HP Storage Architecture

Understanding the SCSI MIB

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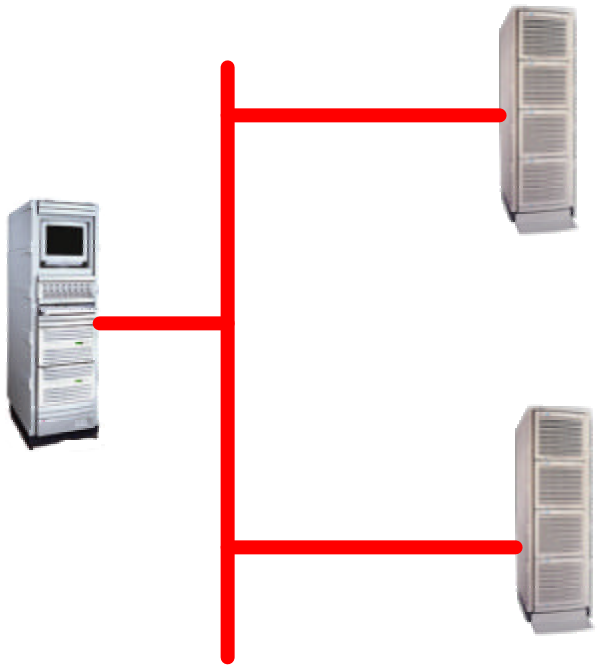
Jan. 14 2002 T10 meeting

Network Mgmt

Managing Perspectives…



SCSI takes the perspective of a host managing Logical Units. The management of devices (if possible) is accomplished thru LU (mode pages).

Range of influence limited to "addressable LUNS" Cannot affect aspects of the device which are outside the scope of LU.

This results in implementation inconsistencies when changing parameters which apply to a broader scope than just the LU

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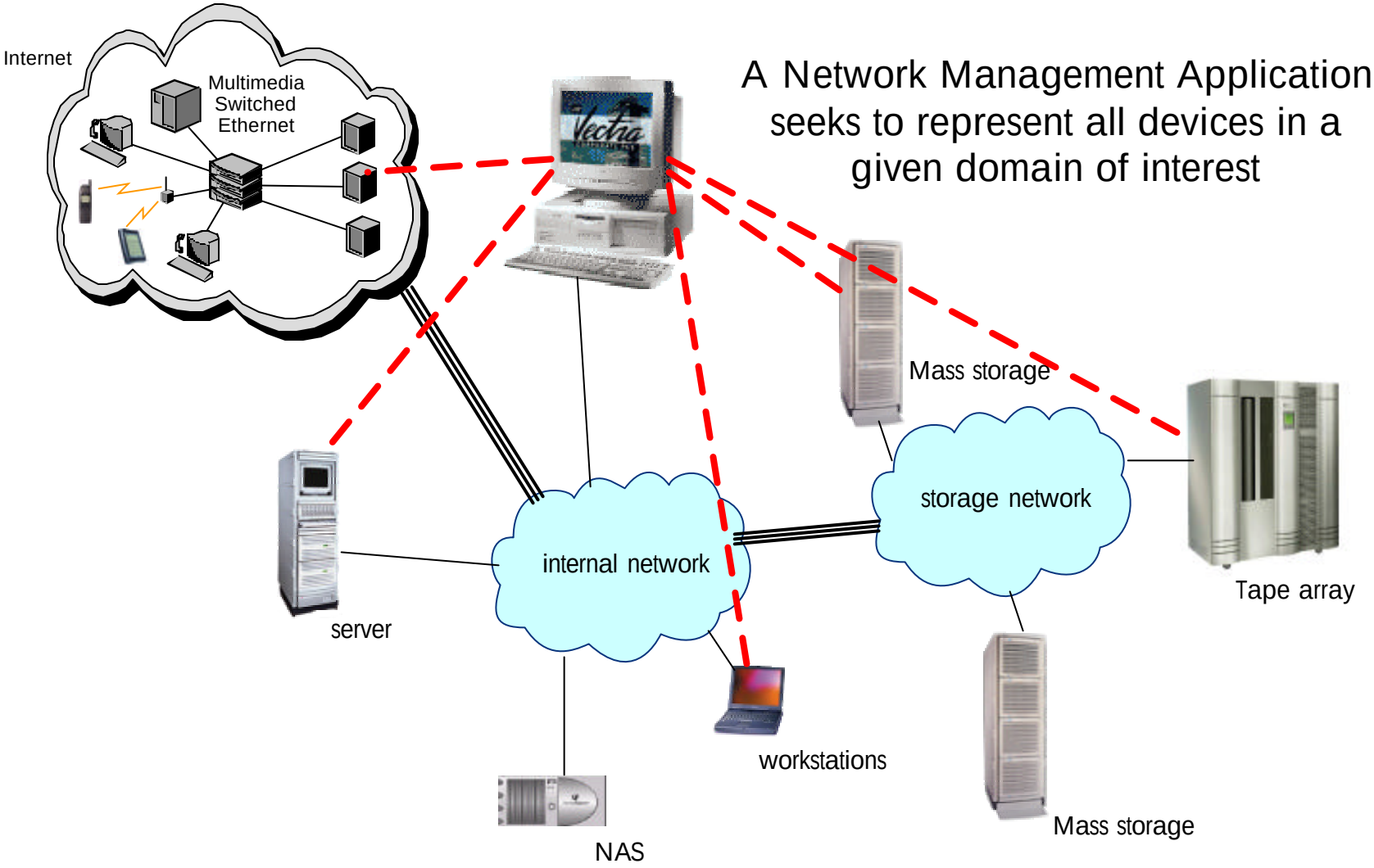
Managing Perspectives…



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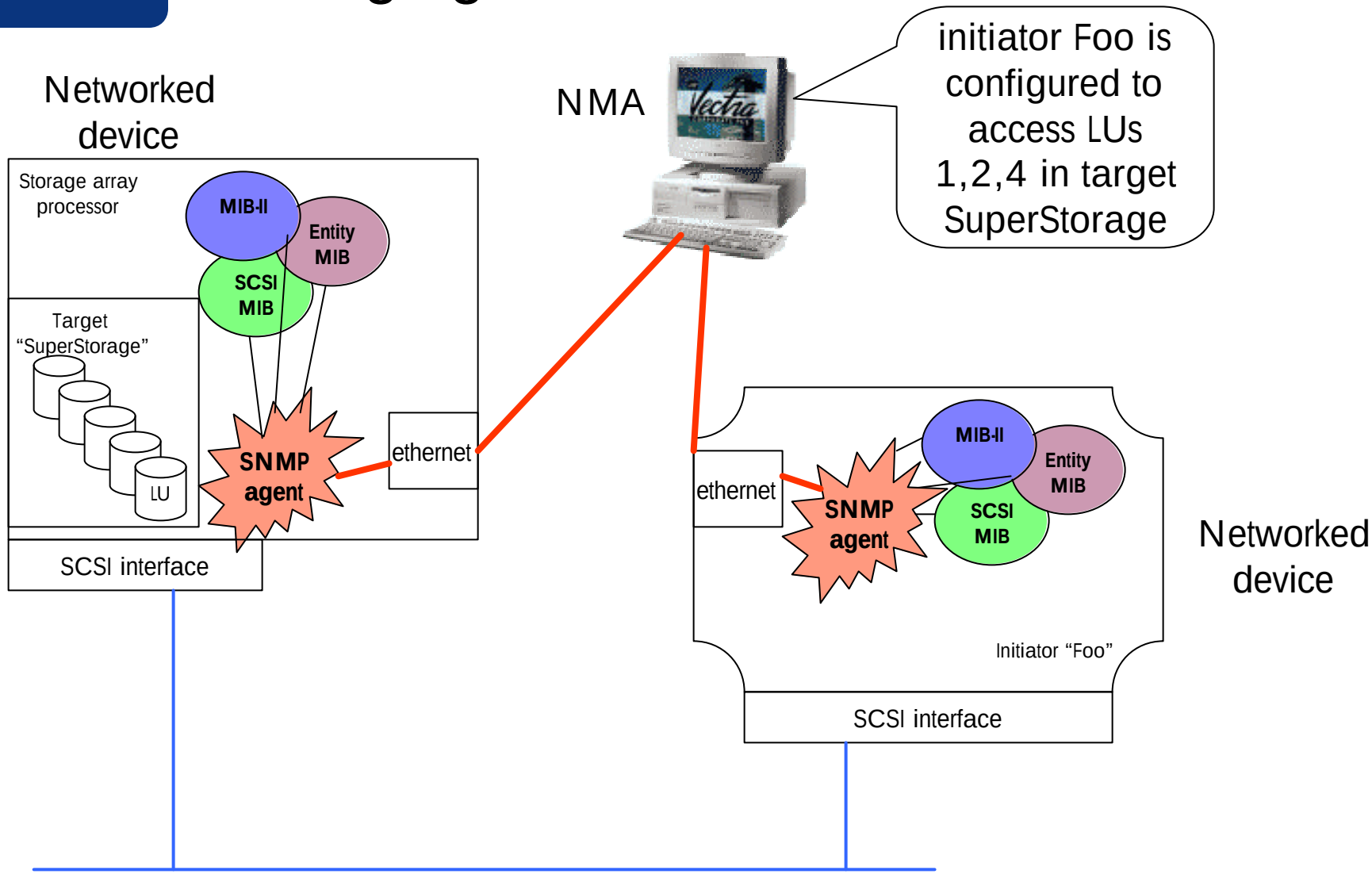
Managing SCSI devices via ethernet



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Networked Resource Mgmt

- Network Management Application
  - collects device information from any number of devices via IP protocols (SNMP, etc)
  - correlates information from many devices into a map of the networked resources
  - Provides services such as interpreting, sorting and filtering of this information for user convenience.
  - Assists in configuration of the networked devices
- Device communicates what it knows about itself and it's current context

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Network Management

- SNMP - Simple Network Management Protocol (exchange protocol)
- SMI – structure of management information (MIB syntax)
- MIB – management information base (SMI–encoded database)
- Network Management Application = SNMP mgmt application requests objects (described in MIBs) from SNMP agents at various locations throughout the network
- Devices typically support several MIBs for different classes of information
  - For example:
    - MIB-II – RFC1213,1303,2011,2012
    - Interface MIB –RFC 2863
    - Entity MIB – RFC 2737

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Networked Object Management

- A typical agent usually:
  - Implements full SNMP protocol.
  - Stores and retrieves management data as defined by Management Information Base(s)
  - Can asynchronously signal an event to the manager
  - Can be a proxy for non-SNMP manageable devices
  - Supports several MIBs
- A typical manager usually:
  - Implemented as a Network Managment Application (the NMA)
  - Implements full SNMP Protocol
  - Able to
    - Query agents
    - Get responses from agents
    - Set variables in agents
    - Acknowledge asynchronous events from agents

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Standard MIBs contain:

- Objects that represent:
  - properties
  - status
  - statistics
  - Actions
- Objects are:
  - Common to all or most standard implementations
  - Read-only or read-write access

SNMP Tutorial link

http://directory.google.com/Top/Computers/Internet/Protocols/SNMP/References_and_Tutorials/

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Purpose of SCSI MIB

- Describe the SCSI attributes and configuration of a networked device
- Represent SCSI information about a device
  - Not SCSI architectural constructs
  - Not all possible ‘views’ of this information
    - Include information necessary for extracting multiple ‘views’
- Least common denominator (biggest bang for the byte)
  - Smallest amount of information possible so that a NMA can compose all aggregates and views for it’s own context
  - Describe a SCSI device (or collection of) for the purpose of OOB mgmt and configuration, mapping (constructing a picture of the domain of interest)

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Current MIB Object Model

- Described using the UML syntax for Class Diagrams
- Links for information on UML modeling
- http://www.rational.com/uml/index.jsp
- http://www.omg.org/technology/uml/
- A good overview of the UML class diagram notation:

http://www.objectmentor.com/publications/umlClassDiagrams.pdf

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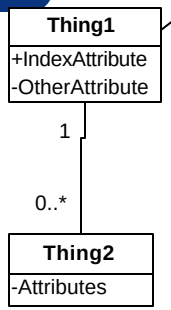
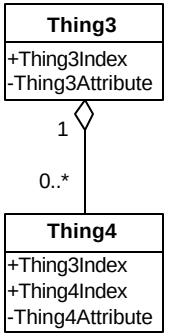
UML Drawing Key

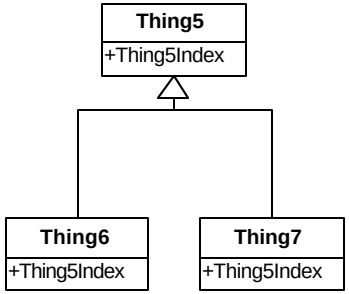
Attribute Key : Attributes marked with a plus sign "+" are used to index the object in which they appear. Non-index attributes are marked with a dash "-".



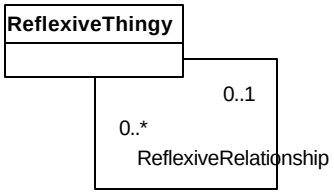
Association- There are zero or more Thing2 instances associated with each Thing1. A Thing2 is associated with exactly one Thing1. If a name is present on the association, it is the attribute in one thing that "points to" the other.



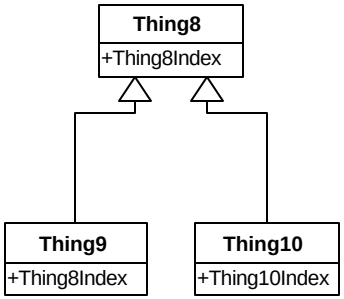
Aggregation- Each Thing3 contains zero or more Thing4 instances. A Thing4 belongs to exactly one Thing3 and cannot exist without a Thing3. The contained object always inherits the indices from the container object, and adds at least one of its own.



Inheritance(Exclusive OR) - Each Instance of Thing7 or Thing6 is also a Thing5. A Thing5 must be either a Thing6 or Thing7, but not both. Thing6 has the attributes of Thing5 + Thing6; Thing7 has the attributes of Thing5 + Thing7. Each of the involved classes shares the same indices.



Reflexive Relationship Each ReflexiveThingy can be related to zero or one "parent" ReflexiveThingy; each ReflexiveThingy can be the parent of zero or more other ReflexiveThingies. This basically specifies a tree structure.



Inheritance(Logical OR) - Each Instance of Thing10 or Thing9 is also a Thing8. A Thing8 must be either a Thing9, a Thing10, or both. Objects also inherit the same indices as the parent object.

SCSI MIB UML Drawing

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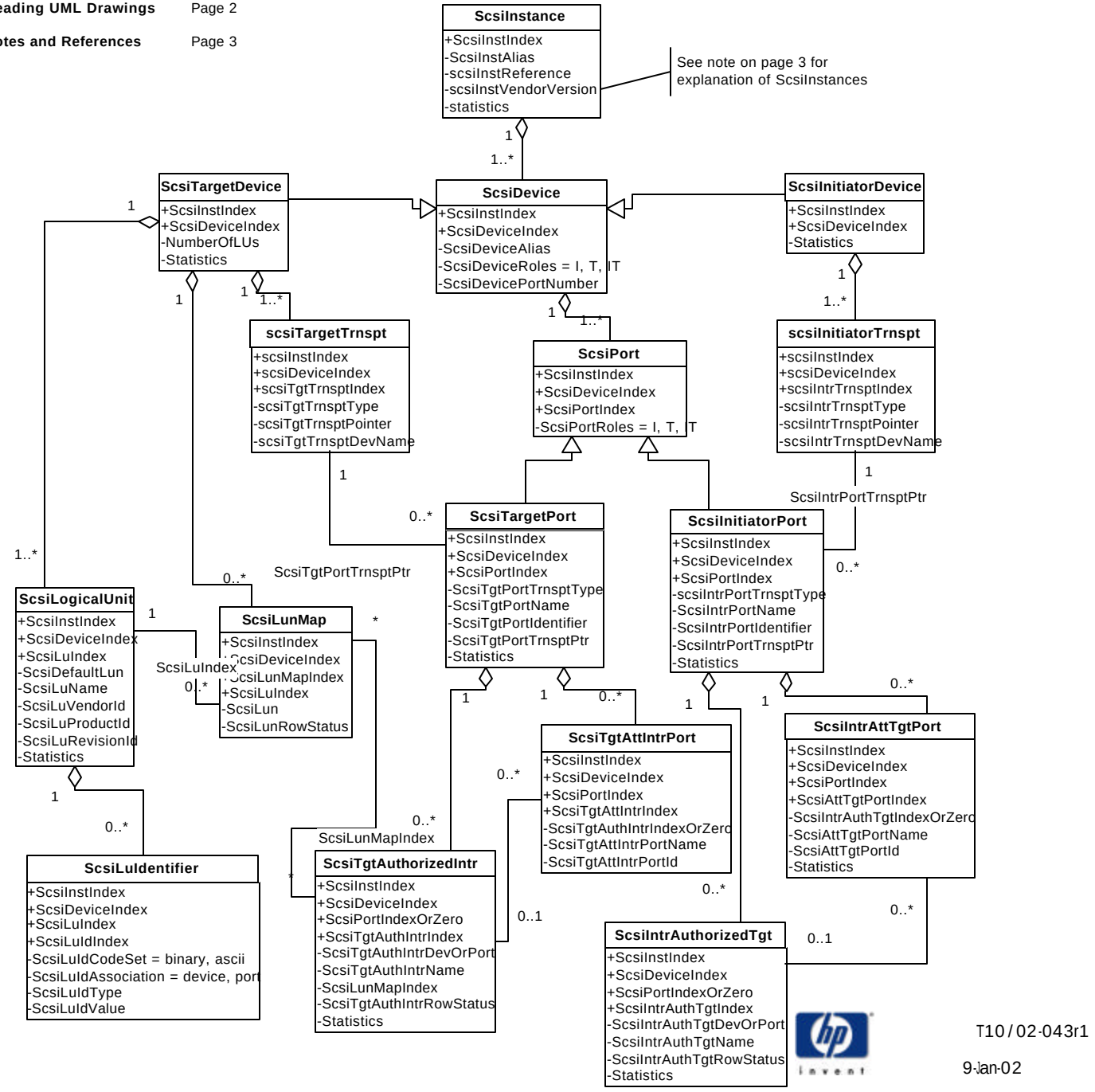

SCSI MIB Family Model

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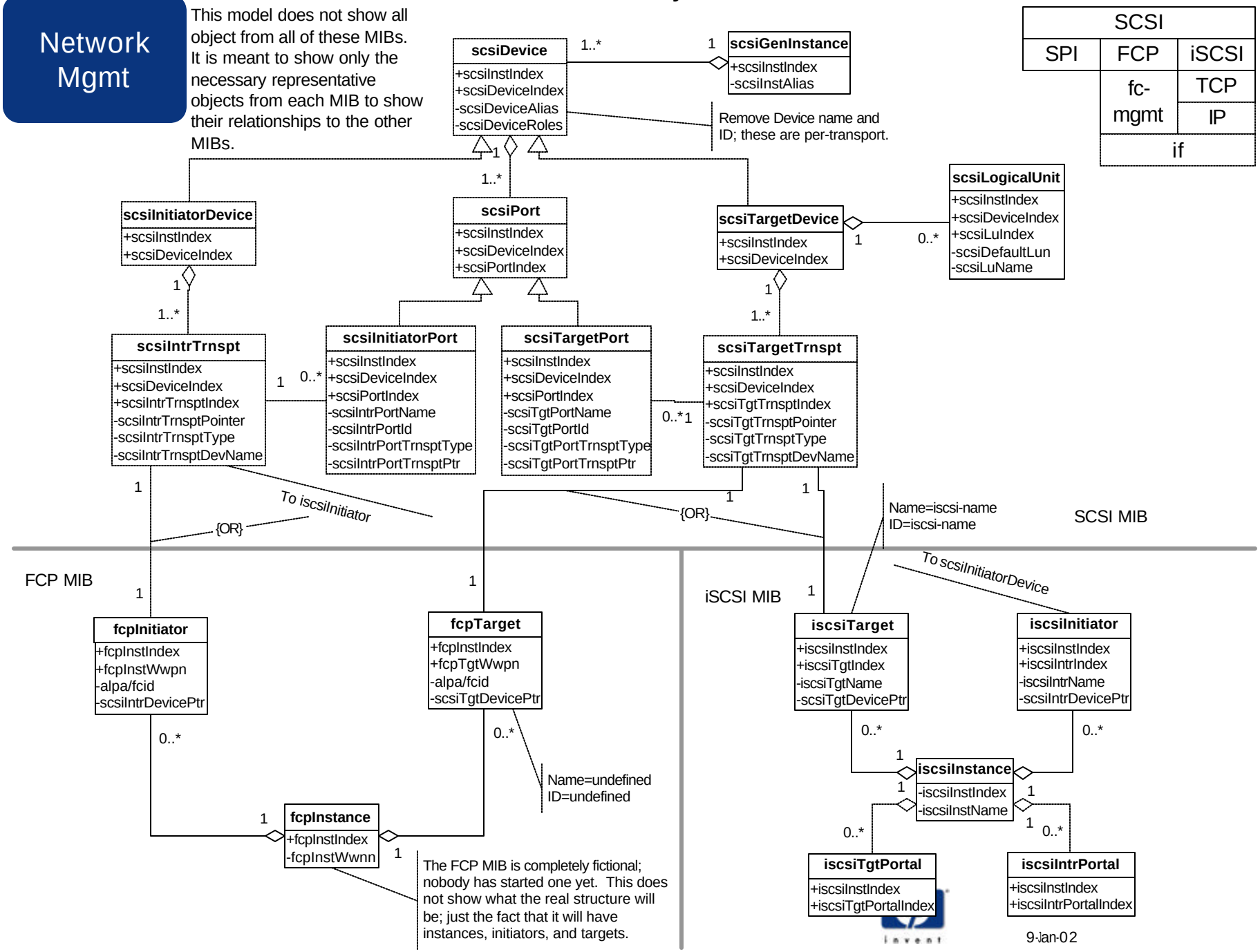
This model does not show all object from all of these MIBs. It is meant to show only the necessary representative objects from each MIB to show their relationships to the other MIBs.



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Current Issues

- Collecting input from developers on statistics commonly kept by initiator and target implementations
  - Reply to email to T10 reflector Subject: “SCSI MIB input request” dated Jan. 9, 2002
- Does an LU ever present more than one LUN to a particular initiator?

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SCSI MIB Draft and Documents

- SCSI MIB draft document

http://www.ietf.org/internet-drafts/draft-ietf-ips-scsi-mib-00.txt

- UML drawing for SCSI MIB

ftp://ftpeng.cisco.com/mbakke/ips/scsi-mib/Visio-scsi-uml-model-00d.pdf