

Tutorial for Chapter 5

SNMPv1 Network Management: Communication and Functional Models

NET 311 – Computer Network Management

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Problem 1

Three managed hubs with IP addresses 200.100.100.11 to 200.100.100.13 are being monitored by an NMS using sysUpTime. The NMS periodically issues the command

```
snmpget -v1 -c <community> <IP> <OID>
```

Fill the operands in the three set of requests that the NMS sends out. Use “public” for the community variable. Use numeric value for OID.

Solution

```
snmpget -v1 -c public 200.100.100.11 1.3.6.1.2.1.1.3  
snmpget -v1 -c public 200.100.100.12 1.3.6.1.2.1.1.3  
snmpget -v1 -c public 200.100.100.13 1.3.6.1.2.1.1.3
```

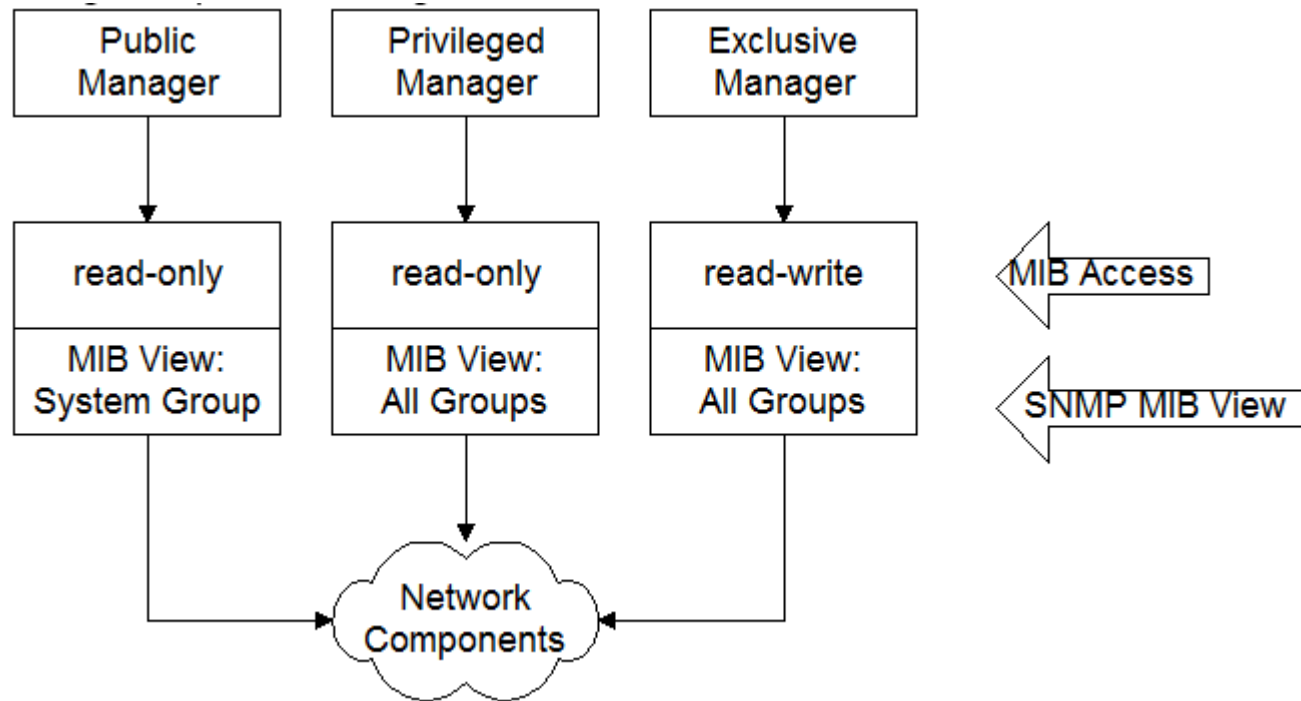
Problem 2

You are assigned the task of writing specifications for configuring SNMP managers and agents for a corporate network to implement the access policy.

- Public group (community name public) can only look at the System group.
- Privileged group (community name privileged) can look at all the MIB objects.
- Exclusive group (community name exclusive) can do a read-write on all allowed components.

Draw a figure showing the paths from the SNMP managers to managed objects of a network component.

Solution



Problem 3

Fill in the data in the trap PDU format for a message sent by the hub shown in the figure below 2 seconds after it is reset following a failure. Treat the trap as generic and leave the specific trap field blank. The only varBind that the trap sends is sysUpTime.

```
Title: System Information      : 172.16.46.2
Name or IP Address: 172.16.46.2

System Name      :
System Description : 3Com LinkBuilder FMS, SW version:3.02
System Contact   :
System Location   :
System Object ID  : .iso.org.dod.internet.private.enterprises.43.1.8.5
System Up Time    : (2475380 437) 286 days, 12:03:24.37
```

Solution

PDU Type	4
Enterprise	1.3.6.1.4.1.43.1.8.5
Agent Address	172.16.46.2
Generic Trap Type	0
Specific Trap Type	
Timestamp	200
VarBind 1 name	1.3.6.1.2.1.1.3.0
VarBind 1 value	200

Note that the time is represented in Timeticks, which is hundredth of a second. Thus, 2 seconds = 200 Timeticks.

Problem 4

An SNMP manager sends a request message to an SNMP agent requesting sysUpTime at 8: 00 A.M. Fill in the data for the fields of an SNMP PDU shown in Figure 5.5. Use “SNMP” for the application header, enumerated INTEGER 0 for version-1, and “public” for community name.

Solution

Application Header	Version	Community	PDU Type	Request ID	Error Status	Error Index	VarBind 1 name	VarBind 1 value
SNMP	0	public	0	100	0	0	1.3.6.1.2.1.1.3.0	

Problem 5

In the previous problem, if the SNMP manager sent the request at 8: 00 A.M. and the SNMP agent was reset at midnight after a failure, fill in the fields for the SNMP PDU on the **response** received.

Solution

The system is up for 8 hours.

Time in hundredths of second = $8 \times 60 \times 60 \times 100 = 2880000$

Application Header	Version	Community	PDU Type	Request ID	Error Status	Error Index	VarBind 1 name	VarBind 1 value
SNMP	0	public	2	100	0	0	1.3.6.1.2.1.1.3.0	2880000

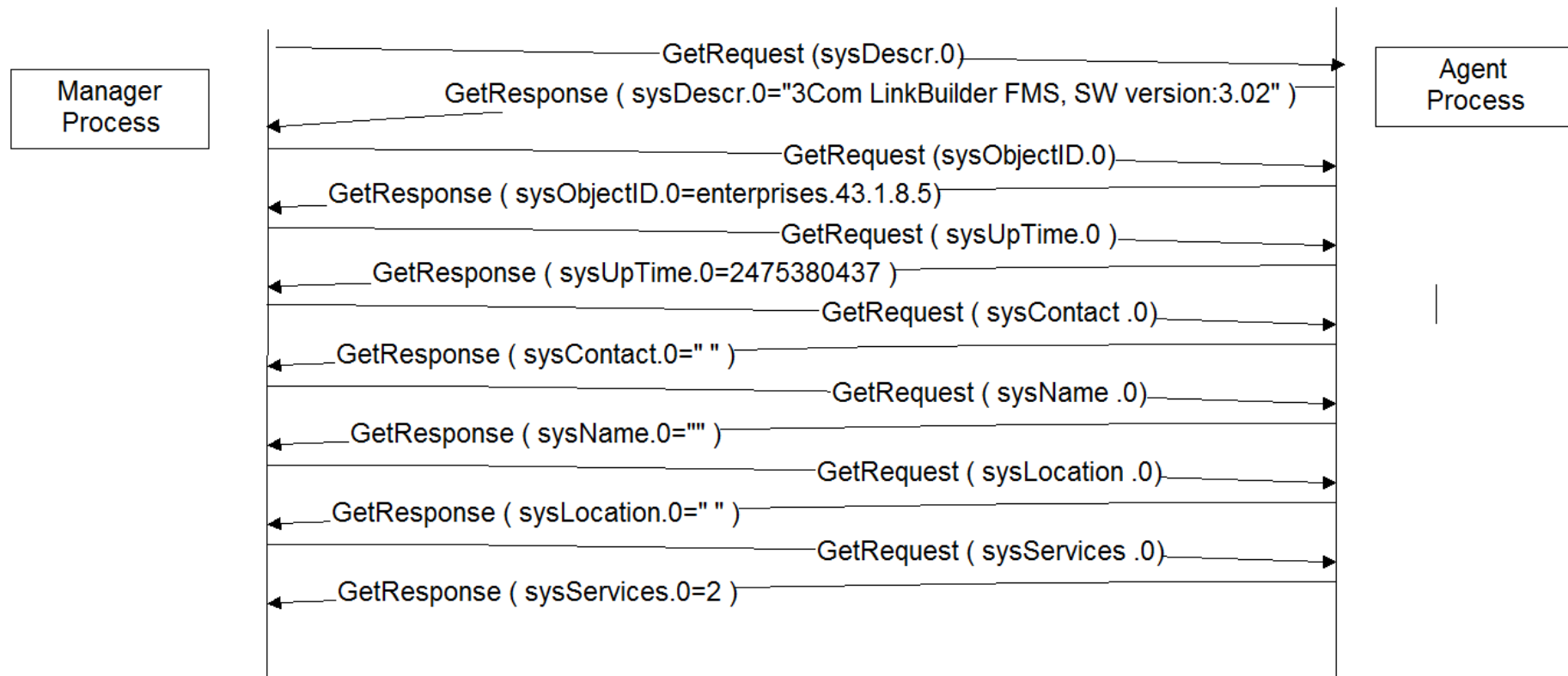
Problem 6

Draw the message sequence diagram similar to the one shown in Figure 5.10 for the hub example given in the figure below. Assume that a separate get-request message is sent for each data value.

```
Title: System Information : 172.16.46.2
Name or IP Address: 172.16.46.2

System Name      :
System Description : 3Com LinkBuilder FMS, SW version:3.02
System Contact   :
System Location   :
System Object ID  : .iso.org.dod.internet.private.enterprises.43.1.8.5
System Up Time    : (2475380 437) 286 days, 12:03:24.37
```

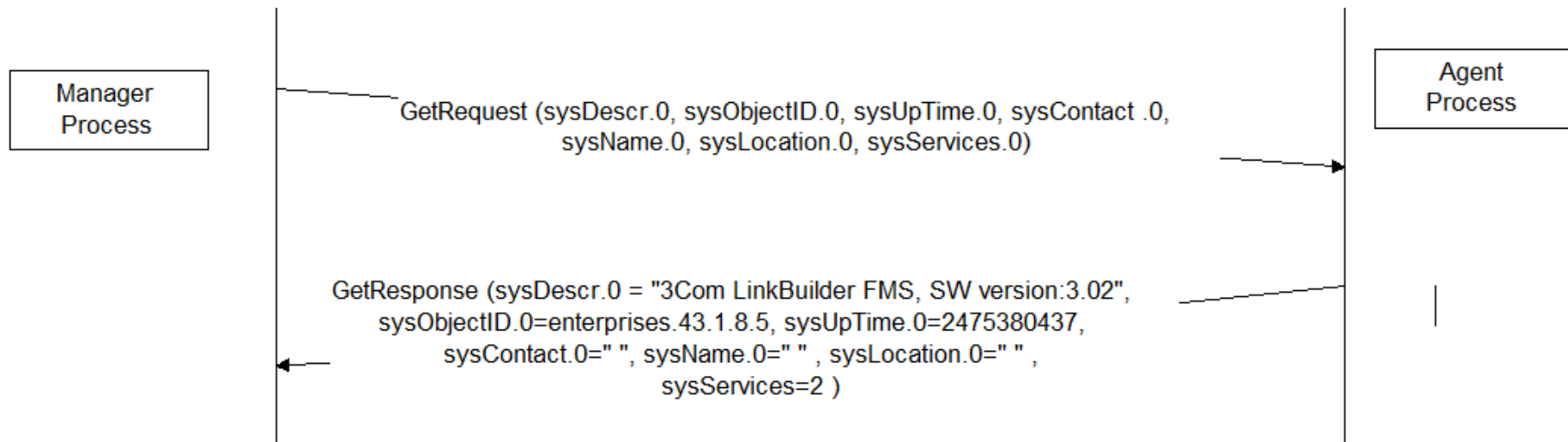
Solution



Problem 7

Repeat the previous problem with a `VarBindList`. Use the format of **Figure 5.16**.

Solution



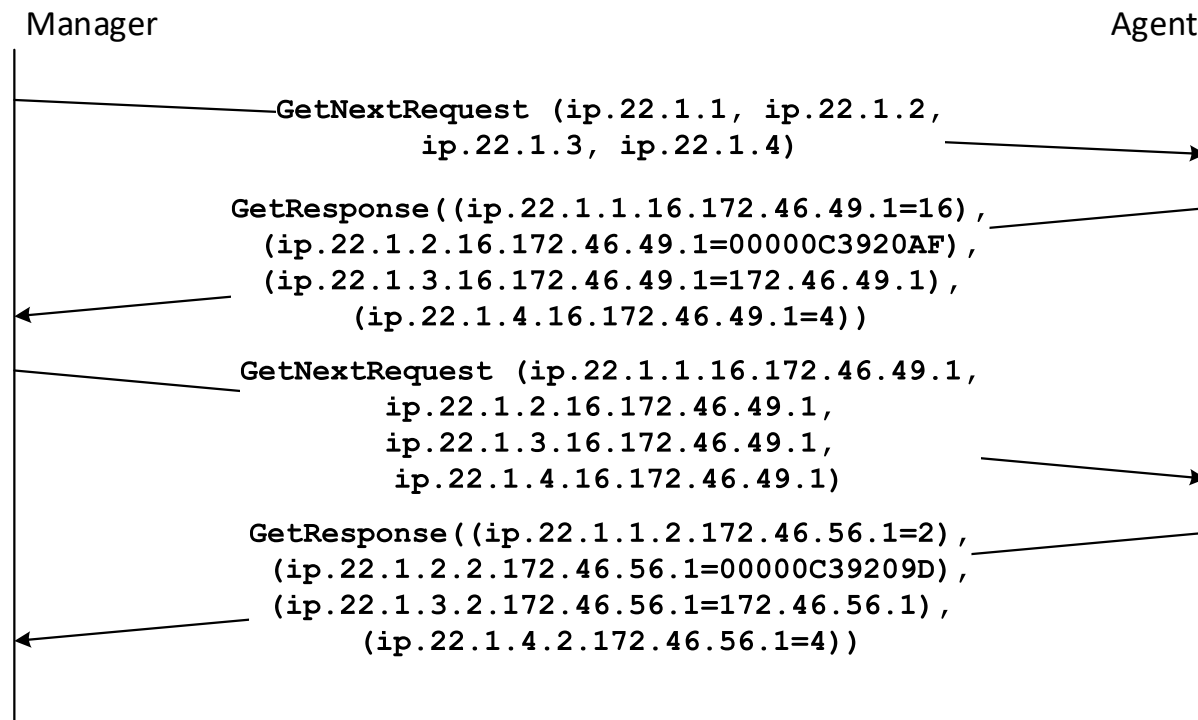
Problem 8

Draw the message sequence diagram for the following **ipNetToMediaTable** retrieving all the values of objects in each row with single get-next-request commands, similar to the one shown in **Figure 5.16** (ignore obtaining sysUpTime). The **indices** are **ipNetToMediaIfIndex** and **ipNetToMediaNetAddress**.

Use OID of ipNetToMediaTable = ip.22

ipNetToMediaIfIndex	ipNetToMediaPhysAddress	ipNetToMediaNetAddress	ipNetToMediaType
16	00000C3920AF	172.16.49.1	4
2	00000C39209D	172.16.56.1	4

Solution



You can also try the following command on Linux and watch the output on Wireshark:

```
snmpgetnext -c public -v1 localhost .1.3.6.1.2.1.4.22.1.1
.1.3.6.1.2.1.4.22.1.2 .1.3.6.1.2.1.4.22.1.3
.1.3.6.1.2.1.4.22.1.4
```

Appendix

SNMP PDU Types

get-request	0
get-next-request	1
get-response	2
set-request	3
trap	4

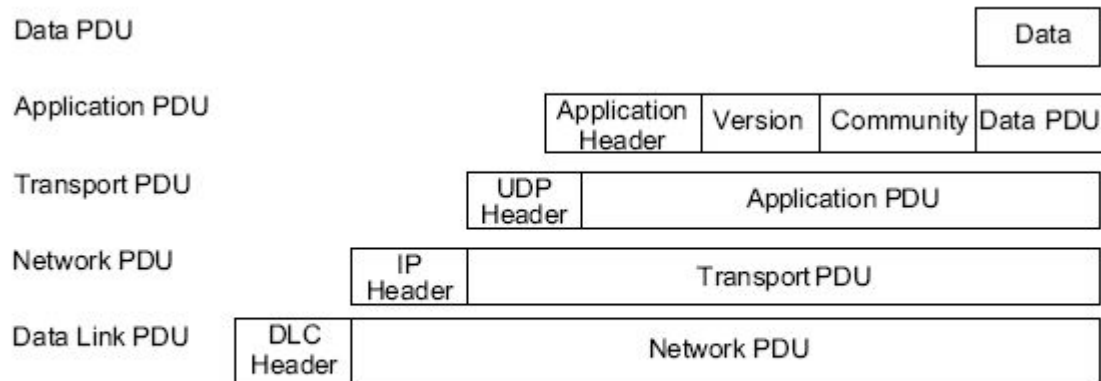


Figure 5.5 Encapsulated SNMP Message

PDU Type	RequestID	Error Status	Error Index	VarBind 1 Name	VarBind 1 Value	...	VarBind n Name	VarBind n Value
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Figure 5.8 Get and Set Type PDUs

PDU Type	Enterprise	Agent Address	Generic-Trap Type	Specific-Trap Type	Time-Stamp	VarBind 1 Name	VarBind 1 Value	...	VarBind n Name	VarBind n Value
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Figure 5.9 Trap PDU