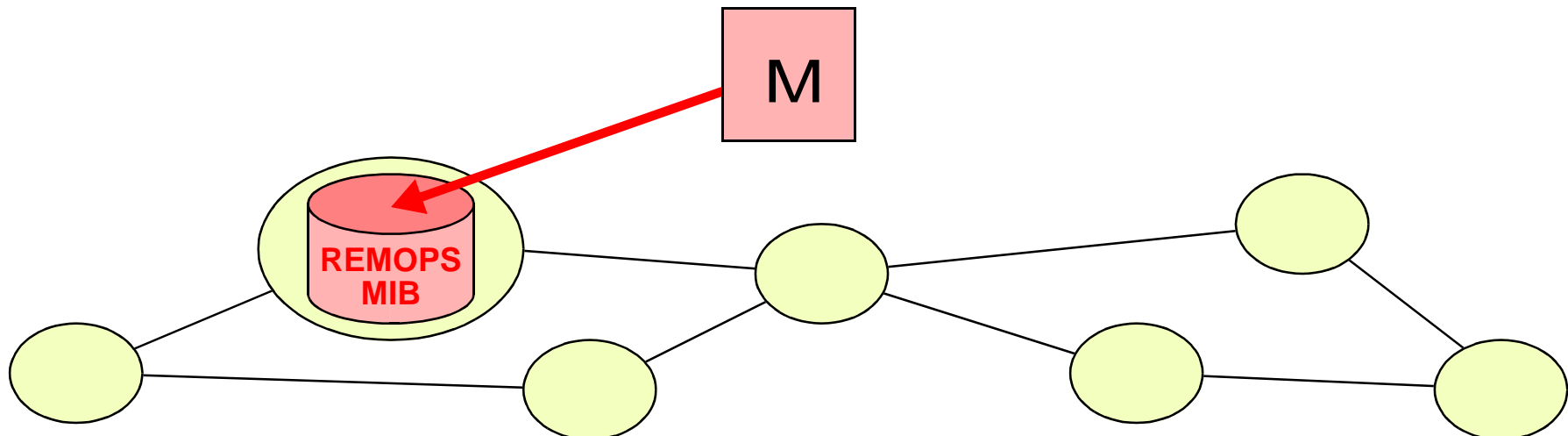
- TO PERFORM PING FROM A REMOTE HOST

### TRACEROUTE MIB

- TO PERFORM TRACEROUTE FROM A REMOTE HOST

### NAME LOOKUP MIB

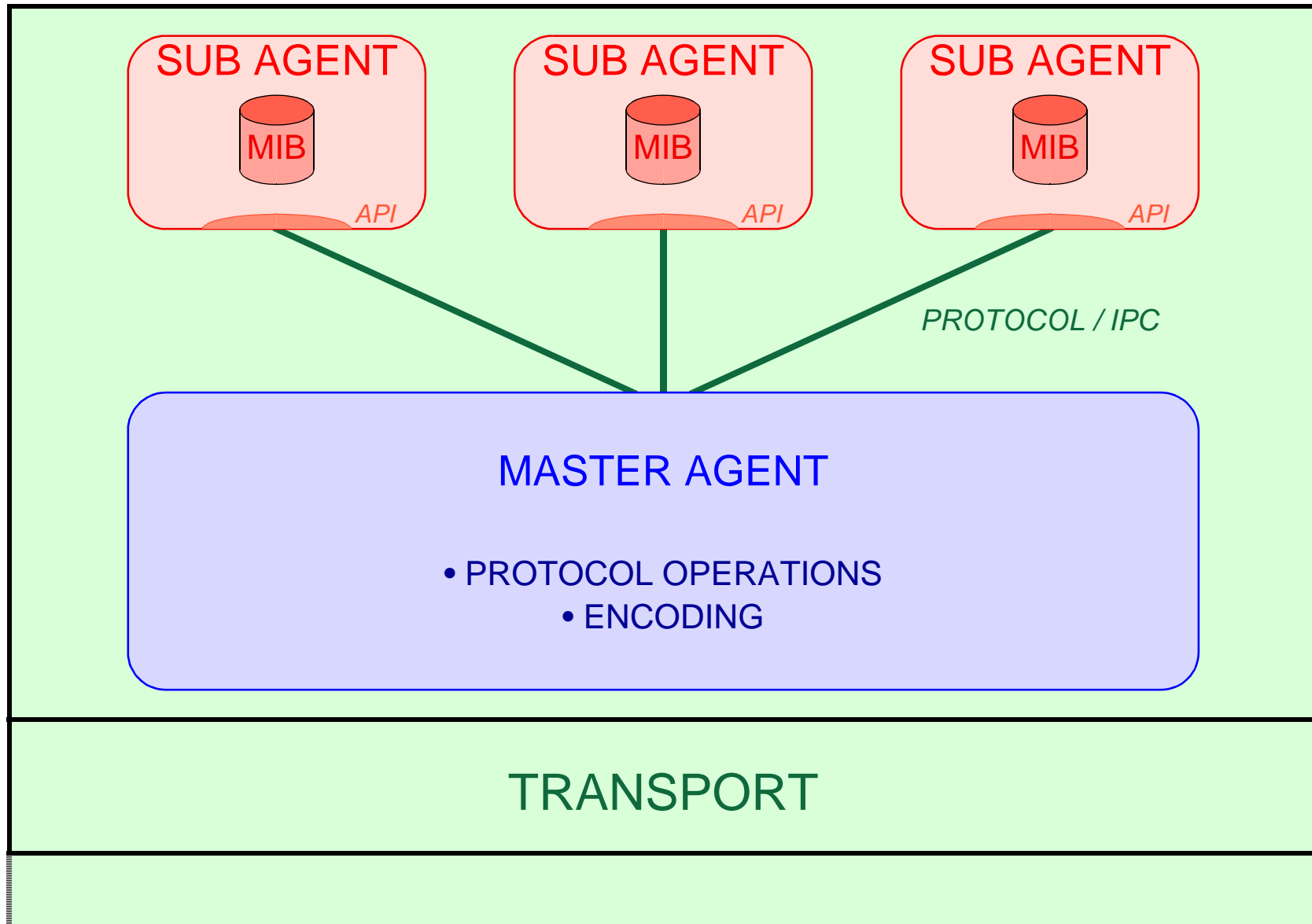
- TO PERFORM NAME LOOKUP FROM A REMOTE HOST







# EXTENSIBLE AGENTS





## HISTORY

SMUX (1991: RFC 1227)

SNMP MULTIPLEXING PROTOCOL

DPI (1991-1994: RFC 1228 & RFC 1592)

DISTRIBUTED PROTOCOL INTERFACE

RESEARCH PROTOTYPES

FOR EXAMPLE: UNIVERSITY OF TWENTE - UT-SNMPv2

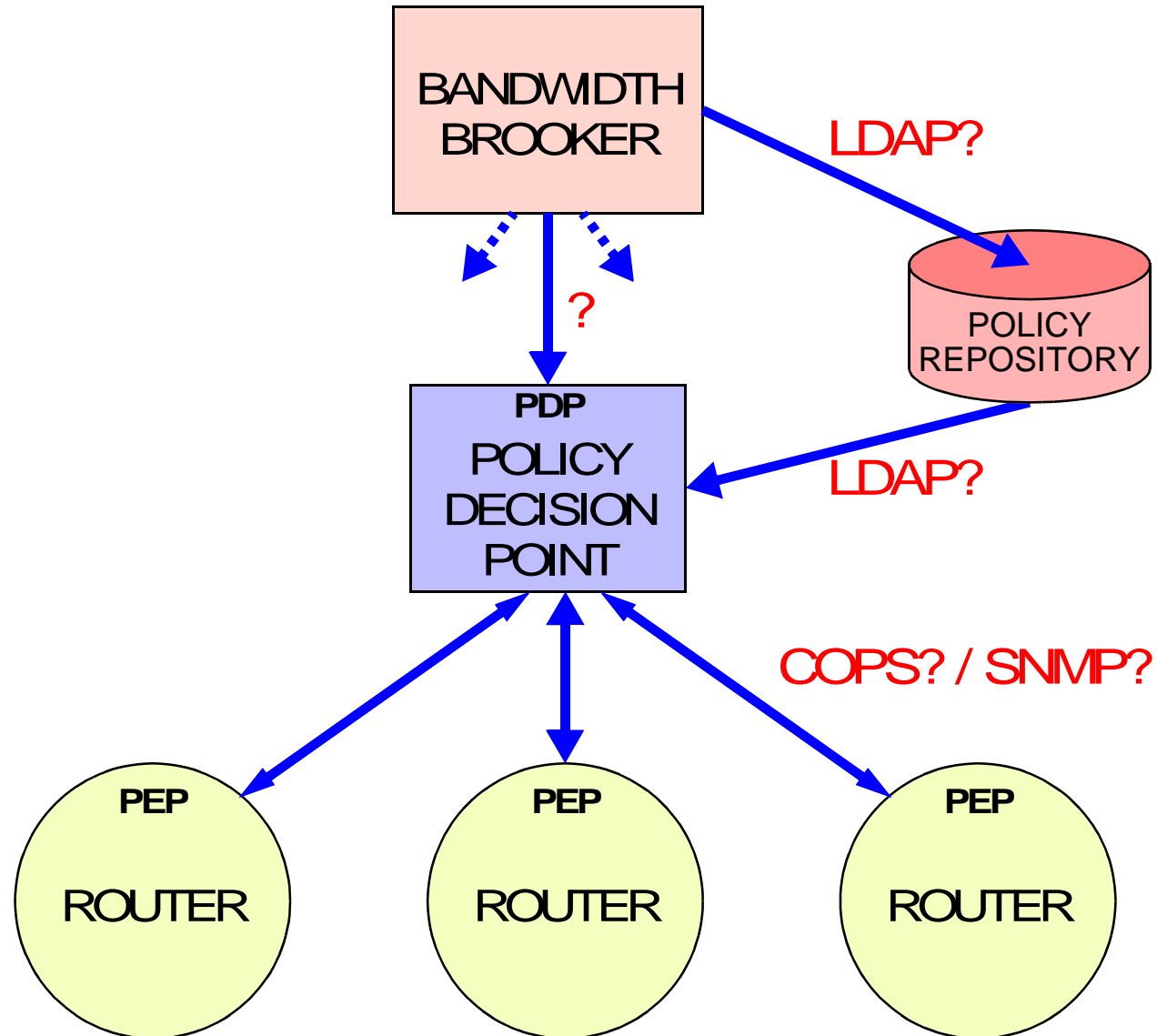
COMMERCIAL PRODUCTS

FOR EXAMPLE: SNMP RESEARCH - EMANATE  
(ENHANCED MANAGEMENT AGENT THROUGH EXTENSIONS)

AGENTX (1998-2000: RFC2741 & RFC2742)



# POLICY BASED MANAGEMENT





## COPS VERSUS SNMP

### COPS:

- SPECIAL CASE OF CONFIGURATION MANAGEMENT
- 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



## IRTF NMRG

### 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 INTEGRATED WITH SMIV2
- CAN BE USED OVER SNMP OR COPS
- **POWERFUL NEW IDEA!**



## FURTHER INFO: WWW SERVERS

- IETF

<http://www.ietf.org/>

- IRTF

<http://www.irtf.org/>

- The SimpleWeb

<http://www.simpleweb.org/>

- The Simple Times

<http://www.simple-times.org/>