SNMPv2

OVERVIEW:

LIMITATIONS OF SNMPv1

HISTORY OF SNMPv2
- HIERARCHIES
- SECURITY

SNMPv2 PROTOCOL OPERATIONS

TRANSPORT INDEPENDENCE

RFCs

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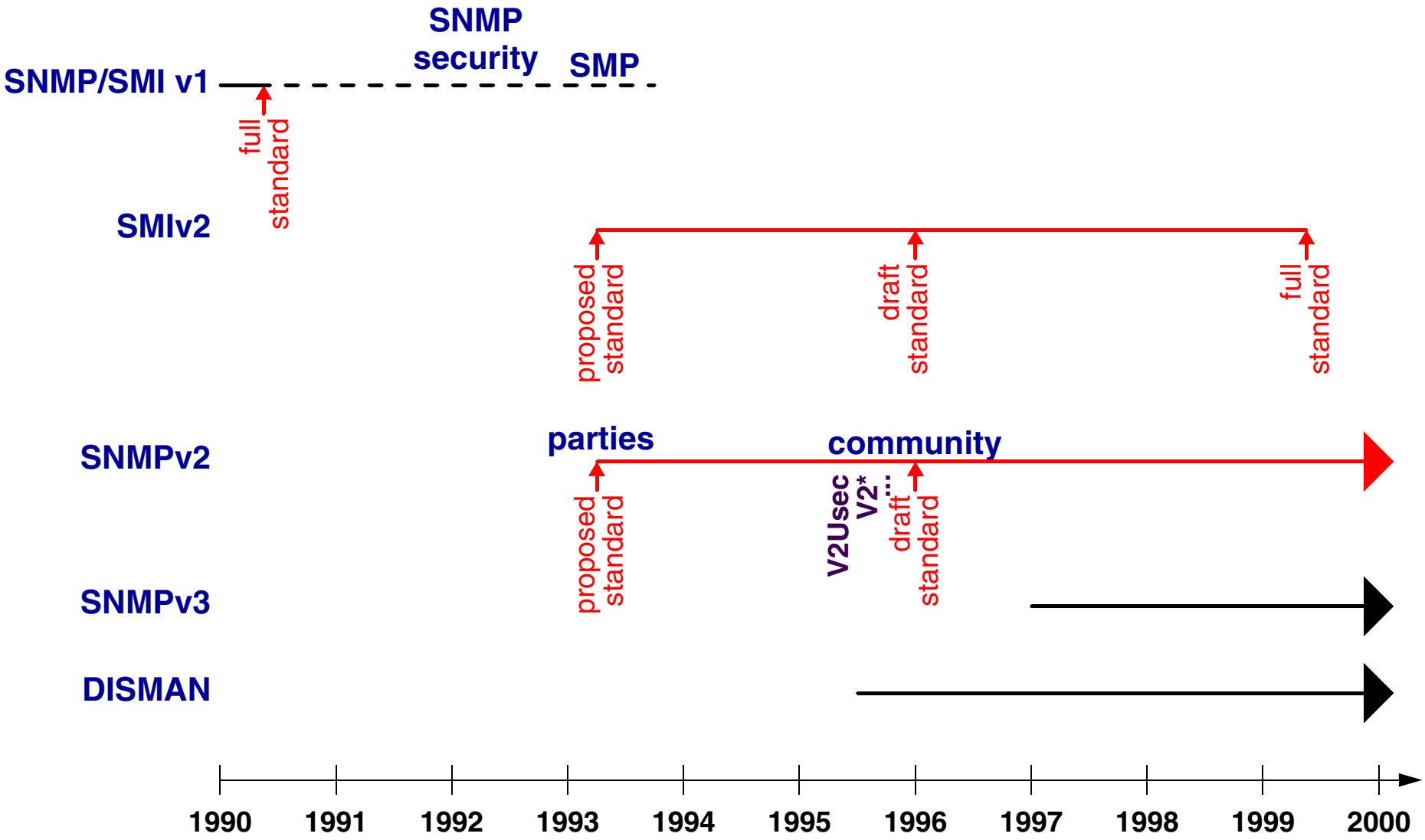
LIMITATIONS OF SNMPv1

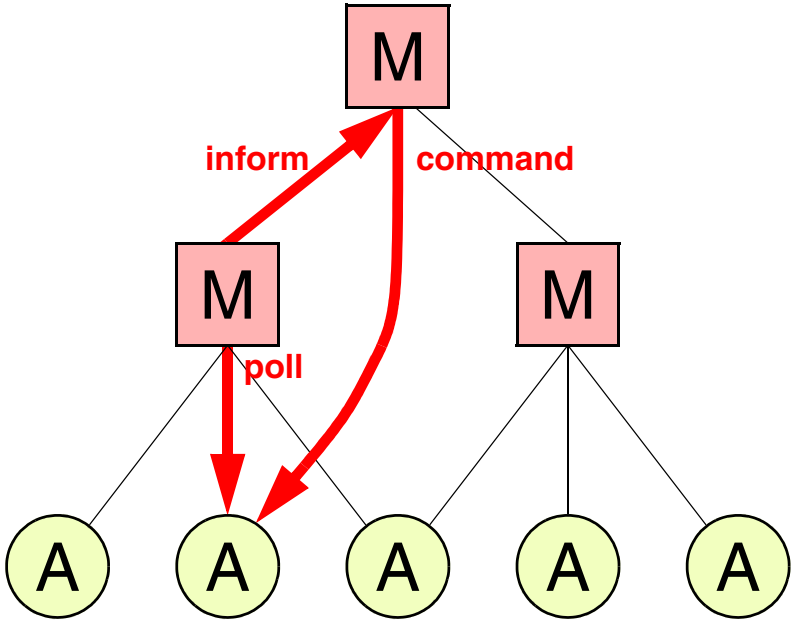
- LIMITED ERROR CODES
- LIMITED NOTIFICATIONS
- LIMITED PERFORMANCE
- TRANSPORT DEPENDENCE
- LACK OF HIERARCHIES
- LACK OF SECURITY

HISTORY OF SNMPv2



HIERARCHIES: ORIGINAL IDEA

MANAGER TO MANAGER (M2M) MIB



- STANDARD MIB APPROACH
- LIMITED FUNCTIONALITY
- RUN-TIME BEHAVIOUR MUST BE DEFINED AT IMPLEMENTATION TIME

HIERARCHIES: STATUS

WORK HAS MOVED TO A SEPARATE
DISTRIBUTED MANAGEMENT GROUP
(DISMAN)

THREE APPROACHES ARE STANDARDIZED:

- MIB BASED (EXPRESSION, EVENT AND NOTIFICATION LOG MIB)
- SCRIPT BASED (SCRIPT AND SCHEDULE MIB)
- REMOTE OPERATIONS BASED (REMOPS MIB)

SNMPv2 SECURITY: WHAT HAPPENED?

APRIL 1993:

PROPOSED STANDARD
FOUR EDITORS
SECURITY BASED ON *PARTIES*
FIRST PROTOTYPES APPEARED SOON

JUNE 1995:

PROPOSED STANDARD REJECTED BY TWO OF THE ORIGINAL EDITORS!

AUGUST 1995:

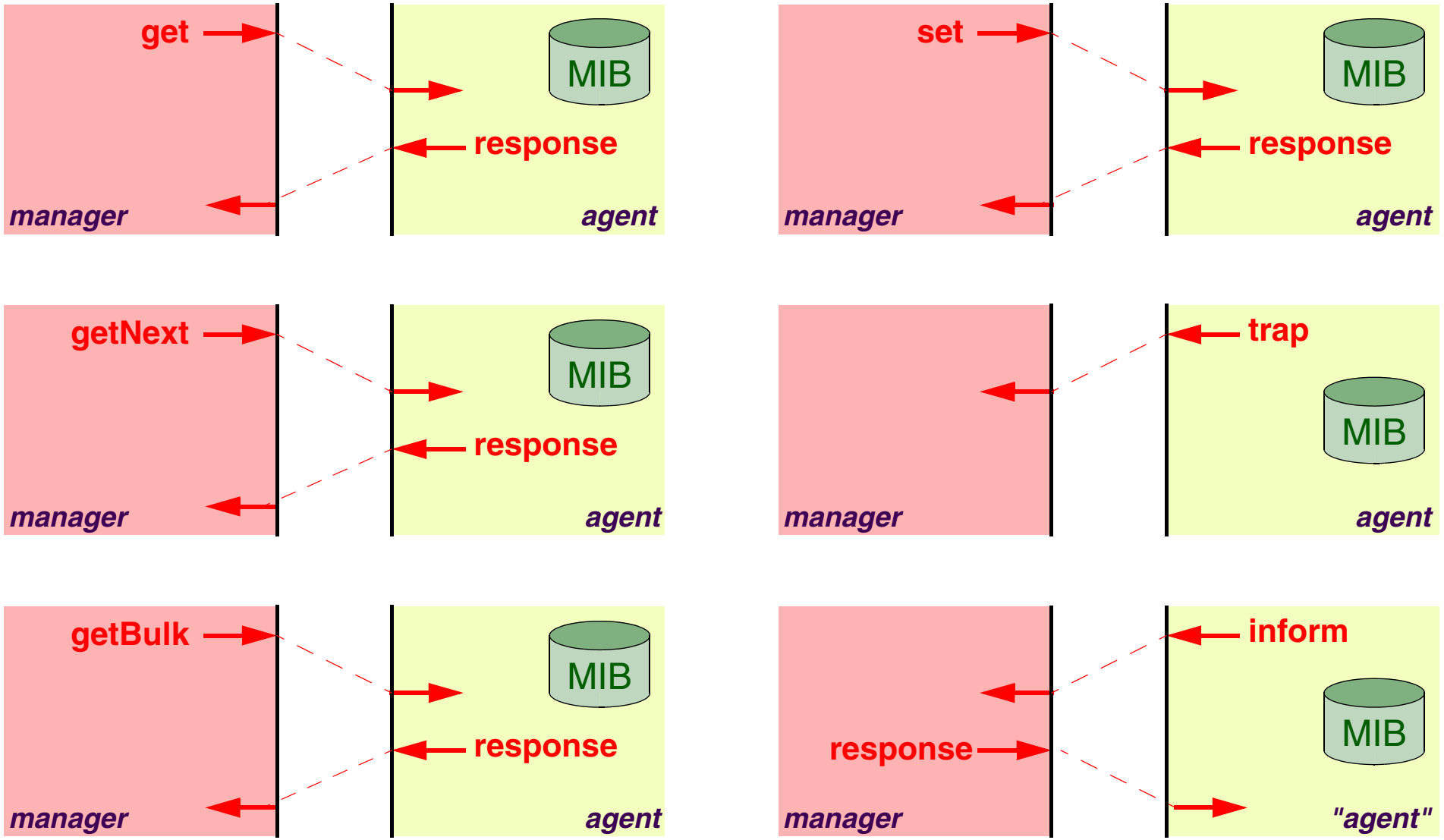
GENERAL AGREEMENT THAT PARTY BASED MODEL WAS TOO COMPLEX!
MANY NEW PROPOSALS APPEARED:

- SNMPv2C: COMMUNITY BASED
- SNMPv2U: USER BASED
- ...

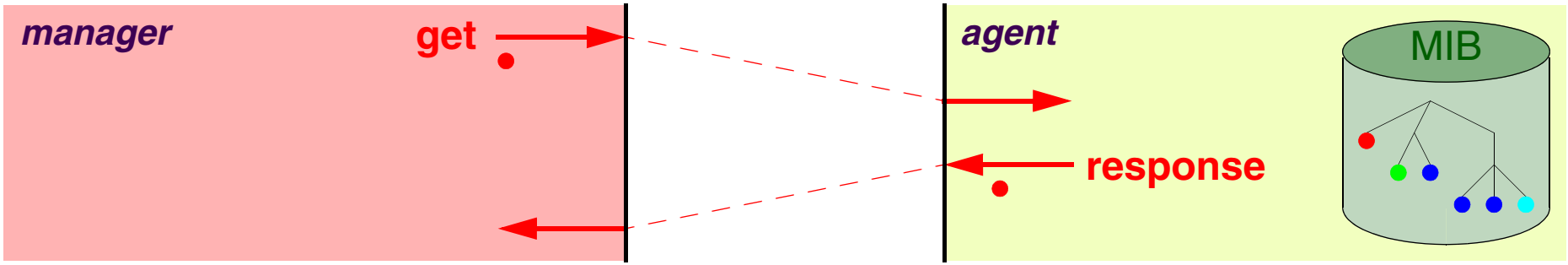
1997:

NEW SNMPv3 WORKING GROUP WAS FORMED
WITH NEW EDITORS

SNMPv2 PROTOCOL OPERATIONS



GET



SIMILAR TO SNMPv1, EXCEPT FOR "EXCEPTIONS"

POSSIBLE EXCEPTIONS:

- noSuchObject
- noSuchInstance

EXCEPTIONS ARE CODED WITHIN THE VARBINDS

EXCEPTIONS DO NOT RAISE ERROR STATUS AND INDEX

GET EXAMPLES

get(7)
response(error-status => noError, 7 => noSuchObject)

get(7.1)
response(error-status => noError, 7.1 => noSuchInstance)

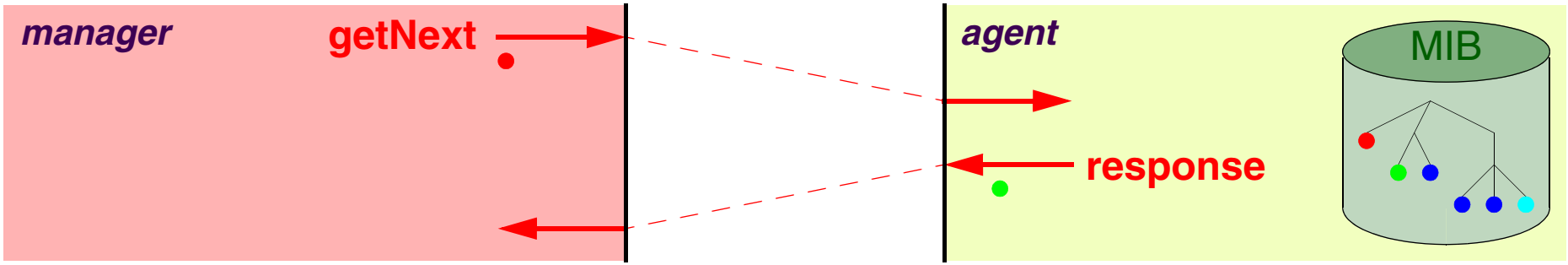
get(7.1.9)
response(error-status => noError, 7.1.9 => noSuchInstance)

get(7.2)
response(error-status => noError, 7.2 => noSuchObject)

get(7.4.0)
response(error-status => noError, 7.4.0 => noSuchObject)

get(7.1.0, 7.4.0)
response(error-status => noError, 7.1.0 => *192.168.101.102,* 7.4.0 => noSuchObject)

GET-NEXT



SIMILAR TO SNMPv1, EXCEPT FOR "EXCEPTIONS"

POSSIBLE EXCEPTIONS:

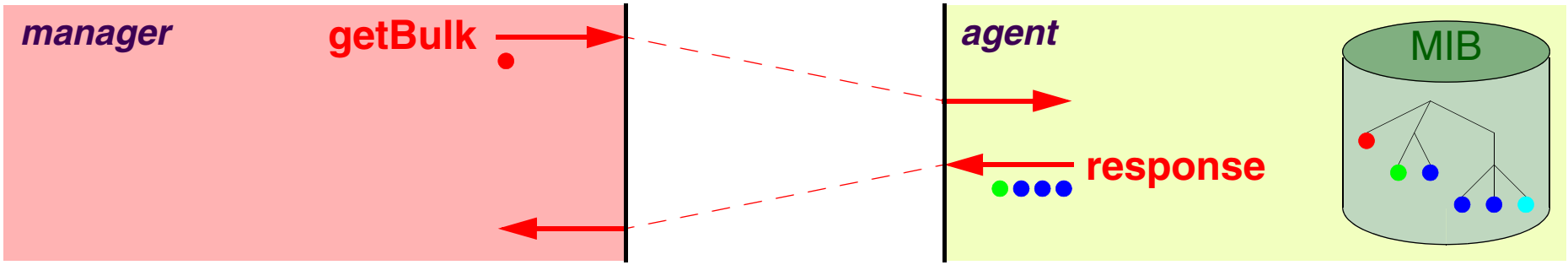
- endOfMibView

EXAMPLE

getNext(7.4.0)

response(error-status => noError, 7.4.0 => endOfMibView)

GET-BULK

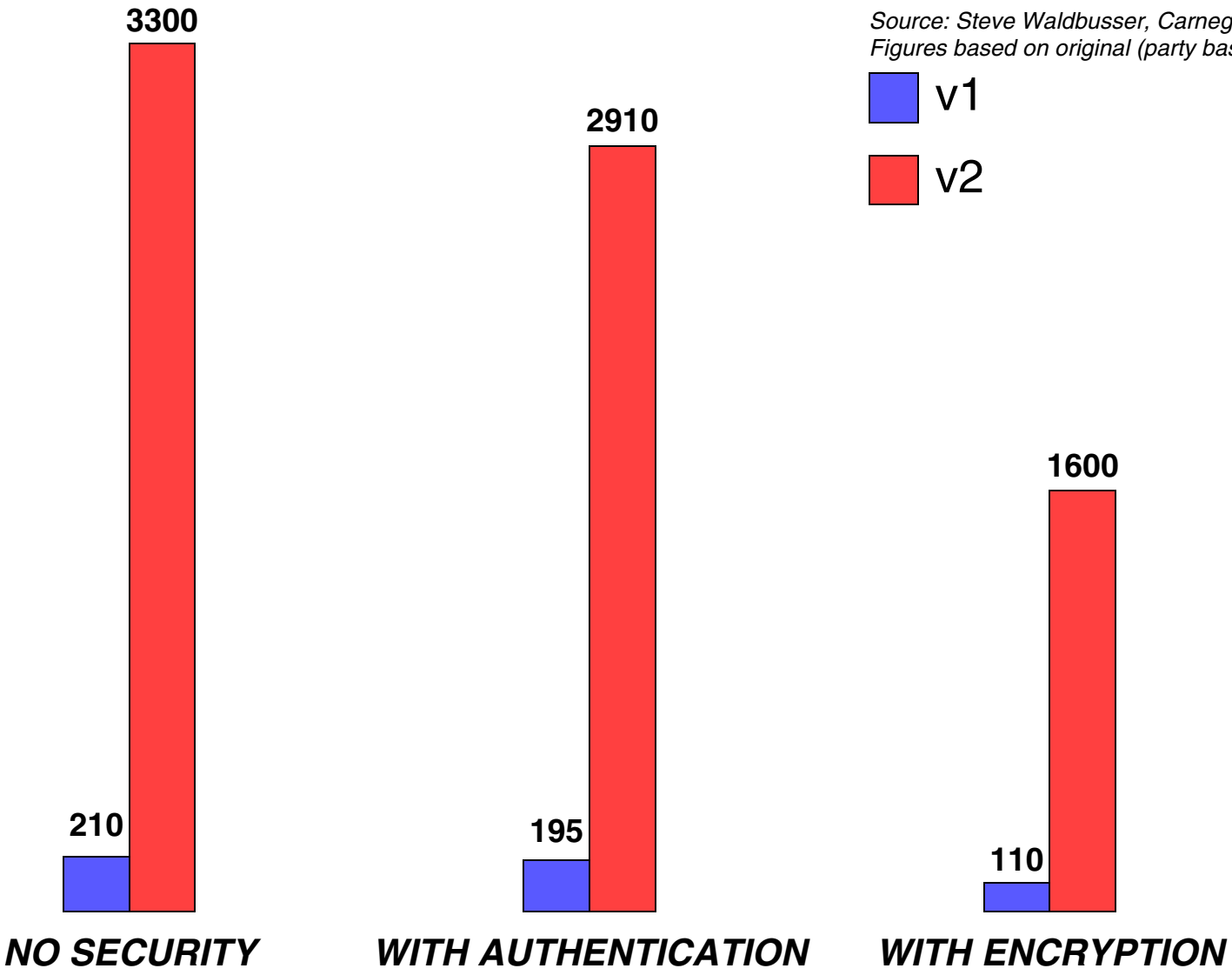


NEW IN SNMPv2

TO RETRIEVE A LARGE NUMBER OF VARBINDS

IMPROVES PERFORMANCE!

GETBULK PERFORMANCE



Source: Steve Waldbusser, Carnegie-Mellon University
Figures based on original (party based) SNMPv2

GET-BULK

getBulk REQUEST HAS TWO ADDITIONAL PARAMETERS:

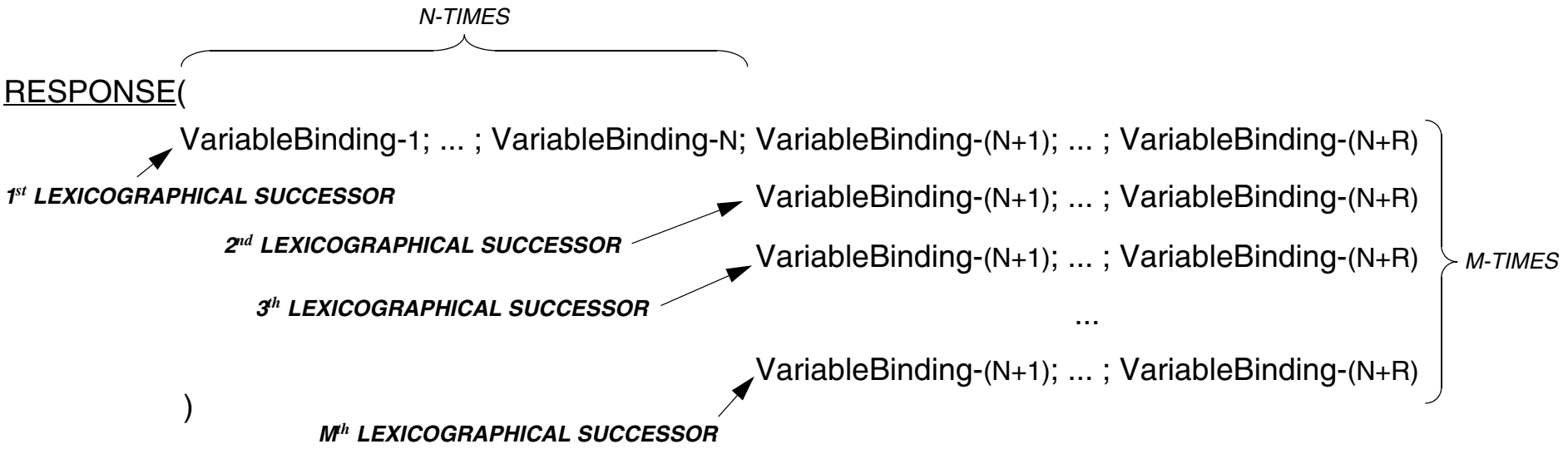
- non-repeators
- max-repetitions

- THE FIRST N ELEMENTS (non-repeators) OF THE VARBIND LIST ARE TREATED AS IF THE OPERATION WAS A NORMAL getnext OPERATION

- THE NEXT ELEMENTS OF THE VARBIND LIST ARE TREATED AS IF THE OPERATION CONSISTED OF A NUMBER (max-repetitions) OF REPEATED getnext OPERATIONS

GET-BULK

REQUEST(non-repeaters = N; max-repetitions = M;
VariableBinding-1; ... ; VariableBinding-N; VariableBinding-(N+1); ... ; VariableBinding-(N+R)
)



GET-BULK EXAMPLE

getBulk(max-repetitions = 4; 7.1)

response(
7.1.0 => *192.168.101.102*
7.2.1.0 => *printer-1*
7.2.2.0 => *123456*
7.3.1.1.2.1 => *2*)

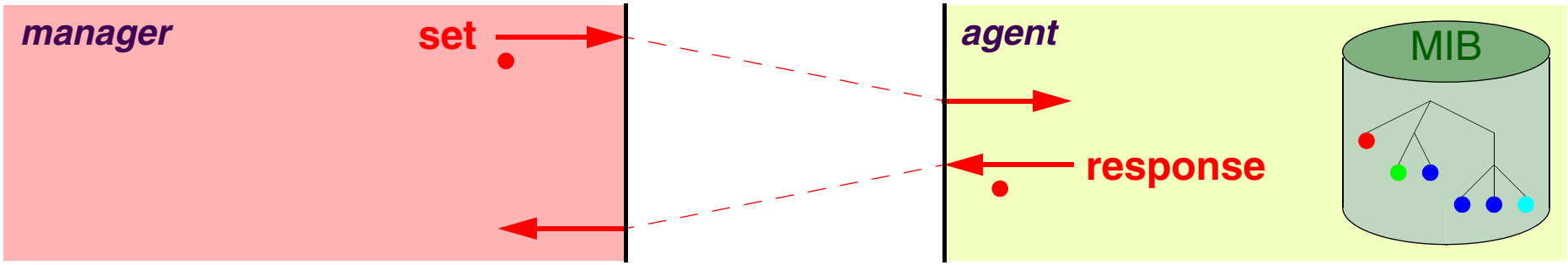
getBulk(max-repetitions = 3; 7.3.1.1; 7.3.1.2; 7.3.1.3)

response(

7.3.1.1.2.1 => *2*;	7.3.1.2.2.1 => *1*;	7.3.1.3.2.1 => *2*
7.3.1.1.3.1 => *3*;	7.3.1.2.3.1 => *1*;	7.3.1.3.3.1 => *3*
7.3.1.1.5.1 => *5*;	7.3.1.2.5.1 => *1*;	7.3.1.3.5.1 => *2*

)

SET



SIMILAR TO SNMPv1

CONCEPTUAL TWO PHASE COMMIT:

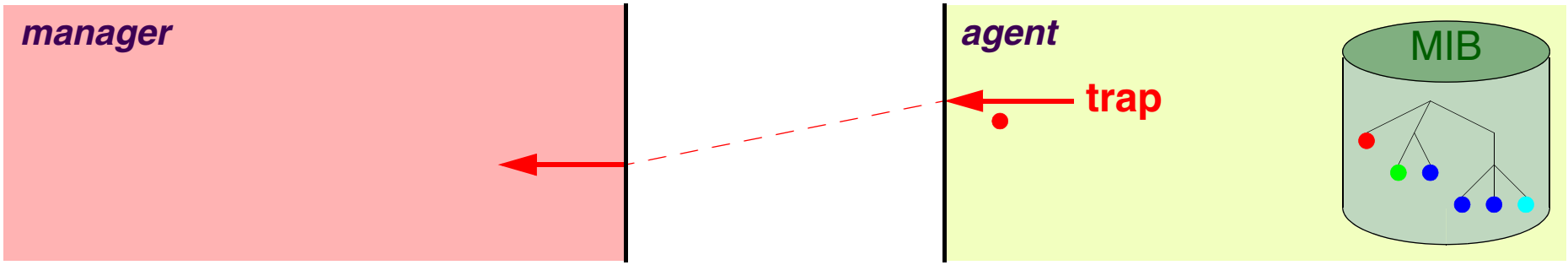
- PHASE 1: PERFORM VARIOUS CHECKS
- PHASE 2: PERFORM THE ACTUAL SET

MANY NEW ERROR CODES ARE DEFINED

NEW ERROR CODES FOR SETS

	SNMPv1	SNMPv2
PHASE 1:	badValue	wrongValue
	badValue	wrongEncoding
	badValue	wrongType
	badValue	wrongLength
	badValue	inconsistentValue
	noSuchName	noAccess
	noSuchName	notWritable
	noSuchName	noCreation
	noSuchName	inconsistentName
	genErr	resourceUnavailable
	genErr	genErr
PHASE 2:	genErr	CommitFailed
	genErr	undoFailed

TRAP



SNMPv1:

- COLD START
- WARM START
- LINK DOWN
- LINK UP
- AUTHETICATION FAILURE
- EGP NEIGHBOR LOSS

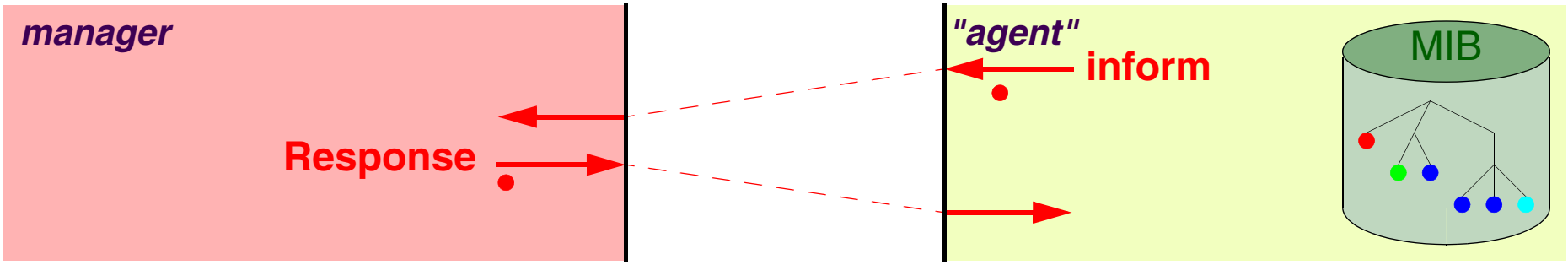
SNMPv2:

- MIBs MAY NOW INCLUDE NOTIFICATION TYPE MACROS
- FIRST TWO VARBINDS: sysUptime AND snmpTrapOID
- USES SAME FORMAT AS OTHER PDUs

EXAMPLE OF NOTIFICATION TYPE MACRO

```
linkUp        NOTIFICATION-TYPE
OBJECTS       {ifIndex}
STATUS        current
DESCRIPTION   "A linkUp trap signifies that the entity
              has detected that the ifOperStatus
              object has changed to Up"
::= {snmpTraps 4}
```

INFORM



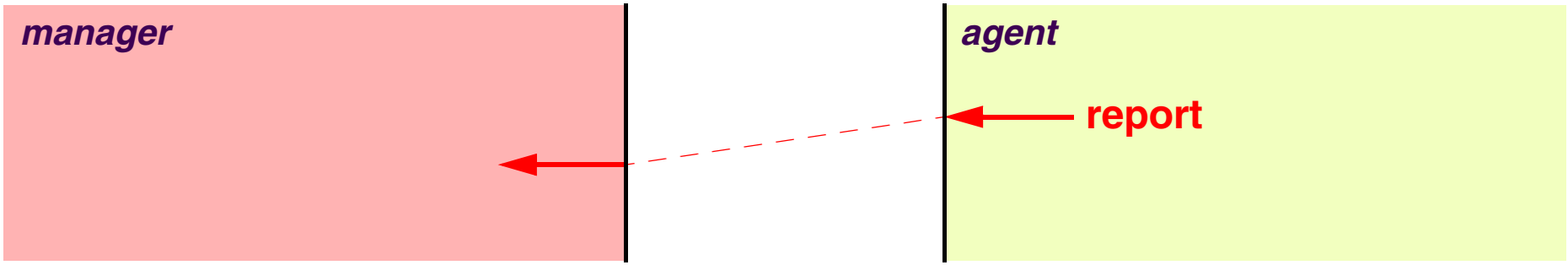
CONFIRMED TRAP

ORIGINALLY TO INFORM A HIGHER LEVEL MANAGER

SAME FORMAT AS TRAP PDU

POSSIBLE ERROR: tooBig

REPORT



NEW PDU TO SIGNAL PROTOCOL EXCEPTIONS / ERRORS

NO SEMANTICS DEFINED IN SNMPv2

TRANSPORT DEPENDANCE

SNMPv1:

- UDP

SNMPv2:

- UDP
- CLNS (OSI)
- DDP (APPLETALK)
- IPX

SNMPv2 RFCs

COMMUNICATION MODEL

- FULL STANDARD
- RFC 3416, RFC3417

SECURITY MODEL - SNMPv2C:

- COMMUNITY BASED SNMP
- SAME 'SECURITY MECHANISMS' AS SNMPv1
- HISTORIC
- RFC 1901

SECURITY MODEL - SNMPv2U:

- USER BASED SECURITY (AUTHENTICATION / ENCRYPTION / ACCESS CONTROL)
- HISTORIC
- RFC 1909, RFC1910

SNMPv2 - SUMMARY

IMPROVED COMMUNICATION MODEL

- TRAPS HAVE SAME FORMAT AS OTHER PDUS
- GET-BULK PDU
- ADDITIONAL ERROR CODES FOR SETS

TWO SECURITY MODELS

- SNMPv2C: COMMUNITY BASED
- SNMPv2U: USER BASED
- BOTH ARE NOW HISTORIC

SECURITY AND HIERARCHIES TO SNMPv3 & DISMAN