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The SNMP Information Model

atus of this Memo

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This memo attempts to capture the de facto information model of SNMP MIBs.

onventions used in this document

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC-2119 [ii].

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The Internet-Standard Management Framework

For a detailed overview of the documents that describe the current Internet-Standard Management Framework, please refer to section 7 of RFC 3410 [RFC3410].

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. MIB objects are generally accessed through the Simple Network Management Protocol (SNMP). Objects in the MIB are defined using the mechanisms defined in the Structure of Management Information (SMI). This memo specifies a MIB module that is compliant to the SMIv2, which is described in STD 58, RFC 2578 [RFC2578], STD 58, RFC 2579 [RFC2579] and STD 58, RFC 2580

The SNMP Information Model

1 Introduction

An information model consists of three components: the objects, the attributes of the objects and its relationship with other objects. An information model can be thought of as a higher level of abstraction that either be used to create data models such as MIBs, or can be abstracted from existing definitions. This memo attempts to do the latter.

The motivation for capturing the de facto information model that has been used in SNMP MIBs is to increase awareness of the model. Lack of awareness of the de facto information model used in SNMP MIBs can lead to poor design choices, which in turn can increase the costs or in some cases prevent the use of the MIBs in management solutions.

2 Relationships between MIB Tables

While information in MIBs is organized into groups and tables, the definition of the group or table usually does not provide a direct mapping to the abstract object whose attributes are being captured. In practice, the definition of all attributes of an abstract object may span several tables and may even be spit between different MIB modules.

Information in a table can be related to that in another table in a number of ways. While there isn't one single design pattern that has been used in designing MIBs, there are some general patterns that can be used as the starting point for abstracting out the SNMP Information Model.

If a table shares an index with or is an augmentation of another table, and for each row in the first table there is a corresponding row in the second, then both of these tables can be considered to be defining attributes of the same object.

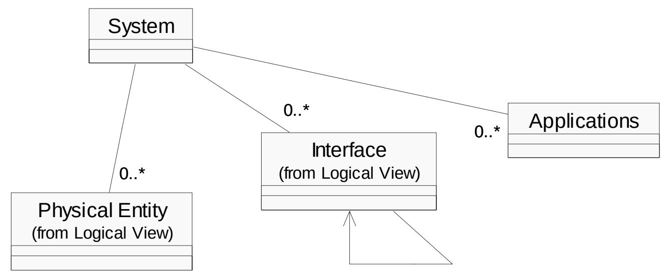
If a table shares an index, or a copy of an index with another table and there are only rows in the second table for a subset of the rows in the first table, the second table can be thought of as a specialization of the general object whose attributes were defined in the first. This is often referred to as a sparse augmentation.

Another common relationship is where an attribute in one table contains the index values of another table with different indexing. These tables are either defining attributes for different objects that are related or providing a mapping between attributes of the same object, but that are referenced in different ways.

3 The Core Models

3.1 The System

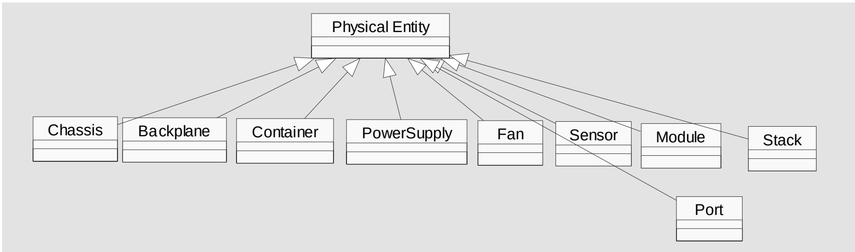
A system consists of a collection of physical and logical components that will be managed as a single managed entity. It consists of the objects within the SystemGroup [RFC3418] as well as the objects defined in all other MIBs supported on the managed entity.



3.2 Physical Entities

Physical entities can be thought of as a generalized object whose base attributes are defined in the Entity MIB[RFC2737]. Specializations of the physical entity include chassis, backplane, container, powerSupply, fan, sensor, module, port, and stack, as indicated by entPhysicalClass and the existence of sparsely augmented physical entity tables.

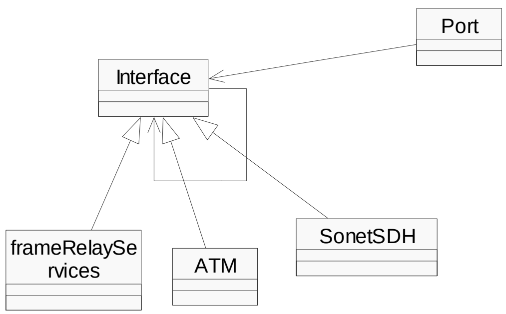
The relationship between the interfaces and their physical entity is indicated by the entAliasMappingIdentifier[RFC2737], which is applicable only to port specializations.



3.3 Interfaces

An interface can be thought of us a generalized object whose base attributes are defined in the Interfaces MIB [RFC2863]. Specializations of the interface include ATM, Frame Relay Services, SONET/SDH and other as indicated by the ifType and the existence of sparsely augmented interface tables.

The base interface attributes are defined in the ifTable and ifXTable. The layering relationship between interfaces is defined in the ifStack table.

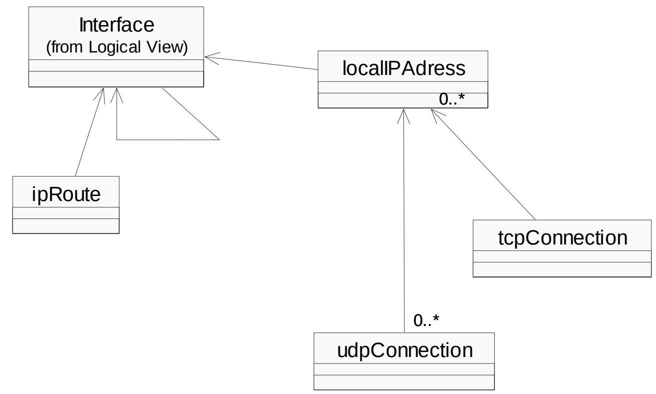


3.4 IP

A local IP address is associated with an interface via ipAddEntIfIndex [RFC2011]. Note that not all interfaces have Ip Address.

An IP route is associated with an interface via either the ipCidrRouteIfIndex [RFC2096] or the ipROuteIfIndex [RFC1213], depending on which version of the route table used.

UDP and TCP Connections are associated with local IP Addresses via udpLocalAddress [RFC2013] and tcpConnLocalAddress [RFC2012], respectively.



3.5 Applications

This section will be addressed in an update to this memo.

Security Considerations

There are no additional security considerations other than those normally associated with the use of SNMP.

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Full Copyright Statement

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i Bradner, S., "The Internet Standards Process -- Revision 3", BCP 9, RFC 2026, October 1996.

ii Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997