Entity MIB
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Status of this Memo

1. Introduction

This memo defines an experimental portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it describes managed objects used for managing multiple logical entities managed by a single SNMP agent.

2. The SNMPv2 Network Management Framework

The SNMPv2 Network Management Framework consists of four major components. They are:

- RFC 1442 [1] which defines the SMI, the mechanisms used for describing and naming objects for the purpose of management.
- STD 17, RFC 1213 [2] defines MIB-II, the core set of managed objects for the Internet suite of protocols.
- RFC 1445 [3] which defines the administrative and other architectural aspects of the framework.
- RFC 1448 [4] which defines the protocol used for network access to managed objects.

The Framework permits new objects to be defined for the purpose of experimentation and evaluation.

2.1. Object Definitions

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. Objects in the MIB are defined using the subset of Abstract Syntax Notation One (ASN.1) defined in the SMI. In particular, each object type is named by an OBJECT IDENTIFIER, an administratively assigned name. The object type together with an object instance serves to uniquely identify a specific instantiation of the object. For human convenience, we often use a textual string, termed the descriptor, to refer to the object type.

3. Overview

There is a need for a standardized way of representing a single agent which supports multiple instances of one MIB. This is already true for at least 3 standard MIBs, and is likely to become true for more and more MIBs as time passes. For example:

- multiple instances of a bridge supported within a single device having a single agent;

- multiple repeaters supported by a single agent;

- multiple OSPF backbone areas, each one operating as part of its own Autonomous System, and each identified by the same area-id (e.g., 0.0.0.0), supported inside a single router with one agent.

The fact that it is a single agent in each of these cases implies there is some relationship which binds all of these entities together. Effectively, there is some "overall" physical entity which houses the sum of the things managed by that one agent, i.e., there are multiple "logical" entities within a single physical entity. Sometimes, the overall physical entity contains multiple (smaller) physical entities and each logical entity is associated with a particular such physical entity. Sometimes, the overall physical entity is a "compound" of multiple physical entities (e.g., a stack of stackable hubs).

What is needed is a way to determine exactly what logical entities are managed by the agent (either by SNMPv1 or SNMPv2), and thereby to be able to communicate with the agent about a particular logical entity.

When different logical entities are associated with different physical entities within the overall physical entity, it is also useful to be able to use this information to distinguish between logical entities.

In these situations, there is no need for varbinds for multiple logical entities to be referenced in the same SNMP message (although that might be useful in the future). Rather, it is sufficient, and in some situations preferable, to have the context/community in the message identify the logical entity to which the varbinds apply.

3.1. Relationship to Contexts

For SNMPv2, in simple scenarios, a SNMPv2 context [5] will correspond directly to a logical entity. However, in the general case, there is a

many-to-many correspondence between an entry in the contextTable and an entry in the entLogicalTable.

On the one hand, each logical entity is associated with exactly one value of contextLocalEntity. However, it is possible to have multiple logical entities associated with the same value of contextLocalEntity. For example, the logical entities, 'bridge1' and 'repeater1', may be represented in an agent's main context, even though different contexts may be used to represent logical entities 'bridge2' and 'repeater2'.

On the other hand, a single value of contextLocalEntity can be associated with multiple contexts (multiple entries in the contextTable) when each has the same value of contextLocalEntity, but a different value of contextLocalTime.

3.2. Relationship to Community Strings

For SNMPv1, distinguishing between different logical entities is one (but not the only) purpose of the community string [6]. This is accommodated by representing each community string as a logical entity.

3.3. Relationship to a Chassis MIB

Some readers may recall that a previous IETF working group attempted to define a Chassis MIB. No consensus was reached by that working group, possibly because its scope was too broad. As such, it is not the purpose of this MIB to be a "Chassis MIB replacement", nor is it within the scope of this MIB to contain all the information which might be necessary to manage a "chassis". On the other hand, the entities represented by an implementation of this MIB might well be contained in a chassis.

3.4. Relationship to the Interfaces MIB

The Entity MIB contains a mapping table identifying physical components that have 'external values' (e.g. ifIndex) associated with them within a given context. This table can be used to identify the physical location of each interface in the ifTable. Since ifIndex values in different contexts are not related to one another, the interface to physical component associations are relative to a specific logical entity within

the agent.

3.5. Relationship to the Other MIBs

The Entity MIB contains a mapping table identifying physical components that have identifiers from other standard MIBs associated with them. For example, this table can be used along with the physical mapping table to identify the physical location of each repeater port in the rptrPortTable, each bridge port in the dot1dBasePortTable, or each ifIndex in the ifTable.

3.6. Re-Configuration of Entities

All the MIB objects defined in this MIB have at most a read-only MAX-

ACCESS clause, i.e., none are write-able. This is another conscious decision by the authors to limit this MIB's scope. It is possible that this restriction could be lifted after implementation experience.

3.7. MIB Structure

This MIB contains four tables: the entPhysicalTable and the entLogicalTable each provide a list of entities. The entLPMappingTable provides mappings between logical and physical entities. The entAliasMappingTable provides mappings between physical components and associated identifiers from other MIBs. For example, a physical repeater port may be associated with an instance of 'rptrPortGroupIndex.1.5', or 'ifIndex.12', or both.

The entPhysicalTable contains one row per physical entity, and should always contains at least one row for an "overall" physical entity. Each row is indexed by an arbitrary, small integer, and contains a description and type of the physical entity. It also optionally contains the index number of another row in the same table indicating a containment relationship between the two.

The entLogicalTable contains one row per logical entity. Each row is indexed by an arbitrary, small integer and contains a name, description, and type of the logical entity. It also contains information to allow SNMPv2 and/or SNMPv1 access to the MIB information for the logical

entity.

The entLPMappingTable contains mappings between entLogicalIndex values (logical entities) and entPhysicalIndex values (the physical components supporting that entity). A logical entity can map to more than one physical component, and more than one logical entity can map to (share) the same physical component.

The entAliasMappingTable contains mappings between entPhysicalIndex,

entLogicalIndex pairs and 'alias' object identifier values. This allows resources managed with other MIBs (e.g. repeater ports, bridge ports, physical and logical interfaces) to be identified in the physical entity hierarchy.

3.8. Multiple Agents

Even though a primary motivation for this MIB is to represent the multiple logical entities supported by a single agent, it is also possible to use it to represent multiple logical entities supported by multiple agents (in the same "overall" physical entity). Indeed, it is implicit in the SNMP architecture, that the number of agents is transparent to a network management station.

4. Definitions

```
ENTITY-MIB DEFINITIONS ::= BEGIN

IMPORTS
```

```
    MODULE-IDENTITY, OBJECT-TYPE, experimental,
    IpAddress
        FROM SNMPv2-SMI
    DisplayString, AutonomousType, TruthValue
        FROM SNMPv2-TC
    Context
        FROM SNMPv2-PARTY-MIB
    MODULE-COMPLIANCE, OBJECT-GROUP
        FROM SNMPv2-CONF;


entityMIB MODULE-IDENTITY
    LAST-UPDATED "9511170000Z"
    ORGANIZATION "IETF ENTMIB Working Group"
    CONTACT-INFO
            "        Keith McCloghrie
                     Cisco Systems Inc.
                     170 West Tasman Drive
                     San Jose, CA 95134
                     408-526-5260
                     kzm@cisco.com

                     Andy Bierman
                     Bierman Consulting
                     1200 Sagamore Lane
                     Ventura, CA 93001
                     805-648-2028
                     abierman@west.net"
    DESCRIPTION
            "The MIB module for representing multiple logical
            entities supported by a single SNMP agent."
    ::= { experimental xx }

entityMIBObjects OBJECT IDENTIFIER ::= { entityMIB 1 }
```

```
--           The Physical Entity Table

entPhysicalTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF EntPhysicalEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
            "This table contains one row per physical entity.  There is
            always at least one row for an 'overall' physical entity."
    ::= { entityMIBObjects 1 }

entPhysicalEntry       OBJECT-TYPE
    SYNTAX      EntPhysicalEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
            "Information about a particular physical entity.  An agent
            is expected to represent physical components in as much
            detail as possible.  If more than one agent within a chassis
            implements the Entity MIB, the information retrieved from
            each agent must be consistent, but not necessarily
            identical."
    INDEX   { entPhysicalIndex }
    ::= { entPhysicalTable 1 }

EntPhysicalEntry ::= SEQUENCE {
      entPhysicalIndex          INTEGER,
      entPhysicalDescr          DisplayString,
      entPhysicalVendorType     AutonomousType,
      entPhysicalContainedIn    INTEGER,
      entPhysicalIsRemovable    TruthValue,
      entPhysicalClass          AutonomousType
}

entPhysicalIndex    OBJECT-TYPE
    SYNTAX      INTEGER (1..2147483647)
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
            "The value of this object uniquely identifies the physical
            entity.  The value is a small positive integer; index values
            for different physical entities are not necessarily
            contiguous."
    ::= { entPhysicalEntry 1 }
```

```
entPhysicalDescr OBJECT-TYPE
    SYNTAX      DisplayString
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "A textual description of physical entity."
    ::= { entPhysicalEntry 2 }

entPhysicalVendorType OBJECT-TYPE
    SYNTAX      AutonomousType
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "An indication of the vendor-specific hardware type of the
            physical entity. Note that this is different from the
            definition of MIB-II's sysObjectID.

            An agent should set this object to a enterprise-specific
            registration identifier value indicating the specific
            equipment type in detail.  The associated instance of the
            entPhysicalClass object should be used to indicate the
            general type of hardware device.

            If no vendor-specific registration identifier exists for
            this physical entity, then the value { 0 0 } is returned. If
            the value is unknown by this agent, then the special value
            'entPClassUnknown' is returned."
    ::= { entPhysicalEntry 3 }

entPhysicalContainedIn OBJECT-TYPE
    SYNTAX      INTEGER (0..2147483647)
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "The value of entPhysicalIndex for the physical entity which
            'contains' this physical entity.  A value of zero indicates
            this physical entity is not contained in any other physical
            entity.  Note that the set of 'containment' relationships
            define a strict hierarchy; that is, recursion is not
            allowed."
    ::= { entPhysicalEntry 4 }

entPhysicalIsRemovable OBJECT-TYPE
```

```
    SYNTAX      TruthValue
    MAX-ACCESS  read-only
```



```
    STATUS      current
    DESCRIPTION
            "An indication of the physical characteristics of specified
            component.  A value of 'true(1)' indicates that this
            entPhysicalEntry represents a field-replaceable unit. A
            value of 'false(2)' indicates a physical component that
            cannot be replaced by a user or equipment installer."
    ::= { entPhysicalEntry 5 }

entPhysicalClass OBJECT-TYPE
    SYNTAX      AutonomousType
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "An indication of the general hardware type of the physical
            entity.

            An agent should set this object to a standard registration
            identifier value (from the entPClassTypes sub-tree) which
            most accurately indicates the general class of the physical
            entity.

            If no appropriate standard registration identifier exists
            for this physical entity, then the value { 0 0 } is
            returned. If the value is unknown by this agent, then the
            special value 'entPClassUnknown' is returned."
    ::= { entPhysicalEntry 6 }
```

```
--           The Logical Entity Table
entLogicalTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF EntLogicalEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
            "This table contains one row per logical entity."
    ::= { entityMIBObjects 2 }

entLogicalEntry       OBJECT-TYPE
    SYNTAX      EntLogicalEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
            "Information about a particular logical entity.  Entities
            may be managed by this agent or other SNMP agents (possibly)
            in the same chassis."
    INDEX       { entLogicalIndex }
    ::= { entLogicalTable 1 }

EntLogicalEntry ::= SEQUENCE {
      entLogicalIndex            INTEGER,
      entLogicalDescr            DisplayString,
      entLogicalType             AutonomousType,
      entLogicalLocalEntityName  OCTET STRING,
      entLogicalContext          Context,
      entLogicalCommunity        OCTET STRING,
      entLogicalIpAddress        IpAddress
}

entLogicalIndex OBJECT-TYPE
```

```
    SYNTAX      INTEGER (1..2147483647)
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
            "The value of this object uniquely identifies the logical
            entity. The value is a small positive integer; index values
            for different logical entities are are not necessarily
            contiguous."
    ::= { entLogicalEntry 1 }
```

```
entLogicalDescr OBJECT-TYPE
    SYNTAX      DisplayString
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "A textual description of logical entity."
    ::= { entLogicalEntry 2 }

entLogicalType OBJECT-TYPE
    SYNTAX      AutonomousType
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "An indication of the type of logical entity.  This will
            typically be the OBJECT IDENTIFIER name of the node in the
            SMI's naming hierarchy which represents the major MIB
            module, or the majority of the MIB modules, supported by the
            logical entity.  For example:
               a logical entity of a regular host/router -> mib-2
               a logical entity of a 802.1d bridge     -> dot1dBridge
               a logical entity of a 802.3 repeater  ->
            snmpDot3RptrMgmt"
    ::= { entLogicalEntry 3 }

entLogicalLocalEntityName OBJECT-TYPE
```

```
    SYNTAX      OCTET STRING (SIZE(0..255))
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "A name associated with the logical entity.  This name and
            the SNMPv2 contextLocalEntity [RFC-1447] for the
            corresponding local context have the same value.  Note that
            multiple contexts may have the same value of
            contextLocalEntity, each having a different value of
            contextLocalTime.

            A conformant SNMPv2 agent may wish to conserve contexts by
            representing multiple logical entities in a single 'main'
            context.  This is possible when the logical entities
            represented by the same value of contextLocalEntity have no
            object instances in common.  For example, 'bridge1' and
            'repeater1' may be part of the main context, but two
            additional entries are needed to represent 'bridge2' and
            'repeater2'.
```



```
            Logical entities 'bridge1' and 'repeater1' would be
            represented by sysOREntries associated with the 'main'
            context.

            For agents not accessible via SNMPv2, the value of this
            object is the empty string."
    ::= { entLogicalEntry 4 }

entLogicalContext OBJECT-TYPE
    SYNTAX      Context
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "An SNMPv2 context containing detailed management
            information for this logical entity. If more than one
            context is associated with this logical entity, then the
            agent should choose a 'primary' context for the logical
            entity; e.g. the context whose associated value of
            contextLocalTime is equal to 'currentTime'.
```

```
            Other contexts (for different values of contextLocalTime)
            may be derived from the entLogicalLocalEntityName according
            to whatever conventions are used for context naming.

            For agents not accessible via SNMPv2, this object would have
            the value 0.0.

            [TBD 1: the issue of which Parties to use along with this
            context is considered beyond the scope of the Entity MIB.
             TBD 2: this part of the entLogicalTable will change to
            reflect the new SNMPv2 administrative model.] "
    ::= { entLogicalEntry 5 }

entLogicalCommunity OBJECT-TYPE
    SYNTAX      OCTET STRING
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "A SNMPv1 community-string which can be used to access
            detailed management information for this logical entity.
            The agent should allow read access with this community
            string (to an appropriate subset of all managed objects) and
            may also choose to return a community string based on the
            privileges of the request used to read this object (e.g.
            only return a string having read-write privileges when
```



```
            accessed with read-write privileges).

            For agents not accessible via SNMPv1, the value of this
            object is the empty-string."
    ::= { entLogicalEntry 6 }

entLogicalIpAddress OBJECT-TYPE
    SYNTAX      IpAddress
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "The IP-address of the SNMPv1 agent from which detailed
            management information for this logical entity can be
```

```
            obtained.  For agents not accessible via SNMPv1, the value
            of this object is 0.0.0.0."
    ::= { entLogicalEntry 7 }
```



```
--   entLPMappingTable: for each entity index, there are N
--      rows, each representing a physical component
--      that is associated with the indicated entity
--
-- entity to component table
entLPMappingTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF EntLPMappingEntry
```

```
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
            "This table contains zero or more rows of logical entity to
            physical equipment associations."
    ::= { entityMIBObjects 3 }

entLPMappingEntry       OBJECT-TYPE
    SYNTAX      EntLPMappingEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
            "Information about a particular logical entity to physical
            equipment binding."
    INDEX       { entLogicalIndex, entLPPhysicalIndex }
    ::= { entLPMappingTable 1 }

EntLPMappingEntry ::= SEQUENCE {
      entLPPhysicalIndex         INTEGER
}

entLPPhysicalIndex OBJECT-TYPE
    SYNTAX      INTEGER (1..2147483647)
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "The value of this object identifies a particular
            entPhysicalEntry associated with the indicated
            entLogicalEntity."
    ::= { entLPMappingEntry 1 }
```



```
-- logical entity/component to alias table
```

```
entAliasMappingTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF EntAliasMappingEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
            "This table contains zero or more rows of logical entity,
            and physical component to external identifier associations."
    ::= { entityMIBObjects 4 }

entAliasMappingEntry       OBJECT-TYPE
    SYNTAX      EntAliasMappingEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
            "Information about a particular physical equipment, logical
            entity to external identifier binding. Note that the same
            physical component-logical entity pair may have an arbitrary
            number of external identifier (alias) bindings."
    INDEX { entPhysicalIndex, entLogicalIndex, entAliasMappingIndex }
    ::= { entAliasMappingTable 1 }

EntAliasMappingEntry ::= SEQUENCE {
      entAliasMappingIndex      INTEGER,
      entAliasIdentifier        OBJECT IDENTIFIER
}

entAliasMappingIndex OBJECT-TYPE
    SYNTAX      INTEGER (1..2147483647)
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
            "The value of this object uniquely identifies the particular
            binding for a specific logical entity on a particular
            physical component. The value is a small positive integer;
            index values for different entAlias mappings are not
            necessarily contiguous."
    ::= { entAliasMappingEntry 1 }

entAliasIdentifier OBJECT-TYPE
    SYNTAX      OBJECT IDENTIFIER
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "The value of this object identifies a particular MIB
```

```
            instance associated with the indicated entPhysicalEntry and
            entLogicalEntry pair.

            For example, suppose a physical port was represented by
            entPhysicalEntry.3, and entLogicalEntry.1 existed for a
            repeater, entLogicalEntry.2 existed for a bridge, and the
            bridge port was also represented in the ifTable. Then there
            might be three associated instances of entAliasIdentifier:
               entAliasIdentifier.3.1.1 == rptrPortGroupIndex.5.2
               entAliasIdentifier.3.2.1 == dot1dBasePort.2
               entAliasIdentifier.3.2.2 == ifIndex.2 "
    ::= { entAliasMappingEntry 2 }
```

```
-- standard OBJECT IDENTIFIER values for entPhysicalClass
--
-- this section needs a lot of work
-- the following identifiers are intended to be a
-- starting point for WG discussion, and should not be
-- considered complete
--
entPClassTypes OBJECT IDENTIFIER ::= { entityMIBObjects 5 }

entPClassUnknown OBJECT IDENTIFIER ::= { entPClassTypes 1 }

entPClassChassis OBJECT IDENTIFIER ::= { entPClassTypes 2 }

entPClassBackplanes OBJECT IDENTIFIER ::= { entPClassTypes 3 }

entPClassNetBackplane OBJECT IDENTIFIER ::= { entPClassBackplanes 1 }

entPClassPowerBackplane OBJECT IDENTIFIER ::= { entPClassBackplanes 2 }

entPClassSlot OBJECT IDENTIFIER ::= { entPClassTypes 4 }

entPClassPowerSupply OBJECT IDENTIFIER ::= { entPClassTypes 5 }

entPClassFan OBJECT IDENTIFIER ::= { entPClassTypes 6 }

entPClassSensors OBJECT IDENTIFIER ::= { entPClassTypes 7 }

entPClassTempSensor OBJECT IDENTIFIER ::= { entPClassSensors 1 }

entPClassGenModules OBJECT IDENTIFIER ::= { entPClassTypes 8 }

entPClassNetModules OBJECT IDENTIFIER ::= { entPClassTypes 9 }

entPClassNetRepeater OBJECT IDENTIFIER ::= { entPClassNetModules 1 }

entPClassNetRouter   OBJECT IDENTIFIER ::= { entPClassNetModules 2 }

entPClassNetBridge   OBJECT IDENTIFIER ::= { entPClassNetModules 3 }

entPClassTermServer  OBJECT IDENTIFIER ::= { entPClassNetModules 4 }
```

```
entPClassPort        OBJECT IDENTIFIER ::= { entPClassTypes 10 }
```



```
-- conformance information

entityConformance OBJECT IDENTIFIER ::= { entityMIB 2 }

entityCompliances OBJECT IDENTIFIER ::= { entityConformance 1 }
entityGroups      OBJECT IDENTIFIER ::= { entityConformance 2 }

-- compliance statements

entityCompliance MODULE-COMPLIANCE
    STATUS  current
    DESCRIPTION
            "The compliance statement for SNMPv2 entities
            which implement the Entity MIB."
    MODULE  -- this module
        MANDATORY-GROUPS { entityGroup }
    ::= { entityCompliances 1 }


-- units of conformance

entityGroup    OBJECT-GROUP
    OBJECTS { entPhysicalDescr, entPhysicalVendorType,
              entPhysicalContainedIn, entPhysicalIsRemovable,
              entPhysicalClass,
              entLogicalDescr, entLogicalType,
              entLogicalLocalEntityName, entLogicalContext,
              entLogicalCommunity, entLogicalIpAddress,
              entLPPhysicalIndex, entAliasIdentifier
            }
    STATUS  current
    DESCRIPTION
            "The collection of objects which are used to
            represent the multiple logical entities,
            physical components, interfaces, and port
```

```
            alias identifiers for which a single agent
            provides MIB information."
    ::= { entityGroups 1 }

END
```


5. Usage Examples

5.1. Router/Bridge

A bi-lingual (SNMPv1 and SNMPv2) router containing two slots. Each slot contains a 3 port router/bridge module. Each port is represented in the ifTable. There are two logical instances of OSPF running and two logical bridges:

```
  Physical entities -- entPhysicalTable:
    1 Field-replaceable physical chassis:
      entPhysicalDescr.1 ==             "Acme Chassis Model 100"
      entPhysicalVendorType.1  ==       acmeProducts.chassisTypes.1
      entPhysicalContainedIn.1 ==       0
      entPhysicalIsRemovable.1 ==       true(1)
      entPhysicalClass.1 ==             entPClassChassis

    2 slots within the chassis:
      entPhysicalDescr.2 ==             "Acme Router Chassis Slot 1"
      entPhysicalVendorType.2  ==       acmeProducts.slotTypes.1
      entPhysicalContainedIn.2 ==       1
      entPhysicalIsRemovable.2 ==       false(2)
      entPhysicalClass.2 ==             entPClassSlot


      entPhysicalDescr.3 ==             "Acme Router Chassis Slot 2"
      entPhysicalVendorType.3  ==       acmeProducts.slotTypes.1
      entPhysicalContainedIn.3 ==       1
      entPhysicalIsRemovable.3 ==       false(2)
```

```
    entPhysicalClass.3 ==             entPClassSlot

  2 Field-replaceable modules:
  Slot 1 contains a module with 3 ports:
    entPhysicalDescr.4 ==             "Acme Router Module Model 10"
    entPhysicalVendorType.4  ==       acmeProducts.moduleTypes.14
    entPhysicalContainedIn.4 ==       2
    entPhysicalIsRemovable.4 ==       true(1)
    entPhysicalClass.4 ==             entPClassNetRouter

    entPhysicalDescr.5 ==             "Acme Router Ethernet Port 1"
    entPhysicalVendorType.5  ==       acmeProducts.portTypes.2
    entPhysicalContainedIn.5 ==       4
    entPhysicalIsRemovable.5 ==       false(2)
    entPhysicalClass.5 ==             entPClassPort
```



```
    entPhysicalDescr.6 ==             "Acme Router Ethernet Port 2"
    entPhysicalVendorType.6  ==       acmeProducts.portTypes.2
    entPhysicalContainedIn.6 ==       4
    entPhysicalIsRemovable.6 ==       false(2)
    entPhysicalClass.6 ==             entPClassPort

    entPhysicalDescr.7 ==             "Acme Router Fddi Port 3"
    entPhysicalVendorType.7  ==       acmeProducts.portTypes.3
    entPhysicalContainedIn.7 ==       4
    entPhysicalIsRemovable.7 ==       false(2)
    entPhysicalClass.7 ==             entPClassPort

  Slot 2 contains another 3-port module:
    entPhysicalDescr.8 ==             "Acme Router Module Model 11"
    entPhysicalVendorType.8  ==       acmeProducts.moduleTypes.15
    entPhysicalContainedIn.8 ==       3
    entPhysicalIsRemovable.8 ==       true(1)
    entPhysicalClass.8 ==             entPClassNetRouter

    entPhysicalDescr.9 ==             "Acme Router Fddi Port 1"
    entPhysicalVendorType.9 ==        acmeProducts.portTypes.3
    entPhysicalContainedIn.9 ==       8
    entPhysicalIsRemovable.9 ==       false(2)
```

```
      entPhysicalClass.9 ==             entPClassPort

      entPhysicalDescr.10 ==            "Acme Router Ethernet Port 2"
      entPhysicalVendorType.10 ==       acmeProducts.portTypes.2
      entPhysicalContainedIn.10 ==      8
      entPhysicalIsRemovable.10 ==      false(2)
      entPhysicalClass.10 ==            entPClassPort

      entPhysicalDescr.11 ==            "Acme Router Ethernet Port 3"
      entPhysicalVendorType.11 ==       acmeProducts.portTypes.2
      entPhysicalContainedIn.11 ==      8
      entPhysicalIsRemovable.11 ==      false(2)
      entPhysicalClass.11 ==            entPClassPort

   Logical entities -- entLogicalTable
   2 OSPF instances:
      entLogicalDescr.1 ==            "ospf-1"
      entLogicalType.1 ==             ospf
      entLogicalLocalEntityName.1 ==  "wan-gwty"
      entLogicalContext.1 ==          { initialContextId
                                          124 125 126 127 10 }
      entLogicalCommunity.1 ==        "public-ospf1"
```



```
      entLogicalIpAddress.1 ==        124.125.126.127

      entLogicalDescr.2 ==            "ospf-2"
      entLogicalType.2 ==             ospf
      entLogicalLocalEntityName.2 ==  "wan-gwty-ospf2"
      entLogicalContext.2 ==          { initialContextId
                                          124 125 126 127 11 }
      entLogicalCommunity.2 ==        "public-ospf2"
      entLogicalIpAddress.2 ==        124.125.126.127

    2 logical bridges:
      entLogicalDescr.3 ==            "bridge1"
      entLogicalType.3  ==            dod1dBridge
      entLogicalLocalEntityName.3 ==  "wan-gwty-bridge1"
      entLogicalContext.3 ==          { initialContextId
                                          124 125 126 127 101 }
      entLogicalCommunity.3 ==        "public-bridge1"
```

```
      entLogicalIpAddress.3 ==         124.125.126.127

      entLogicalDescr.4 ==             "bridge2"
      entLogicalType.4 ==              dod1dBridge
      entLogicalLocalEntityName.4 ==   "wan-gwty-bridge2"
      entLogicalContext.4 ==           { initialContextId
                                           124 125 126 127 102 }
      entLogicalCommunity.4 ==         "public-bridge2"
      entLogicalIpAddress.4 ==         124.125.126.127

Logical to Physical Mappings:
  1st OSPF instance: uses module 1-port 1
      entLPPhysicalIndex.1.5 ==         5

  2nd OSPF instance: uses module 2-port 1
      entLPPhysicalIndex.2.9 ==         9

  1st bridge group: uses module 1, all ports
      entLPPhysicalIndex.3.5 ==         5
      entLPPhysicalIndex.3.6 ==         6
      entLPPhysicalIndex.3.7 ==         7

  2nd bridge group: uses module 2, all ports
      entLPPhysicalIndex.4.9  ==        9
      entLPPhysicalIndex.4.10 ==        10
      entLPPhysicalIndex.4.11 ==        11

Physical/Logical to Alias Mappings -- entAliasMappingTable:
```



```
  Bridge 1 uses Ports 1..3 on Slot 1
      entAliasIdentifier.5.3.1 ==       dot1dBasePort.1
      entAliasIdentifier.5.3.2 ==       ifIndex.1
      entAliasIdentifier.6.3.1 ==       dot1dBasePort.2
      entAliasIdentifier.6.3.2 ==       ifIndex.2
      entAliasIdentifier.7.3.1 ==       dot1dBasePort.3
      entAliasIdentifier.7.3.2 ==       ifIndex.3
  Bridge 2 uses Ports 1..3 on Slot 2; uses same Bridge MIB and ifIndex
  values as Bridge 1, but in a different context, and representing
  different physical ports:
      entAliasIdentifier.9.4.1 ==       dot1dBasePort.1
```

```
      entAliasIdentifier.9.4.2 ==       ifIndex.1
      entAliasIdentifier.10.4.1 ==      dot1dBasePort.2
      entAliasIdentifier.10.4.2 ==      ifIndex.2
      entAliasIdentifier.11.4.1 ==      dot1dBasePort.3
      entAliasIdentifier.11.4.2 ==      ifIndex.3
```

5.2. Repeaters

An SNMPv1 only, 3-slot Hub with 2 backplane ethernet segments. Slot three is empty, and the remaining slots contain ethernet repeater modules.

```
   Physical entities -- entPhysicalTable:
    1 Field-replaceable physical chassis:
      entPhysicalDescr.1 ==          "Acme Repeater Chassis Model 110"
      entPhysicalVendorType.1 ==     acmeProducts.chassisTypes.2
      entPhysicalContainedIn.1 ==    0
      entPhysicalIsRemovable.1 ==    true(1)
      entPhysicalClass.1 ==          entPClassChassis

    2 Chassis Ethernet Backplanes:
      entPhysicalDescr.2 ==          "Ethernet Backplane 1"
      entPhysicalVendorType.2 ==     acmeProducts.backplaneTypes.1
      entPhysicalContainedIn.2 ==    1
      entPhysicalIsRemovable.2 ==    false(2)
      entPhysicalClass.2 ==          entPClassNetBackplane

      entPhysicalDescr.3 ==          "Ethernet Backplane 2"
      entPhysicalVendorType.3  ==    acmeProducts.backplaneTypes.1
      entPhysicalContainedIn.3 ==    1
      entPhysicalIsRemovable.3 ==    false(2)
      entPhysicalClass.3 ==          entPClassNetBackplane
```



```
     3 slots within the chassis:
      entPhysicalDescr.4 ==          "Acme Hub Slot 1"
      entPhysicalVendorType.4  ==    acmeProducts.slotTypes.5
      entPhysicalContainedIn.4 ==    1
      entPhysicalIsRemovable.4 ==    false(2)
```

```
    entPhysicalClass.4 ==          entPClassSlot

    entPhysicalDescr.5 ==          "Acme Hub Slot 2"
    entPhysicalVendorType.5  ==    acmeProducts.slotTypes.5
    entPhysicalContainedIn.5 ==    1
    entPhysicalIsRemovable.5 ==    false(2)
    entPhysicalClass.5 ==          entPClassSlot

    entPhysicalDescr.6 ==          "Acme Hub Slot 3"
    entPhysicalVendorType.6  ==    acmeProducts.slotTypes.5
    entPhysicalContainedIn.6 ==    1
    entPhysicalIsRemovable.6 ==    false(2)
    entPhysicalClass.6 ==          entPClassSlot

  Slot 1 contains a plug-in module with 4 10-BaseT ports:
    entPhysicalDescr.7  ==         "10Base-T Module Model 14"
    entPhysicalVendorType.7   ==   acmeProducts.moduleTypes.32
    entPhysicalContainedIn.7  ==   4
    entPhysicalIsRemovable.7 ==    true(1)
    entPhysicalClass.7 ==          entPClassNetRepeater

    entPhysicalDescr.8  ==         "10Base-T Port 1"
    entPhysicalVendorType.8   ==   acmeProducts.portTypes.10
    entPhysicalContainedIn.8  ==   7
    entPhysicalIsRemovable.8  ==   false(2)
    entPhysicalClass.8 ==          entPClassPort

    entPhysicalDescr.9  ==         "10Base-T Port 2"
    entPhysicalVendorType.9   ==   acmeProducts.portTypes.10
    entPhysicalContainedIn.9  ==   7
    entPhysicalIsRemovable.9  ==   false(2)
    entPhysicalClass.9 ==          entPClassPort

    entPhysicalDescr.10 ==         "10Base-T Port 3"
    entPhysicalVendorType.10  ==   acmeProducts.portTypes.10
    entPhysicalContainedIn.10 ==   7
    entPhysicalIsRemovable.10 ==   false(2)
    entPhysicalClass.10 ==         entPClassPort

    entPhysicalDescr.11 ==         "10Base-T Port 4"
```

```
      entPhysicalVendorType.11  ==   acmeProducts.portTypes.10
      entPhysicalContainedIn.11 ==   7
      entPhysicalIsRemovable.11 ==   false(2)
      entPhysicalClass.11 ==         entPClassPort

   Slot 2 contains another ethernet module with 2 ports.
      entPhysicalDescr.12 ==         "Acme 10Base-T Module Model 4"
      entPhysicalVendorType.12 ==    acmeProducts.moduleTypes.30
      entPhysicalContainedIn.12 =    5
      entPhysicalIsRemovable.12 =    true(1)
      entPhysicalClass.12 ==         entPClassNetRepeater

      entPhysicalDescr.13 ==         "802.3 AUI Port 1"
      entPhysicalVendorType.13  ==   acmeProducts.portTypes.11
      entPhysicalContainedIn.13 ==   5
      entPhysicalIsRemovable.13 ==   false(2)
      entPhysicalClass.13 ==         entPClassPort

      entPhysicalDescr.14 ==          "10Base-T Port 2"
      entPhysicalVendorType.14  ==    acmeProducts.portTypes.10
      entPhysicalContainedIn.14 ==    5
      entPhysicalIsRemovable.14 ==    false(2)
      entPhysicalClass.14 ==          entPClassPort

   Logical entities -- entLogicalTable
     Repeater 1--comprised of any ports attached to backplane 1
       entLogicalDescr.1 ==         "repeater1"
       entLogicalType.1  ==         snmpDot3RptrMgt
       entLogicalLocalEntityName.1 ==  ""
       entLogicalContext.1 ==       { 0.0 }
       entLogicalCommunity.1        "public-repeater1"
       entLogicalIpAddress.1        124.125.126.128

     Repeater 2--comprised of any ports attached to backplane 2:
       entLogicalDescr.2 ==         "repeater2"
       entLogicalType.2  ==         snmpDot3RptrMgt
       entLogicalLocalEntityName.2 ==  ""
       entLogicalContext.2 ==       { 0.0 }
       entLogicalCommunity.2 ==     "public-repeater2"
       entLogicalIpAddress.2 ==     124.125.126.128

Logical to Physical Mappings -- entLPMappingTable:

  repeater1 uses backplane 1, slot 1-ports 1 & 2, slot 2-port 1
      entLPPhysicalIndex.1.2 ==         2
```

```
      entLPPhysicalIndex.1.8 ==         8
      entLPPhysicalIndex.1.9 ==         9
      entLPPhysicalIndex.1.13 ==        13

  repeater2 uses backplane 2, slot 1-ports 3 & 4, slot 2-port 2
      entLPPhysicalIndex.2.3 ==         3
      entLPPhysicalIndex.2.10 ==        10
      entLPPhysicalIndex.2.11 ==        11
      entLPPhysicalIndex.2.14 ==        14

Physical/Logical to Alias Mappings -- entAliasMappingTable:
  repeater1 uses slot 1-ports 1 & 2, slot 2-port 1
      entAliasIdentifier.8.1.1 ==       rptrPortGroupIndex.1.1
      entAliasIdentifier.9.1.1 ==       rptrPortGroupIndex.1.2
      entAliasIdentifier.13.1.1 ==      rptrPortGroupIndex.2.1

  repeater2 uses slot 1-ports 3 & 4, slot 2-port 2
      entAliasIdentifier.10.2.1 ==      rptrPortGroupIndex.1.3
      entAliasIdentifier.11.2.1 ==      rptrPortGroupIndex.1.4
      entAliasIdentifier.14.2.1 ==      rptrPortGroupIndex.2.2
```

6. Acknowledgements

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7. References

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8. Security Considerations

Security issues are not discussed in this memo.

9. Authors' Addresses

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