OVERVIEW

INTRODUCTION
- SNMP GOALS
- SNMP HISTORY

STRUCTURE OF MANAGEMENT INFORMATION
- SMI

MANAGEMENT INFORMATION BASE
- MIB-II

SIMPLE NETWORK MANAGEMENT PROTOCOL
- SNMP

SNMP GOALS

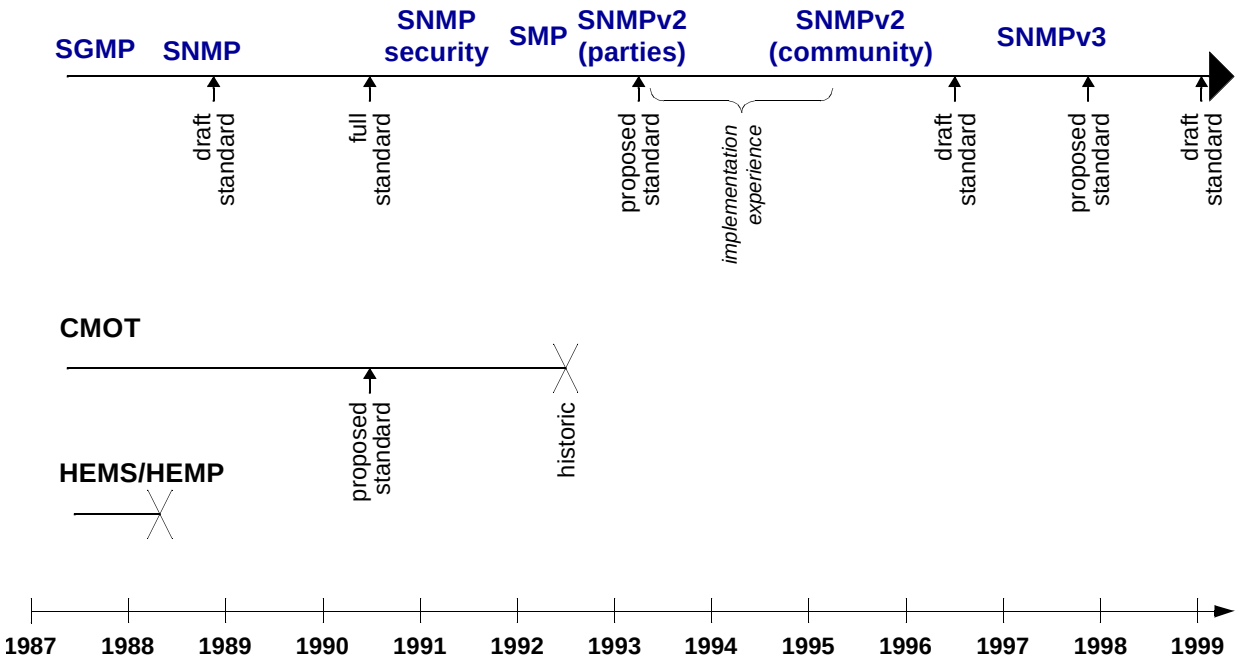
UBIQUITY
- PCs AND CRAYs

INCLUSION OF MANAGEMENT SHOULD BE INEXPENSIVE
- SMALL CODE
- LIMITED FUNCTIONALITY

MANAGEMENT EXTENSIONS SHOULD BE POSSIBLE
- NEW MIBs

MANAGEMENT SHOULD BE ROBUST
- CONNECTIONLESS TRANSPORT

SNMP HISTORY



STRUCTURE OF MANAGEMENT INFO

SMI

STRUCTURE OF MANAGEMENT INFORMATION
RFC 1155, RFC 1212

VERSION 2
RFC 2578, RFC 2579, RFC 2580

MAKES THE DEFINITION OF (NEW) MIBs EASIER

SMI

MANAGEMENT INFORMATION WITHIN MANAGED SYSTEMS
MUST BE REPRESENTED AS:

- SCALARS
- TABLES

(= TWO DIMENSIONAL ARRAYS OF SCALARS)

THE SNMP PROTOCOL CAN ONLY EXCHANGE
(A LIST OF) SCALARS

DEFINED IN TERMS OF ASN.1 CONSTRUCTS

SMI: DATA TYPES FOR SCALARS

SIMPLE TYPES

- INTEGER
- OCTET STRING
- OBJECT IDENTIFIER
- NULL

APPLICATION-WIDE TYPES

- IpAddress
- NetworkAddress
- Counter
- Gauge
- TimeTicks
- Opaque

SMIv2 NEW TYPES

- Unsigned 32
- Counter 64
- Bits

MIB-II

DEFINES THE VARIABLES TO MANAGE THE TCP/IP PROTOCOL STACK

170 VARIABLES

RFC 1213

NEW:
RFC 1907 (System info)
• RFC 2011 (IP)
• RFC 2012 (TCP)
• RFC 2013 (UDP)
• RFC 2233 (Interfaces)
• etc.

DESIGN CRITERIA

• ESSENTIAL FOR FAULT OR CONFIGURATION MANAGEMENT

• ONLY WEAK CONTROL OBJECTS

• SMALL NUMBER OF OBJECTS

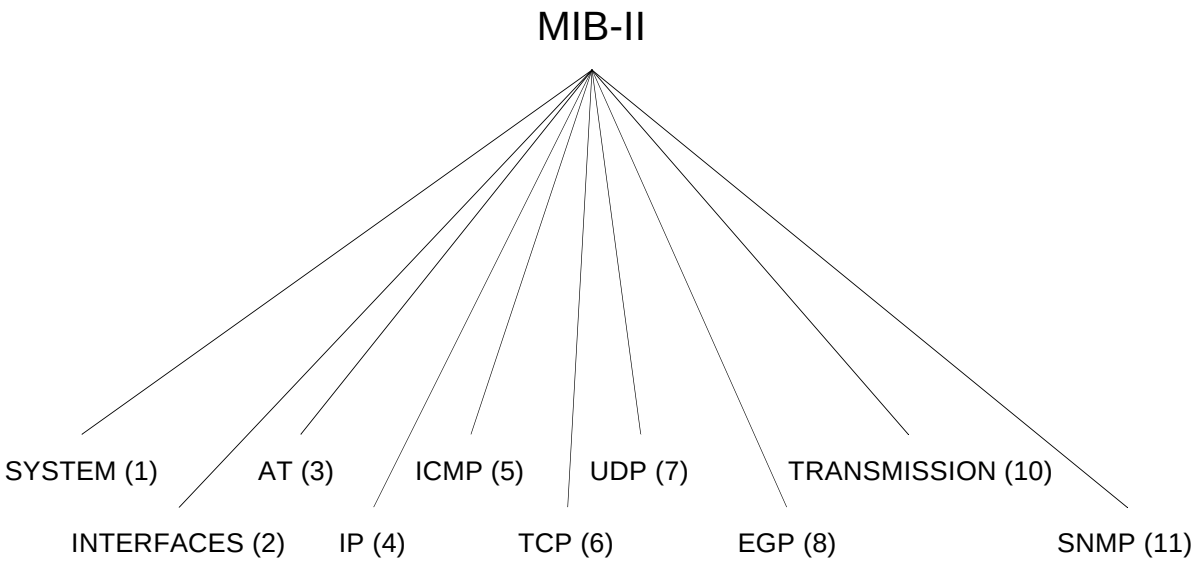
• AVOID REDUNDANCY

• EVIDENCE OF UTILITY

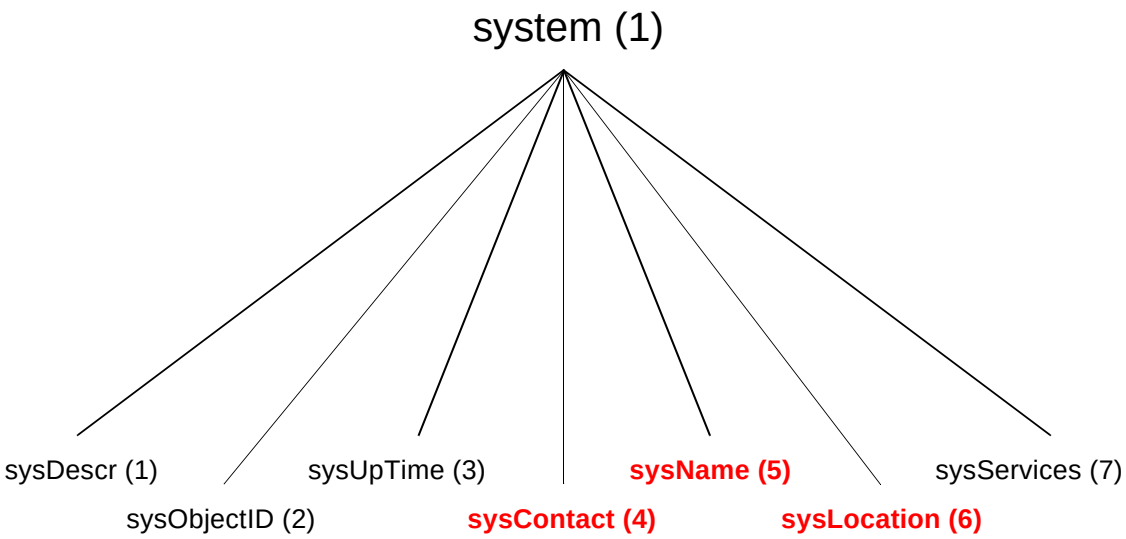
• DO NOT DISTURB NORMAL OPERATION

• NO IMPLEMENTATION SPECIFIC ISSUES

STRUCTURE



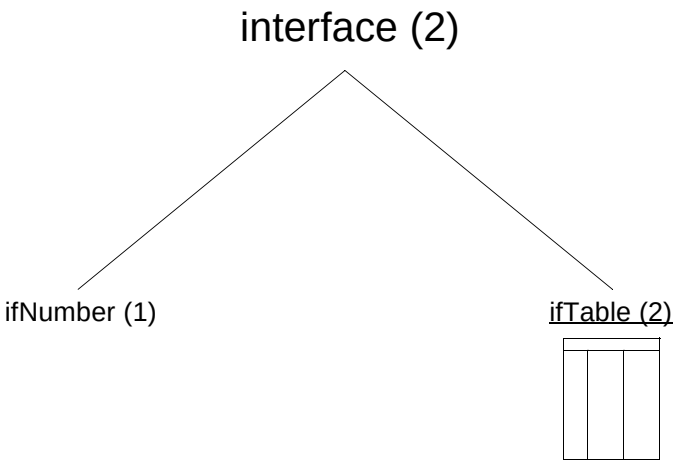
SYSTEM GROUP



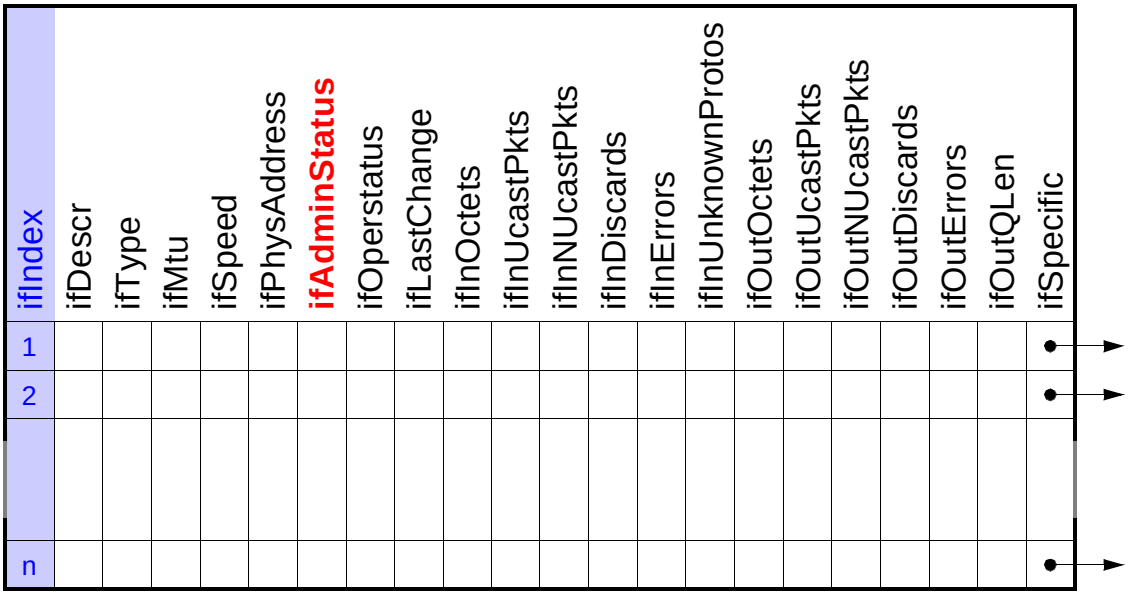
EXAMPLE

sysDescr:	"**Cisco Gateway**"
sysObjectID:	**1.3.6.1.4.1.9.1.1**
sysUpTime:	**37153422** *(4 days, 7 h, 12 min, 14.22 s)*
sysContact:	"**helpdesk@cs.utwente.nl**"
sysName:	"**utic01.cs.utwente.nl**"
sysLocation:	"**near logica meeting room**"
sysServices:	**6** *(bridge and router functions)*

INTERFACES GROUP



ifTable



ifType and ifStatus

- ifType

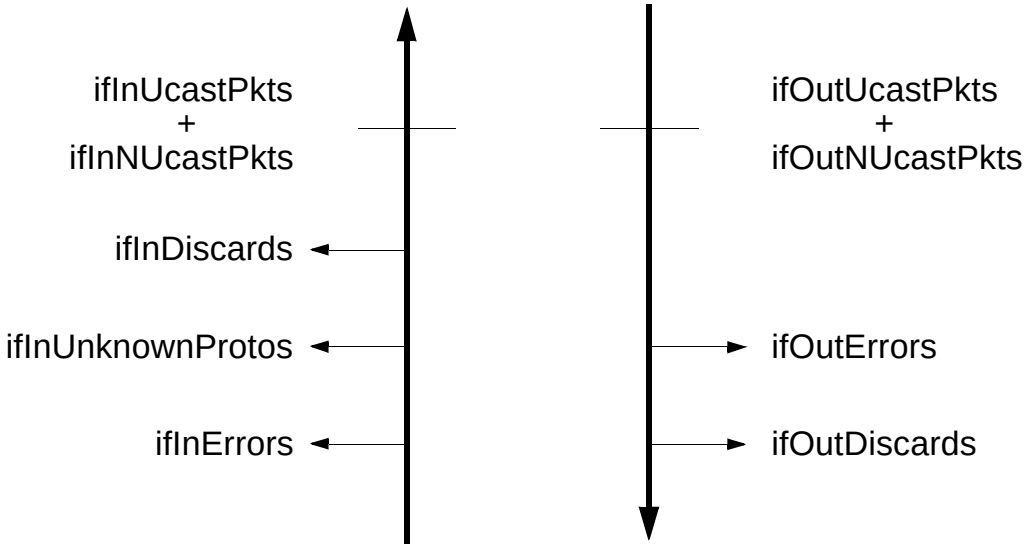
EXAMPLES:

1	Undefined	16	LAPB
6	Ethernet	20	ISDN Basic
7	IEEE 802.3	21	ISDN Primary
8	IEEE 802.4	23	PPP
9	IEEE 802.5	24	Loopback
10	IEEE 802.6	28	SLIP
15	FDDI	32	Frame Relay

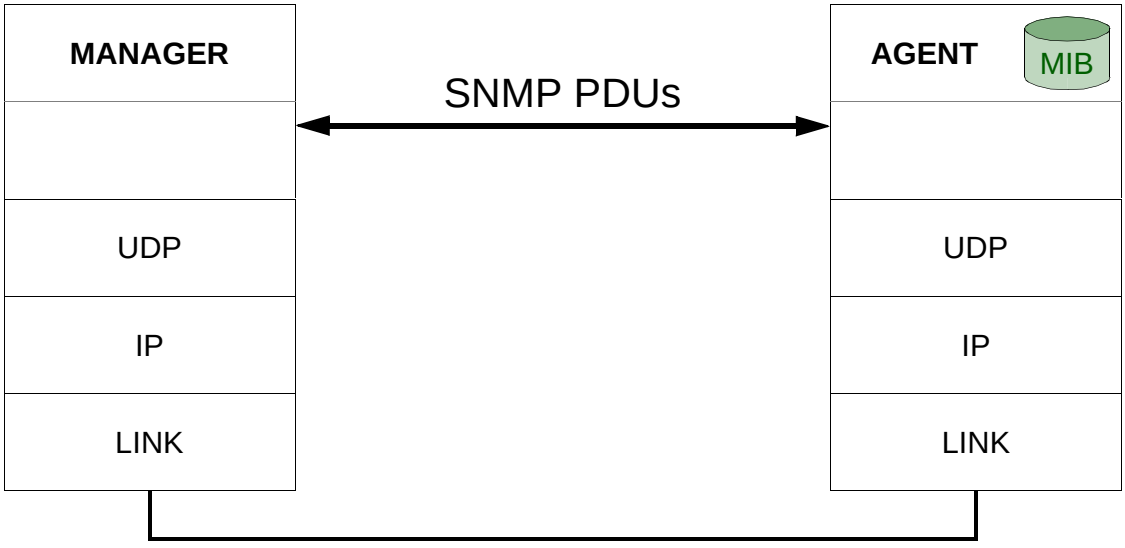
- ifAdminStatus / ifOperStatus

1 = up
2 = down
3 = testing

IF PACKET COUNT



SNMP PROTOCOL



MESSAGE & PDU STRUCTURE

variable bindings:

NAME *1*	VALUE *1*	NAME *2*	VALUE *2*	•••	•••	NAME *n*	VALUE *n*

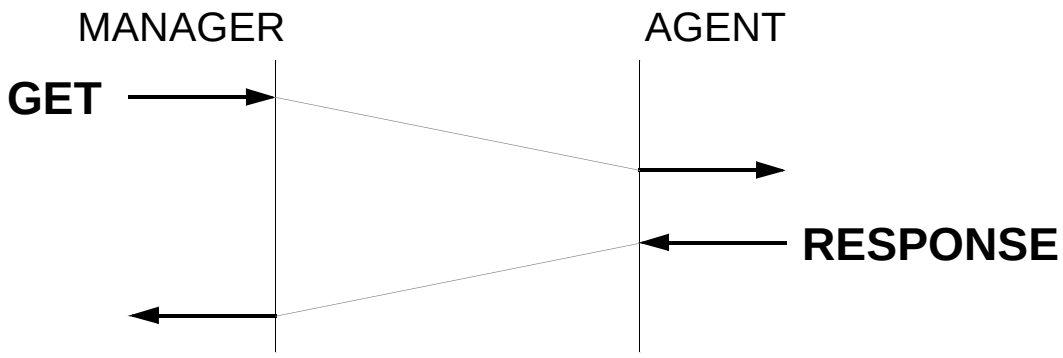
SNMP PDU:

PDU TYPE*	REQUEST ID	ERROR STATUS	ERROR INDEX	VARIABLE BINDINGS

SNMP message:

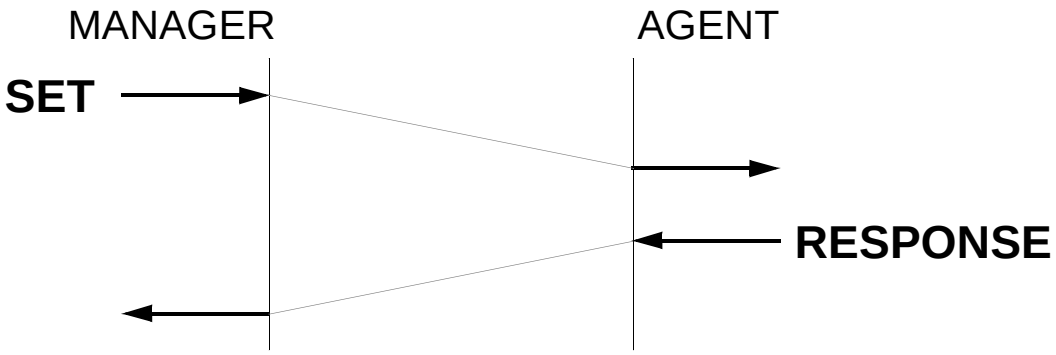
VERSION	COMMUNITY	SNMP PDU

GET



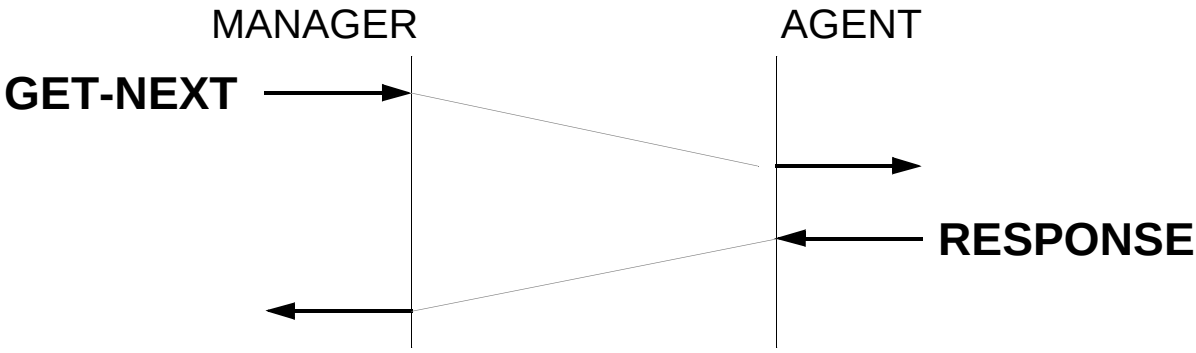
TO REQUEST THE VALUE OF 1 OR MORE VARIABLES

SET



THE SET REQUEST IS
ATOMIC

GET-NEXT

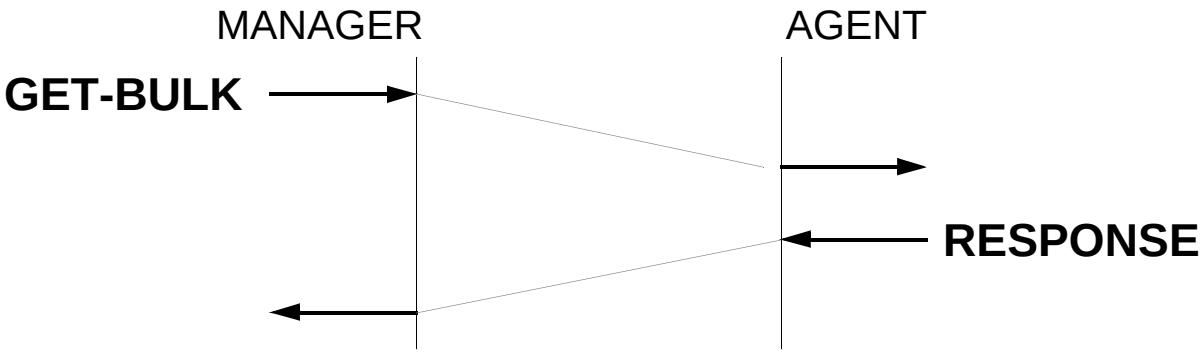


RETRIEVES THE INSTANCE NAME AND VALUE OF THE **NEXT** MIB ELEMENT

TO DISCOVER MIB STRUCTURES

TO RETRIEVE TABLE ROWS

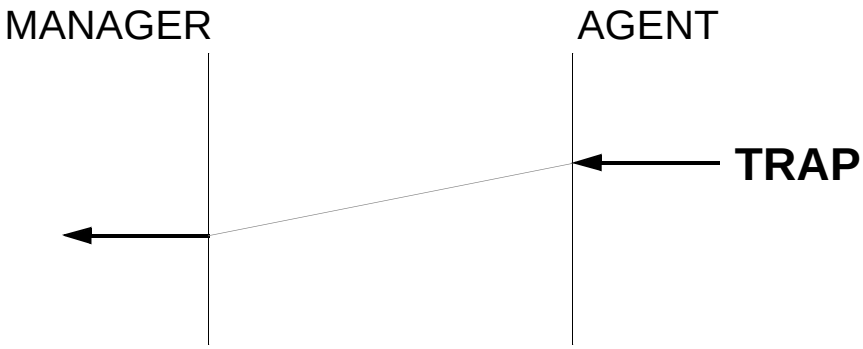
GET-BULK



TO RETRIEVE LARGE AMOUNTS OF MANAGEMENT DATA

RESPONSE SHOULD FIT INTO A SINGLE UDP PACKET

TRAP

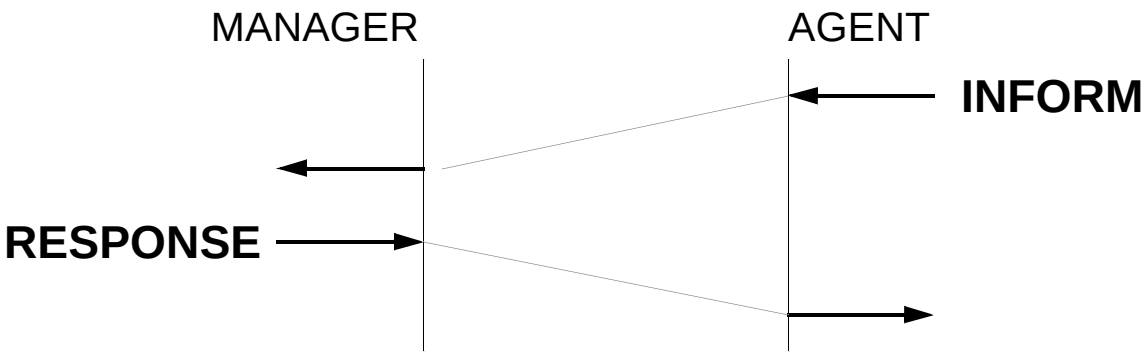


TRAP RECEPTION IS NOT CONFIRMED
(THUS UNRELIABLE)

POLLING REMAINS NECESSARY

AGENTS MAY BE CONFIGURED TO DISCARD TRAPS

INFORM



"CONFIRMED TRAP"

CAN BE USED TO EXCHANGE INFORMATION
BETWEEN MANAGERS