

CHAPTER 1

What are the characteristics of telephones n.w?

Reliable .. dependable .. good quality

What are the reasons for QoS?

- Good planning, design, and implementation
- Good operation and management of networks
- Migration to new technologies
- **Operations Support Systems (OSSs):** help manage the operation of networks (Operations Systems to ensure QoS)
- **OSSs in telecommunications monitor:**
- Analog network parameters (S/N ratio, transmission loss, call blockage)
- Digital network parameters (Packet loss, Packet delay, Throughput, QoS)

TCP/IP Based Networks

- TCP/IP is a suite of protocols
- Internet is based on TCP/IP
- IP is Internet protocol at the network layer level
- TCP is connection-oriented transport protocol and ensures end-to-end connection
- UDP is connectionless transport protocol and provides datagram service
- Internet email and much of the network mgmt. messages are based on UDP/IP
- ICMP part of TCP/IP suite

What are the OSI Layers and what is Services?

Layer No.	Layer Name	Salient services provided by the layer
1	Physical	-Transfers to and gathers from the physical medium raw bit data -Handles physical and electrical interfaces to the transmission medium
2	Data link	-Consists of two sublayers: Logical link control (LLC) and Media access control (MAC) -LLC: Formats the data to go on the medium; performs error control and flow control -MAC: Controls data transfer to and from LAN; resolves conflicts with other data on LAN
3	Network	Forms the switching / routing layer of the network
4	Transport	-Multiplexing and de-multiplexing of messages from applications -Acts as a transparent layer to applications and thus isolates them from the transport system layers -Makes and breaks connections for connection-oriented communications -Flow control of data in both directions
5	Session	-Establishes and clears sessions for applications, and thus minimizes loss of data during large data exchange
6	Presentation	-Provides a set of standard protocols so that the display would be transparent to syntax of the application -Data encryption and decryption
7	Application	-Provides application specific protocols for each specific application and each specific transport protocol system

Cite two main differences between OSI and Internet management models.

OSI	Internet management
Adopted by the International Standards Organization (ISO)	Adopted by The Internet Engineering Task Force (IETF)
The OSI management protocol Standard >>common Management Information Protocol (CMIP)	The Internet management protocol standard >> Simple Network Management Protocol (SNMP)
Object oriented based on object classes and inheritance rules	Scalar Objects
More complex and harder to implement.	Easier to implement

3 sublayers Network Layer? what are

Subnet Independent Convergence protocol SNICP:

Subnet dependent Convergence protocol SNDPCP.

Subnet dependent Convergence protocol SNDCP.

Compare between internet user and OSI user?

internet user	OSI user
Telnet	Virtual Terminal
File Transfer Protocol FTP	File Transfer Access & Mgmt
Simple Mail Transfer protocol SMTP	Message-oriented Text Interchange Standard
Simple Network Management Protocol SNMP	Common Management Information Protocol CMIP

What are the Common Problems of Network

- Loss of connectivity
- Duplicate IP address
- Intermittent problems
- Network configuration issues
- Non-problems
- Performance problems

Challenges of IT Managers

- Reliability
- Non-real time problems
- Rapid technological advance
- Managing client/server environment
- Scalability
- Troubleshooting tools and systems
- Trouble prediction
- Standardization of operations -NMS helps
- Centralized management vs. “sneaker-net”

What are the functions of network management? OR What are NM functional grouping?

Network management can be defined as OAMP

Operations, administration, Maintenance, Provisioning

Provisioning	Operations	Maintenance
Planning Design	Fault Management / Service Restoration Configuration Management Performance Management / Traffic Management Security Management Accounting Management Reports Management Inventory Management Data Gathering & Analyses	Fault Management Trouble Ticket Administration Network Installation Network Repairs Facilities Installation & Maintenance Routine Network Tests

**Interoperability according to dumbbell architecture is achieved in 3 levels☺
(Describe NM Dumbbell Architecture**

Network management dumbbell architecture for interoperability where two vendor systems A and B exchange common management messages that consist of management information data and management controls.

-Application services :are the management-related applications such as fault and configuration management.

Management protocols are CMIP for the OSI model and SNMP for the Internet model.

Transport protocols are the first four OSI layers for the OSI model and TCP/IP over any of the first two layers for the Internet model.

Define CMIP and CMIS

CMIP	CMIS
<p>Common Management Information Protocol</p> <p>built on the Open Systems Interconnection (OSI) communication model</p> <p>an error reporting and diagnostic utility and is considered a required part of any IP implementation.</p>	<p>Common Management Information Services</p> <p>defines services for accessing information about network objects or devices, controlling them, and receiving status reports from them</p>

Network Management can be seen from different perspectives

- Network Management (**Infrastructure**)
- Service Management
- Service and Network Provisioning
- Application Management
- e-Commerce Management
- Inventory Management
- Integrated Management
- Business Management
- Information Management
- Management Protocols
- Management Technologies

Service Perspective

- Communication Services
- Computing Services
- Content Services
- IT Services
- Application Services

CHAPTER 3

Show in a diagram how a Communication Model addresses the way information is exchanged between systems (agents/managers)?

Fuger 3.11

What are the NM standard?

Standard	Salient Points
OSI/CMIP	<ol style="list-style-type: none"> 1. International standard (ISO/OSI) 2. Management of data communications network - LAN and WAN 3. Deals with all 7 layers 4. Most complete 5. Object oriented 6. Well structured and layered 7. Consumes large resource in implementation

SNMP/Internet	<ol style="list-style-type: none"> 1. Industry standard (IETF) 2. Originally intended for management of Internet components, currently adopted for WAN and telecommunication systems 3. Easy to implement 4. Most widely implemented
TMN	<ol style="list-style-type: none"> 1. International standard (ITU-T) 2. Management of telecommunications network 3. Based on OSI network management framework 4. Addresses both network and administrative aspects of management 5. eTOM industry standard for business processes for implementing TMN using NGOSS framework
IEEE	<ol style="list-style-type: none"> 1. IEEE standards adopted internationally 2. Addresses LAN and MAN management 3. Adopts OSI standards significantly 4. Deals with first two layers of OSI RM
Web-based Management	<ol style="list-style-type: none"> 1. Web-Based Enterprise Management (WBEM) 2. Java Management Extension (JMX) 3. XML-Based Network Management 4. CORBA-based Network Management

Give names of models of the SNMP architecture or OSI

List the component of osi or SNMP network mangment architecture?

<u>model</u>	<u>OSI</u>	<u>SNMP</u>
Organization	<ul style="list-style-type: none"> • Network management components <ul style="list-style-type: none"> • Functions of components • Relationships 	<ul style="list-style-type: none"> • Same as OSI model
Information	<ul style="list-style-type: none"> • Structure of management information (SMI) <ul style="list-style-type: none"> • Syntax and semantics • Management information base (MIB) 	<ul style="list-style-type: none"> • Same as OSI model

	<ul style="list-style-type: none"> • Organization of management information • Object-oriented 	
Communication	<ul style="list-style-type: none"> • Transfer syntax with bidirectional messages • Transfer structure (PDU) 	<ul style="list-style-type: none"> • Messages less complex than OSI and unidirectional Transfer structure (PDU)
Functional	<ul style="list-style-type: none"> • Application functions <ul style="list-style-type: none"> • Configure components • Monitor components • Measure performance • Secure information • Usage accounting 	<ul style="list-style-type: none"> • Application functions • Fault management • Configuration management • Account management • Performance management • Security management

.Describe the functional model of SNMPv1?

- **Configuration management**
 - Set and change network configuration component parameters
 - Set up alarm thresholds
- **Fault management**
 - Detection and isolation of failures in network
 - Trouble ticket administration
- **Performance management**
 - Monitor performance of network
- **Security management**
 - Authentication
 - Authorization
 - Encryption
- **Accounting management**
 - Functional accounting of network usage

define TMN architecture?

- **Addresses management of telecommunication networks**

- Based on OSI model
- Superstructure on OSI network
- Addresses network, service, and business management

What are the NM Components or Describe the different organization models of SNMPv1 ? What are standard of nm component and what their roles?

manger	agent	Managed object
<ul style="list-style-type: none"> •Sends requests to agents •Monitors alarms •Houses applications •Provides user interface 	<ul style="list-style-type: none"> •Gathers information from objects •Configures parameters of objects •Responds to managers' requests •Generates alarms and sends them to managers 	<p>Managed object</p> <ul style="list-style-type: none"> •Essentially, network element (Hubs, bridges, routers, transmission facilities) that is managed •Houses management agent <p>Can nw element (hw,system) s.w administrative information</p>

What are the possible organization of NM IN SNMPv1 OR Describe the different organization models of SNMPv1 ? مع الرسم

2 tier	3 tier	Manager of Managers
<p>Agent built into network element (Managed hub, managed router)</p> <ul style="list-style-type: none"> • An agent can manage multiple elements (Switched hub, ATM switch) • MDB is a physical database • Unmanaged objects are network elements that are not managed - both physical (unmanaged hub) and logical (passive elements) 	<ul style="list-style-type: none"> • Middle layer plays the dual role • Agent to the top-level manager • Manager to the managed objects • Example of middle level: Remote monitoring agent (RMON) 	<p>Agent NMS manages the domain</p> <ul style="list-style-type: none"> • MoM presents integrated view of domains • Domain may be geographical, administrative, vendor-specific products, <p>Peer NMSs</p> <ul style="list-style-type: none"> • Dual role of both NMSs • Network management system acts as peers • Dumbbell architecture discussed in Chapter 1 • Notice that the manager and agent functions are processes and not systems

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Describe information model of SNMPv1 مهم

Structure of Management Information (SMI)	Management Information Base (MIB) What are the characteristics of the MIB
SMI defines for a managed object <ul style="list-style-type: none"> •Syntax •Semantics •Plus additional information such as status 	<ul style="list-style-type: none"> • Information base contains information about managed objects • Organized by grouping of related objects • Defines relationship between managed objects • It is NOT a physical database. It is a virtual database that is compiled into management modules (manager module/software and agent module /software)

Management Information Base (MIB)

- Information base contains information about objects
- Organized by grouping of related objects
- Defines relationship between objects
- It is NOT a physical database. It is a *virtual* database that is compiled into management module

MIB View and Access of an Object(What s the the different between MIB View and MIB Access of an Object?)

- A managed object has many attributes – its information base
- There are several operations that can be performed on the objects
- A user (manager) can view and perform only certain operations on the object by invoking the management agent
- The view of the object attributes that the agent perceives is the MIB view
- The operation that a user can perform is the MIB access

Internet vs. OSI Managed Object

- Scalar object in Internet vs. Object-oriented approach in OSI
- OSI characteristics of operations, behavior, and notification are part of communication model in Internet: get/set and response/alarm
- Internet syntax is absorbed as part of OSI attributes
- Internet access is part of OSI security model

- **Internet status is part of OSI conformance application**
- **OSI permits creation and deletion of objects; Internet does not: Enhancement in SNMPv2**

Management Data Base / Information Base

Distinction between MDB and MIB(Distinction or the different between MDB and MIB)

- **MDB physical database; e.g., Oracle, Sybase**
- **MIB virtual database; schema compiled into management software.**
- **An NMS can automatically discover a managed object, such as a hub, when added to the network**
- **The NMS can identify the new object as hub only after the MIB schema of the hub is compiled into NMS software.**

Managed Object: Managed objects can be

- **Network elements (hardware, system)**
 - **Hubs, bridges, routers, transmission facilities**
- **Software (non-physical)**
 - **Programs, algorithms**
- **Administrative information**
 - **Contact person, name of group of objects (IP group)**

Three aspects need to be addressed in the communication of information between two entities:

- **transport medium of message exchange (transport protocol),**
- **message format of communication (application protocol),**
- **actual message (commands and responses).**

Two types of syntax

- **Abstract syntax: set of rules that specify data type and structure for information storage**
- **Transfer syntax: set of rules for communicating information between systems**

What is the different between Structure , tag and macro? OR What is the purpose for them?

- **Structure defines how data type is built**
- **Tag uniquely identifies the data type**
- **Macro is used to create new data types**

Describe functional model of OSI?

- Configuration management
 - Set and change network configuration component parameters
 - Set up alarm thresholds
- Fault management
 - Detection and isolation of failures in network
 - Trouble ticket administration
- Performance management
 - Monitor performance of network
- Security management
 - Authentication
 - Authorization
 - Encryption
- Accounting management
 - Functional accounting of network usage

CHAPTER4

What SNMP model?

•Organization Model	Information Model•	Communication Model	Functional model
<ul style="list-style-type: none"> •Relationship between network element, agent, and manager •Hierarchical architecture 	<ul style="list-style-type: none"> •Uses ASN.1 syntax •SMI (Structure of Management Information) •MIB (Management Information Base) 	<ul style="list-style-type: none"> •Transfer syntax •SNMP over TCP/IP •Communication services addressed by messages •Security framework community-based model 	<ul style="list-style-type: none"> •Fault management •Configuration management •Account management •Performance management •Security management

What are SNMPv1 or Discuss about Two-Tier and Three-Tier Organization Model- RMON (Remote Monitoring).

مع الرسم Two-tier	مع الرسم Three-tier
<p>The initial organization model of SNMP management is a sample two-tier model.</p> <p>It consists of a network agent process, which reside in the managed object, and n.w manger process, which reside in the NMS and manges the managed object both manger and agent are software modules. system that The agent responds to any management communicate with it using SNMP .thus , multiple mangers can interact with one agent.</p>	<p>Three-Tier Organization Model: RMON</p> <ul style="list-style-type: none"> • Managed object comprises network element and management agent • RMON acts as an agent and a manager • RMON (Remote Monitoring) probe gathers data from MO, analyses the data, and stores the data • Communicates the statistics to the manager <p>Three-Tier Organization Model: Proxy Server</p> <p><i>What are the rule of proxy server?</i></p> <p>Proxy server converts non-SNMP data from • non-SNMP objects to SNMP compatible object and message</p>

الرسم Define SNMP1 architecture model and Describe the different SNMPv1 messages ?

SNMP is based on the manager/agent model, consisting of a manager, an agent, a database of management information, managed objects, and the network protocol.

SNMP allows managers and agents to communicate.

SNMP uses five basic messages, the direction of messages: 3 from manager - 2 from agent

Message Sent by Manager: or discusses about SNMP messages

- Get-Request: requesting data from agent
- Get-Next-Request: This operation is like the Get-Request, but it is requesting data on the next MO to the one specified
- Set-Request: Initializes or changes the value of the managed device

. Message Sent by Agent:

- Get-Response: Agent responds with data for get and set requests from the manager
- Trap: Alarm generated by an agent, without request from the manager. (Generic trap, Specific trap Time stamp)

Explain the difference between the database of an NMS and MIB. How do you implement each in a Network Management System?

A database of an NMS is a physical database containing the network objects and values. It is implemented using any proprietary database software.

MIB is a virtual database that is used by network management and agent applications to exchange information about the network object.)

It has a hierarchical structure and the schema of the MIB is compiled into the management and agent management software.

الملاحظة *What a managed object?*

Considered to be composed of an object type and object instance

SMI is considered only with the object type and not the object instance.

object type and object instance are synonymous

object identifier is data type, not instance

object instance IP address

Private MIB: (صحيح او خطأ او كامل) للاطلاع

- private MIB intended for vendor equipment
- IANA (Internet Assigned Numbers Authority) assigns identifiers

Primitive Data Types (صحيح او خطأ او كامل) للاطلاع

Structure	Data Type	Comments
Primitive types	INTEGER	Subtype INTEGER (n1..nN) Special case: Enumerated INTEGER type
	OCTET STRING	8-bit bytes binary and textual data Subtypes can be specified by either range or fixed
	OBJECT IDENTIFIER	Object position in MIB
	NULL	Placeholder

- get-request message has NULL for value fields
and get-response from agent has the values filled
in subtype:
 - INTEGER (0..255)
 - OCTET STRING (SIZE 0..255)
 - OCTET STRING (SIZE 8)

Enumerated: Special case of INTEGER data type (صحيح او خطأ او كامل) للاطلاع •

List row of the table is a sequence

(index, interface, IP address, net mask, net address, link address)

Encoding:

In computers, encoding is the process of putting a sequence of characters (letters, numbers, punctuation, and certain symbols) into a specialized format for efficient transmission or storage.

SNMPv1 has adopted BER with TLV for encoding information to be transmitted between agent and manager processes.

Basic encoding rules(BOER):Type . length , value(TLV)

Structure of managed objects has 5 parameters (textual name , syntax , definition , access , status)

table Consists of objects:

- IP address •Interface•Subnet mask (which subnet this address belongs to)
- Broadcast address (value of I.s.b. in IP broadcast address) •Largest IP datagram that can be assembled

What is the difference between sequence and sequence of?

Sequence/ order list

Sequence of/ ordered array of repetitive data

Aggregate Object:

- A group of objects
- Also called tabular objects
- Can be represented by a table with
 - Columns of objects
 - Rows of instances

ifEntry: ifEntry specifies the objects in a row in the ifTable. Each interface is defined as a row in the table.

ifType: Type of interface below the network layer defined as enumerated integer.

IP Group:

- **ipForwarding:** Gateway(1) and Router(2)
- **IP Address Table** contains table of IP addresses
- **IP Route Table** contains an entry for each route
- **IP Network-to-Media Table** is address translation table mapping IP addresses to physical addresses

ICMP Group:

- **Objects associated with ping**
 - **icmpOutEchos** # ICMP echo messages sent
 - **icmpInEchoReps** # ICMP echo reply messages received
- **Objects associated with traceroute/tracert**
 - **icmpInTimeExcs** # ICMP time exceeded messages received

CHAPTER 5:

What are SNMP entities?

SNMP application entities-Reside in management stations and network elements-Manager and agent

•SNMP protocol entities-Communication processes (PDU handlers)-Peer processes that support application entities

SNMP Messages

•Get-Request

•Get-Next-Request

•Set-Request

•Get-Response

•Trap

•Generic trap TYPE : Indicates one of a number of generic trap types. (coldStart – warmStart – linkDown – linkup – authenticationfailure – egpNeighborLoss – enterpriseSpecific)

•Specific trap : **_** : Indicates one of number of specific trap codes. (For special measurements such as statistics)(INTEGER)

- •Time stamp: Provides a amount of time that has elapsed between the last network reinitialization and generation of the trap. (Time since last initialization)(TIME TICKES)
- VARIABLE BINDING TRAP .

get-next-request and get-request –SNMP commands

The get-request	The get-next-request
will only match exactly the OID(ObjectIdentifier) specified in the request. It will fail if no such OID exists on the target.	will return the OID that is the "next" OID in the "tree". can be used to "walk through" the OIDs in the MIB of a certain domain/system

.Describe the communication model of SNMPv1

The **SNMPv1 communication model** defines specifications of four aspects of SNMP communication: **architecture**, **administrative model** that defines data access policy, **SNMP protocol**, and **SNMP MIB**.

Discuss about SNMP Community and Profile

- Community: Pairing of two application entities (SNMP Manager and SNMP agent)
- Community name: String of octets
- Two applications in the same community communicate with each other

Community profile: is the pairing of SNMP MIB views with an SNMP access mode. A community profile .determines the operation that can be performed on the object by an agent

Discuss about the Administrative Model and SNMP Community.

The administrative model defines SNMP Entities, community profile and policy of communication.

IT defines the community within which messages can be exchanged. It also defines the access policy as to who has access privilege to what data.

SNMP Entities:

SNMP application entities: Residing in management stations and network elements

Manager and agent

SNMP protocol entities: Peer processes that implement SNMP and support application entities. Communication processes (PDU handlers)

Community profile and policy:

Applications in the same community communicate with each other Community is Pairing of two application entities: SNMP Manager & SNMP agent.

Community name: is a String of octets

A community name acts as a password that is shared by SNMP agents and one or more SNMP managers

Community Profile

MIB view

- An agent is programmed to view only a subset of managed objects of a network element

Access mode

- Each community name is assigned an access mode: read-only and read-write
- Community profile: MIB view + SNMP access mode
- Operations on an object determined by community profile and the access mode of the object
- Total of four access privileges
- Some objects, such as table and table entry are non-accessible

What is the role of Proxy Access Policy?

- Proxy agent enables non-SNMP community elements to be managed by an SNMP manager.
- An SNMP MIB is created to handle the non-SNMP objects.

Protocol Entities

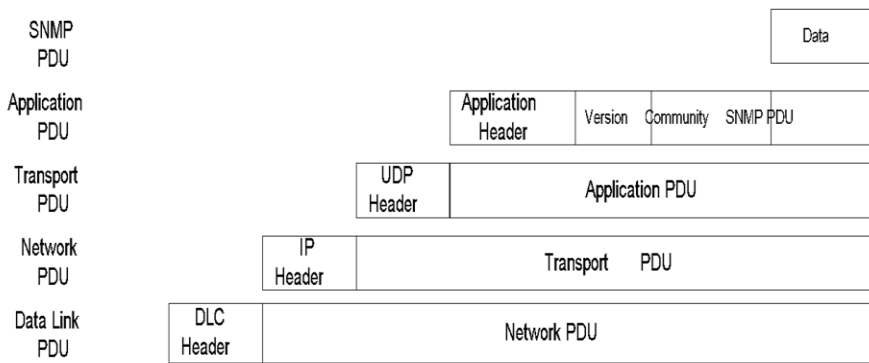


Figure 5.5 Encapsulated SNMP Message

- Protocol entities support application entities
- Communication between remote peer processes
- Message consists of:
 - Version identifier
 - Community name
 - Protocol Data Unit
- Message encapsulated and transmitted

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

Lexicographic Order

Procedure for ordering: للاطلاع

- Start with leftmost digit as first position
- Before increasing the order in the first position, select the lowest digit in the second position
- Continue the process till the lowest digit in the last position is captured

- Increase the order in the last position until all the digits in the last position are captured
- Move back to the last but one position and repeat the process
- Continue advancing to the first position until all the numbers are ordered
- Tree structure for the above process

SNMP MIB

- SNMPv1 MIB has too many objects that are not used
- SNMPv2 obsoleted a large number of them

CHAPTER 6

What is the changes of SNMP2 from SNMP1 :

- **Bulk data transfer**
- **Manager-to-manager message**
- **Enhancements to SMI: SMIV2**
 - **Module definitions: MODULE-IDENTITY macro**
 - **Object definitions: OBJECT-TYPE macro**
 - **Trap definitions: NOTIFICATION-TYPE macro**
- **Textual conventions**
- **Conformance statements**
- **Row creation and deletion in table**
- **MIB enhancements**
- **Transport mappings**

SIMILAR FEATCHER BETWEEN SNMP1 AND SNMP2:

- **Security features, originally to be in SNMPv2 moved to SNMPv3**
- **SNMPv2, like SNMPv1, is community-based administrative framework**
- (In SNMPv2 security features were implemented. False) صح او خطأ

SNMPv2 Messages:

- **inform-request :(manager-to-manager message)**
 - **get request**
 - **get next request**
- **get-bulk-request(transfer of large data)**

- Set request
- Response
- Trap
- Report(not used)

OBJECT :

- **OBJECT IDENTIFIER** (defines the *administrative identification* of a node in the MIB)
- **OBJECT-IDENTITY**(is high level description) macro *assigns* an object identifier to an object identifier in the MIB
- **OBJECT-TYPE** (details description needed for implementation) macro defines the *type* of a managed object.

- **Table Expansion:**

- Augmentation of a table (dependent table) adds additional columns to an existing table (base table)
- Dense table enables addition of more rows to base table
- Sparse table supplements less rows to a base table

- **Textual Convention**

Enables defining new data types

- Makes semantics of data types consistent and human readable
- Creates new data types using existing ones and applies restrictions to them
- An important textual convention in SNMPv2, *RowStatus* creates and deletes rows

- **SNMPv2 MIB:**

- Security is a placeholder
- **System group:** A table sysORTable added that lists resources that the agent controls; NMS configures NE through the agents.
- Most of the objects in the SNMPv1 obsoleted
- Object Groups and Notification Groups defined for conformance specifications.

Conformance: OBJECT-GROUP:

- Conformance defined by

- **OBJECT-GROUP macro**
- **NOTIFICATION-GROUP macro**
- **OBJECT-GROUP**
 - **Compiled during implementation, not at run time**
 - **OBJECTS clause names each object**
 - **Every object belongs to an OBJECT-GROUP**
 - **Access defined by MAX-ACCESS, the maximum access privilege for the object**
- **Conformance: NOTIFICATION-GROUP**
- **NOTIFICATION-GROUP**
 - **Contains trap entities defined in SMIV1**
 - **NOTIFICATIONS clause identifies the notifications in the group**
 - **NOTIFICATIONS-GROUP macro compiled during implementation, not at run time**

Compare between the MIB of SNMPv1 and SNMPv2

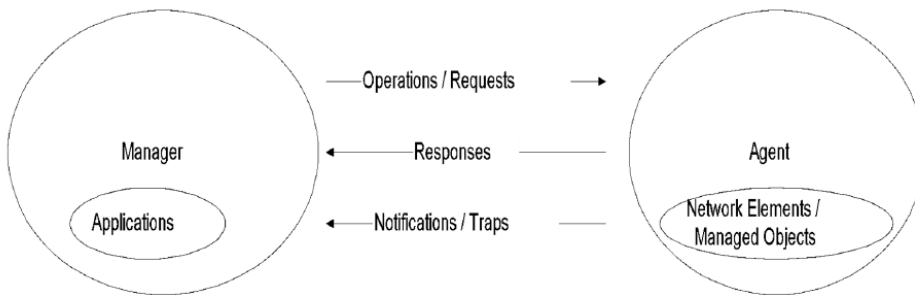
	SNMP1	SNMP2
Security	No security from someone with access to the network	SNMPv2 failed to improve on security.
Complexity	Performance and security limitations.	More powerful but more complex than SNMPv1
Message Format	Five messages (GetRequest, GetNextRequest, SetRequest, Trap, Response)	Seven messages instead of five (inform-request, get-bulk-request)
MIB	Defines limited, easily implemented MIB of scalar variables and two dimensional tables	Defines general framework with which MIB defined and constructed

أسئلة عامة :

2. what is the Ping ? للاطلاع فقط

- Most basic tool for internet management
- Based on ICMP ECHO_REQUEST message
- Available on all TCP/IP stacks
- Useful for measuring connectivity
- Useful for measuring packet loss
- Can do autodiscovery of TCP/IP equipped stations on single segment

Show in a diagram how a Communication Model addresses the way information is exchanged between systems (agents/managers)?



Discuss the enhancement carried by RMON2 compared to RMON1 in terms of monitoring capability.

RMONv1 deals with data that associated with the OSI data link layer. The success of RMON1 leads to develop the RMON2. RMON2 extends the monitoring capability from one layer to next layer either (the network layer to the application layer). Also monitor the packets and clients through the network.

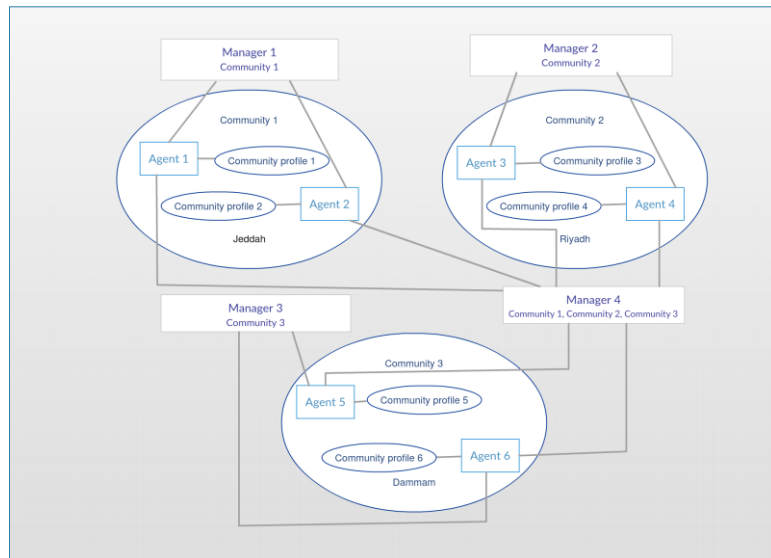
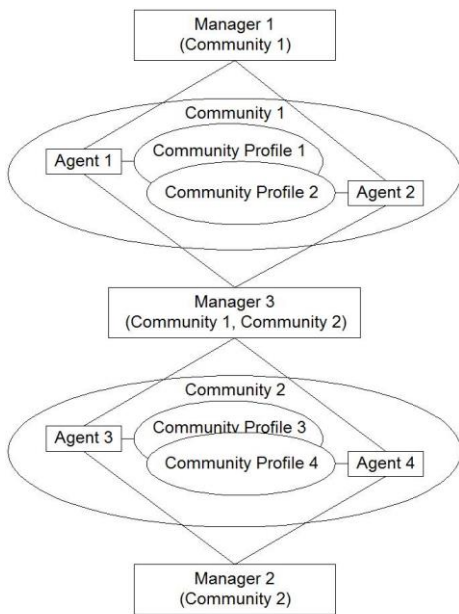
RMON2 focuses on higher layers of traffic at a higher level of the Medium Access Control (MAC) layer.

Provide at least two advantages of using RMON in remotely network monitoring.

- 1- Increasing productivity for administrators
- 2- Fast fault diagnosis.
- 3- Does not need a direct visibility by NMS, so the information is more reliable.
- 4- Monitoring and analyzing locally and relays data so the load is less on the network

Draw the SNMP Access Policy (as in Figure) for the following scenario. Suppose a corporation with headquarters in Riyadh and domains or network sites in Riyadh, Jeddah, and Dammam.

Let Manager 1 and community 1 be associated with Jeddah, Manager 2 and community 2 be associated with Riyadh, and Manager 3 and community 3 be associated with Dammam. Let Manager 4 be the overall network management system, the Manager of Managers (MOM). Each Manager manages 2 Agents associated with network elements in its domain only. So that, Manger 1 does not have the view of Riyadh or Dammam, Manger 2 cannot perform operations on network elements belonging to Jeddah or Dammam domains, and Manger 3 cannot communicate with Agents in Jeddah or Riyadh. However, Manger 4 has all community names defined in its profile and hence has the view of the total enterprise network in Riyadh, Jeddah, and Dammam.



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