

Assignment 2



NET 3006 – Enterprise Network Management

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Due date: March 10, 2016, on CULearn at 11:55 pm

Question 1 – SNMPv1 (15 marks)

An SNMP manager sends a request message at 8:00a.m. to an SNMP agent requesting the time since its last reset

- Which MIB group contains this information and what is the OBJECT IDENTIFIER of the entity that gives the requested information.
- Fill in the data for the fields of an SNMP PDU used by the manager to retrieve this information.
- If the SNMP agent was rebooted at midnight after a failure, fill in the fields for the SNMP PDU on the response received.

NOTE: use “SNMP” for the application header, enumerated INTEGER 0 for version-1, and “public” for community name.

Question 2 – SNMPv2 (25 marks)

- Write the OBJECT TYPE modules for `ipAddrTable`, `ipAddrEntry`, and `ipAdEntIfIndex` in an IP address translation table in SMIV2.

Add two columnar objects, `cardNumber` (of interface card) and `portNumber` (port in the interface card), to an IP address table in a router. The index values for the IP address table rows are 150.50.51.1, 150.50.52.1, 150.50.53.1, and 150.50.54.1. The packets to the first two addresses are directed to ports 1 and 2 of interface card 1. The last two addresses refer to ports 1 and 2 of interface card 2.

- Draw a conceptual base table and an augmented table (ipAug 1).
- Present the ASN.1 constructs for both down to the leaf level of the MIB tree. Limit your leaf for `ipTable` to `ipAdEntAddr` object.

Question 3 – SNMPv2 (15 marks)

Consider the following table

Index atIfIndex	IP Address atNetAddress	Physical Address atPhysAddress
3	172.46.41.1	00:00:0C:35:C1:D2
4	172.46.42.1	00:00:0C:35:C1:D3

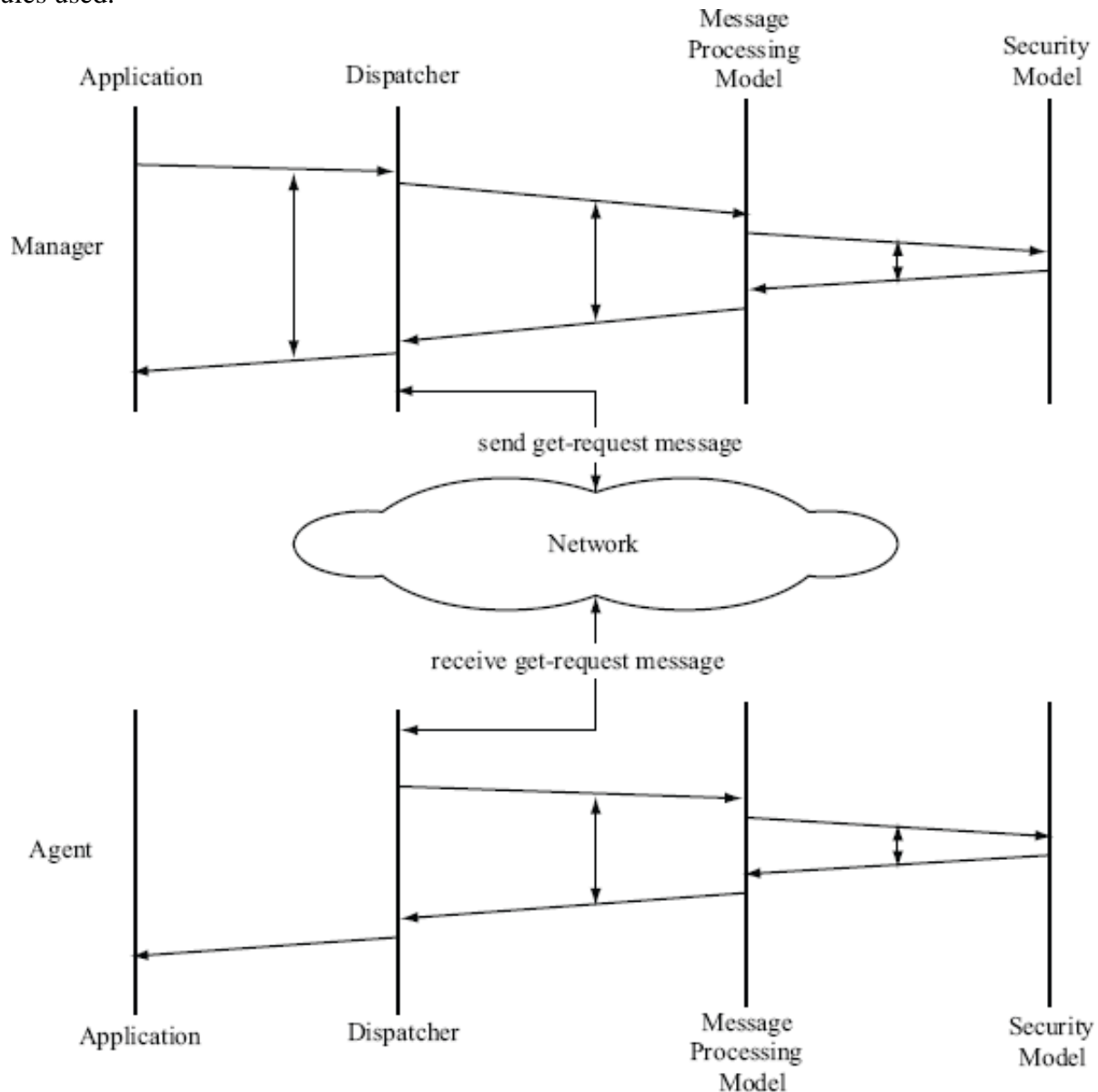
5	172.46.43.1	00:00:0C:35:C1:D4
6	172.46.44.1	00:00:0C:35:C1:D5
2	172.46.63.1	00:00:0C:35:C1:D1
7	172.46.165.1	00:00:0C:35:C1:D8
1	172.46.252.1	00:00:0C:35:C1:D0

Assume that you know the number of rows in the table in making requests:

- Draw the get-next-request and response messages
- Draw the get-bulk-request and response messages
- Compare the results of parts (a) and (b)

Question 4 – SNMPv3 (15 marks)

The following figure shows a generalized time-sequenced operation for get-request message going from a manager to an agent. Complete the primitives in the figure explicitly identifying the application modules used.



Question 5 – SNMPv3 (5 marks)

Detail the IN and OUT parameters of the *sendPdu* and *prepareOutgoingMsg* primitives by referring to RFC 2271.

Question 6 – SNMPv3 (15 marks)

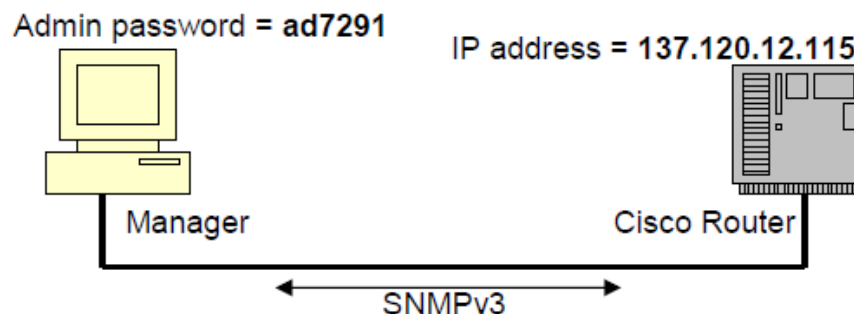
- Describe thoroughly and in details the security services of SNMPv3 and the role of each security module.
- Describe the privacy and authentication services of outgoing/incoming messages in SNMPv3; use figures to illustrate.
- What is access control in SNMPv3? Briefly what are the elements of VACM model?

Question 7 – SNMPv3 (10 marks)

- Explain the meaning of the following objects: `snmpEngineBoots`, `snmpEngineTime` and `latestReceivedEngineTime`
- Write the check condition that must be met in order to have an authentic message.

Bonus (2 marks, added directly to the 100 marks of the course)

An agent is sitting on an SNMPv3-compliant Cisco router with IP address 137.120.12.115. An administrator, whose password is ad7291, uses an SNMPv3-compliant manager station for secure (private and authenticated) querying of the agent on this router. This is shown in the figure below:



Answer the following questions, showing intermediate steps and the final answer, in hexadecimal:

- If the IPv4 addressing method is used, what is the `snmpEngineID` for this agent? (refer to the book Sec 7.3.1)
- What is the Authentication Key shared between this administrator and the agent if MD5 is used? Show all of `digest0`, `digest1`, and `digest2`, (refer to the book Sec. 7.7.1).
Hint: You can use the standard Java class `java.security.MessageDigest` to calculate digests. Attach a hard copy of your Java (or other language) program to the solution.
- What is the Encryption Key used between this administrator and the agent?