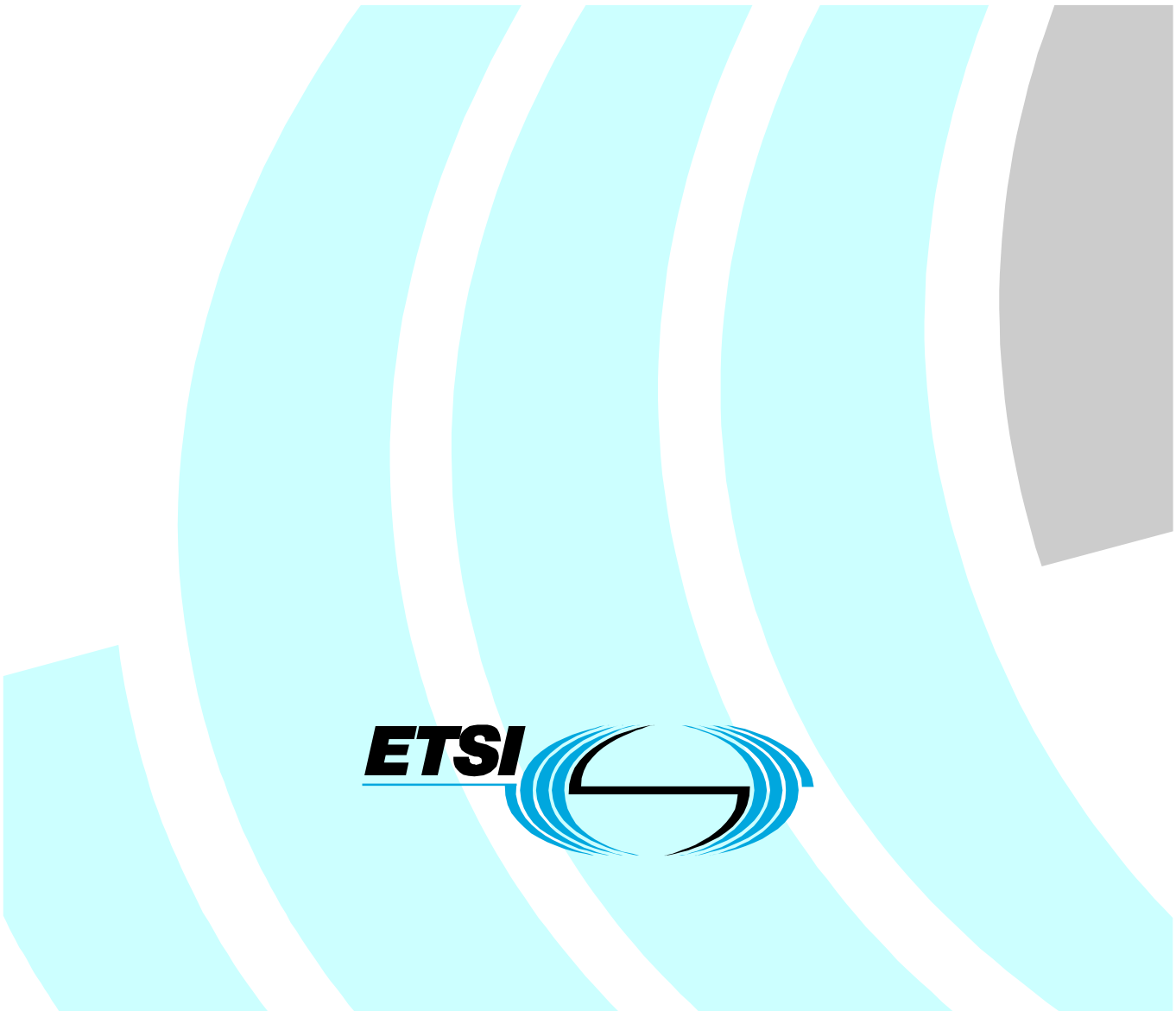
# ETSI TS 102 359 V1.1.1 (2004-10)

*Technical Specification*

# Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Equipment Information in the Management Information Base (MIB)



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***ETSI***

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
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# Contents

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# Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN).

# Introduction

More and more Network Operators (NOs) implement auto-discovery type of tools to get an instant picture of their equipment. The use of auto-discovery tools relies on the availability of equipment information in the Management Information Base (MIB).

Many NOs experience difficulties in linking the data provided by the MIB to their inventory systems which give the full picture of working/spare equipment. Therefore there can be differences between the search given by the auto-discovery tools and the Inventory System (IS). The lack of a common data structure and content stops NOs from having flowthrough from the MIB up to the inventory system or other relevant systems.

Purchasers of Network Equipment should use the present document to specify minimum requirements to their equipment suppliers. Equipment Manufacturers should use the present document as a reference base for data elements to include in the MIB, whenever possible.

# 1 Scope

The present document specifies equipment identity and location data that should be included, when relevant, in the equipment Management Information Base (MIB) to support inventory processes amongst for example Service Providers and Manufacturers.

This work item extends the equipment information work i.e. TR 102 214 [2] and TS 102 209 [1].

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

[1] ETSI TS 102 209 (V1.2.1): "Telecommunications and Internet converged Services and Protocols for Advancing Networks (TISPAN); Telecommunication Equipment Identification".

[2] ETSI TR 102 214 (V1.1.1): "Services and Protocols for Advanced Networks (SPAN);Result of the PNOs and Equipment Manufacturers questionnaires for identification of Equipment Unit".

[3] ETSI TS 132 692 (V5.0.0): "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Network Resource Model for Inventory Management (3GPP TS 32.692 version 5.0.0 Release 5)".

[4] ISO 8601 (2000): "Data elements and interchange formats - Information interchange - Representation of dates and times".

[5] ISO/IEC 15418: "Information technology - EAN/UCC Application Identifiers and Fact Data Identifiers and Maintenance".

[6] ISO/IEC 15459-1: "Information technology - Unique identification of transport units - Part 1: General ".

[7] ISO/IEC 15459-2: "Information technology - Unique identification of transport units - Part 2: Registration procedures".

[8] TeleManagement Forum: "Shared Information/Data (SID) Model", GB922 Addendum 1L - Common Business Entity Definitions - Location.

[9] IETF RFC 2737: "Entity MIB (Version 2)".

[10] Department of Defense Guide to Uniquely Identifying Items: "Assuring Valuation, Accountability and Control of Government Property", Version 1.4; April 16, 2004.

[11] ETSI TS 132 101: "Universal Mobile Telecommunications System (UMTS); Telecommunication management; Principles and high level requirements (3GPP TS 32.101)".

[12] ETSI TS 132 102: "Universal Mobile Telecommunications System (UMTS); Telecommunication management; Architecture (3GPP TS 32.102)".

[13] ITU-T Recommendation M.1400: "Designations for interconnections among operators' networks".

[14] ITU-T Recommendation M.3320: "Management requirements framework for the TMN X-Interface".

[15] ITU-T Recommendation M.3208.1: "Leased circuit services".

[16] ISO/IEC 646: "Information technology - ISO 7-bit coded character set for information interchange".

# 3 Definitions and abbreviations

## 3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

**auto-discovery:** ability to perform an inventory and asset verification from a Network Management Station

**Equipment Identity (EI):** (as defined in TS 102 209 [1], clause 7.1) provides information in a uniform, concise and function-oriented format about each equipment unit within its particular network application or environment

**operator equipment name:** equipment name given by the operator for internal purposes

**geographic location:** information on the location of the equipment. This information is specific to each operator and is used for internal purposes e.g. inventory

NOTE 1: For example, the TeleManagement Forum Shared Information/Data (SID) Model, GB922 [8] Addendum 1L - Common Business Entity Definitions - Location, defines the Geographic Location as follow: "A defined place on or near the earth's surface. It is an abstract modeling concept that provides a linking point to other parts of the SID model. It holds attributes common to all Geographic Location subclasses. Sources Cross- References Synonyms / Aliases Related Business Entities Geographic Location Name Business".

NOTE 2: For example, the structure of geographic location could correspond to the location of a site (country/region/geographic area/site or property) and include "sub urban, locality, city, town, building".

NOTE 3: Network Operators or Manufacturers may have additional information requirements.

**physical location:** This information is specific for the equipment unit and is used for internal purposes e.g. inventory, assurance. Information can be specified by the Network Operator and/or the Manufacturer based on when equipment configuration is maintained, e.g. during manufacturing or handling at site.

NOTE 1: For example IETF specifies (see annex C):

- in chassis (hierarchy structure) entPhysicalContainedIn;
- entPhysicalParentRelPos.

NOTE 2: For example, TS 132 692 [3] specifies (see annex A):

- unitPosition: Position of inventory unit (Rack, shelf, slot).

NOTE 3: Network Operators or Manufacturers may have additional information requirements.

**manufacturer name:** (as defined in TS 102 209 [1]) name of the business entity that is responsible for the manufacturing and assembly of the equipment unit

**manufacturer part number:** (as defined in TS 102 209 [1]) proprietary character string of information that is assigned to each equipment unit by its manufacturer

**manufacturer software version:** manufacturer specified version of the software, defined and maintained by the manufacturer

**manufacture date:** (as defined in ISO 8601 [4] and ISO/IEC 15418 [5]): date of manufacture of the product in format YYYYMMDD

**Management Information Base (MIB):** database of configuration management information that is stored on a Network Agent for access by a Network Management Station or local user interface device. MIB consists of a repository of characteristics and parameters managed in a network device such as a NIC, hub, switch or router

**Network Agent (NA):** device, such as a workstation, a router or a plug-in card, that is equipped to gather network performance information to send to the network management station

**Network Management Station (NMS):** is a dedicated workstation that gathers and stores network performance data, obtaining that data from network nodesrunning network agent software that enables them to collect the data

**operator equipment name:** equipment name given by the operator for internal purposes

**manufacturer product name:** equipment name given by the equipment manufacturer (refer to "Product Name" as defined in TS 102 209 [1], clause 7.2)

**operator:** as defined in ITU-T Recommendation M.1400 [13]: An organization responsible for identification and management of telecommunication resources. An operator must be legally recognized by the telecommunication administration of the Country, or delegation thereof. An Operator may or may not correspond to a trading partner.

**Network Operator (NO):** as defined in ITU-T Recommendation M.1400 [13]: An operator that manages a telecommunications network. A Network Operator may be a Service Provider and vice versa. A Network Operator may or may not provide particular telecommunications services. See ITU-T Recommendations M.3208.1 [15] clause 1.4.2.3 and M.3320 [14] clause 1.4.4.

**service provider:** as defined in ITU-T Recommendation M.1400 [13]: A general reference to an operator that provides telecommunication services to Customers and other users either on a tariff or contract basis. A Service Provider may or may not operate a network. A Service Provider may or may not be a Customer of another Service provider. See ITU-T Recommendation M.3320 [14] clause 1.4.6.

**Unique Item Identification (UID):** As defined in the ISO/IEC 15459-1 [6] (refers to ISO/IEC 646 [16]).

NOTE: ISO/IEC 15459-1 [6] states that the characters in the UID must be strictly Alpha Numeric All Caps. The present document extends the set of allowed chars in the UID such that it would include the slashes and dashes as defined in the U.S. "Department of Defense Guide to Uniquely Identifying Items; Assuring Valuation, Accountability and Control of Government Property" [10]. When constructing the UID:

- Any spaces contained in the component data elements will be deleted.
- All special characters will be deleted from the enterprise identifier.
- All special characters, except for dashes (-) and forward slashes (/) will be deleted from the original part number and serial number.
- The UID may only contain uppercase English alphabet characters A through Z, numeric characters 0 through 9, and the special characters "-" and "/"".

## 3.2 Abbreviations

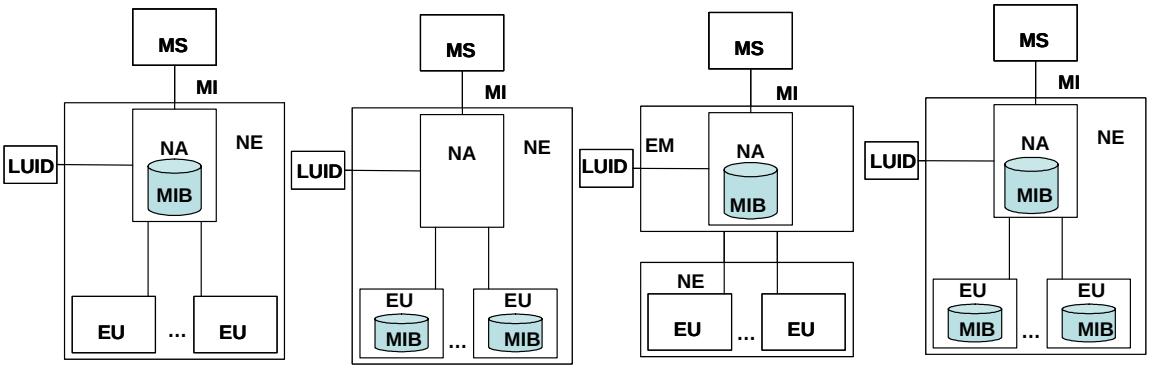
For the purposes of the present document, the following abbreviations apply:

| | |
|---|---|
| CRUD | Create Read Update and Delete |
| EI | Equipment Identity |
| EM | Equipment Manager |
| EU | Equipment Units |
| IS | Inventory System |
| LUID | Local User Interface Device |
| MI | Management Interface |
| MIB | Management Information Base |
| MS | Management System |
| NA | Network Agent |
| NE | Network Element |
| NIC | Network Interface Card |
| NMS | Network Management Station |
| NO | Network Operator |
| PN | Part Number |
| PSU | Power Supply Unit |
| RDN | Relative Distinguished Name |
| SID | Shared Information/Data |
| UID | Unique item IDentification |
| USI | Unique Serial Identification (USI) |

# 4 Context of application

Figures 1 to 4 provide some possible overviews of the architectural components and the relations between them which are relevant for the present document.

NOTE: These are typical views; other architectures may exist. However, most architectures can be mapped to these generic views.




The central component is the Network Element, NE. From a functional point of view, an NE provides telecommunication functions. These functions are usually closely related such that an NE can be considered to be a building block for a telecommunication network. Examples of NEs are: a router, a voice switch, an optical line system.

From a physical point of view, an NE is an aggregate of one or more equipment mountings, and one or more Equipment Units, EU. Dimension wise, an NE can be very compact, like an ADSL modem, or very large, like an multi thousand kilometer long DWDM optical transport system.

The normal day-to-day management of an NE is done via a Management System, MS.

The MS communicates with the NE or the EM through a management interface, MI, which usually terminates on an Network Agent, NA. This NA is an EU, designated to handle system management functions. The other EUs in the NE communicate with the NA through communication channels which are not visible from outside the NE. The NA can reside in an Equipment Manager (EM) (for definition see TS 132 101 [11] or in a NE (see TS 132 102 [12] clause 8).

To support local interaction, e.g. in case of physical repair, most NEs and EMs are equipped with a Local User Interface Device, LUID. This is a built-in or a handheld device which communicates with the NE or EM over a local interface, using a proprietary protocol.

In order to provide the MS with a way to exercise management operations on the manageable parts of the NE, a database is present on the EU which represents the management information towards the MS in a structured way. This database is named Management Information Base, MIB. Next to information about manageable aspects of the telecommunication functions of the NE, like port characteristics, etc, the MIB contains also information on the identity of the constituent parts of the NE. This information may be used by a number of agents, e.g. network auditing applications, network testing systems, network inventory systems, network operations center staff and local maintenance staff. For the latter, the equipment identity information can usually be retrieved via the LUID.

# 5 Type of equipment data elements in the MIB

The present part specifies the type of information and the structure for the equipment information in the MIB.

The equipment information in the MIB is comprised of the ten following mandatory or optional data elements:

- Equipment Identity (EI);
- Unique item IDentification (UID);
- manufacturer software part number and version;
- manufacturer product name;
- manufacture date;
- operator equipment name;
- geographic location;
- physical location;
- manufacturer name;
- manufacturer part number and version.

NOTE 1: The maximum length of each data element, with the exception of Geographic Location and Physical Location should follow ISO/IEC 15459-1 [6]. ISO/IEC 15459-1 [6] specifies that the field shall not contain more than 35 characters.

NOTE 2: For efficient use within bar coding systems, it is recommended that wherever possible the number of characters be maximum 20. However, any data processing system shall be capable of processing numbers of 35 characters (i.e. the maximum allowable in EDIFACT).

NOTE 3: The lengths of the data elements Geographic Location and Physical Location require further study.

NOTE 4: The character set for all data elements is printable 7-bit ASCII.

# 6 Information model

This clause presents the information that are listed in clause 5 and defines:

- the mandatory and optional data elements;
- the Create Read Update and Delete (CRUD model) rights of the equipment manufacturers and NOs to access and manage the information.

NOTE 1: In table 1: M stands for Mandatory; O stands for Optional.

**Table 1**

| Information Element | Mandatory/ Optional | Manufacturer | Network Operator |
|---|---|---|---|
| EI | M | Create/Update | Read |
| UID | M | Create | Read |
| Manufacturer Software Part Number and version | M | Create/Update | Read |
| Manufacturer Product name | M | Create/Update | Read |
| Manufacture Date | O | Create | Read |
| Operator Equipment name | O | Read | Create/Update/Delete |
| Geographic Location | O | Read | Create/Update/Delete |
| Physical Location | O | Create/Update/Delete | Create/Update/Delete |
| Manufacturer Name | O | Create | Read |
| Manufacturer Part Number and Version | O | Create/Update | Read |

NOTE 2: This clause defines the equipment information which is to be included in the MIB. There may be other data elements that the manufacturer may need to include or the customer may require.

NOTE 3: No information structure is recommended for the Geographic Location and the Operator Equipment Name data elements as these data elements are created by the Network Operators for their own internal processes.

NOTE 4: The position in which the information elements appear in the table above does not imply an ordering.

# 7 Mapping with other bodies and fora recommendations

The equipment information specified in the present document result from the screening and analysis of the relevant recommendations written by other international Fora/Bodies.

When possible the present document provides, in the annex informative, mapping against the equipment information recommended in the core of the present document.

Mappings available:

- ETSI 3GPP (see annex A):
  - TS 132 692 [3].
- ANSI (see annex B):
  - TCIF 02-004: "Guidelines for data elements included in the Management Information Base".
- IETF (see annex C):
  - RFC 2737 [9].

- TM Forum (see annex D):
  - TM Forum, MTMN.
  - TM Forum, MTOSI.

NOTE: Annex E refers to other possible mappings that are not provided.

# Annex A (informative): Mapping with TS 132 692 V5.0.0 (3GPP TS 32.692 v5)

Source document: TS 132 692 [3].

**Table A.1**

| Equipment Information as defined in the present document | TS 132 692 [3] equivalents | Comparison |
|---|---|---|
| Equipment Identity | vendorName (7) + vendorUnitTypeNumber (1) | Compliant |
| UID | serialNumber (2) | Compliant |
| Manufacturer Software Part Number and Version | Not specified | Not Applicable |
| Manufacturer Product name | vendorUnitFamilyType (4) | Compliant |
| Manufacture Date | dateOfManufacture (5) | Identical |
| Operator Equipment name | inventoryUnitId (6) | Compliant |
| Geographic Location | Not specified | Not Applicable |
| Physical Location | unitPosition (3) | Compliant |
| Manufacturer Name | vendorName (7) | Identical |
| Manufacturer Part Number and Version | vendorUnitTypeNumber (1) | Compliant |

(1) A vendor/manufacturer defined and assigned number which uniquely identifies the unit type and version (used for replacing HW units, spares).

(2) Serial number of inventory unit.

(3) Position of inventory unit (Rack, shelf, slot).

(4) Mnemonic of inventory unit family type (e.g. Fan, PSU) assigned by vendor.

(5) Date of Manufacture of inventory unit.

(6) An attribute whose "name+value" can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.

(7) Name of inventory unit vendor.

RDN = Relative Distinguished Name (see TS 132 300).

# Annex B (informative): Mapping with ANSI/TCIF 02-004

Source document: ANSI/TCIF 02-004.

**Table B.1**

| Equipment Information as defined in the present document | TCIF 02-004 equivalent | Comparison |
|---|---|---|
| Equipment Identity | CLEI Code (1) | Compliant |
| UID | Unique Serial Identification (2) | Identical |
| Manufacture Software Part Number and Version | Software version (3) | Compliant |
| Manufacturer Product name | Not specified | Not Applicable |
| Manufacture Date | Manufacture Date | Not Compliant |
| Operator Equipment name | Not specified | Not Applicable |
| Geographic Location | Not Specified | Not Applicable |
| Physical Location System/Hierarchy | Not Specified | Not Applicable |
| Manufacturer Name | Manufacturer Identification (6) | Identical |
| Manufacturer Part Number and Version | Manufacturer Product Identifier (7) | Identical |

(1) CLEI Code: the CLEI Code of the hardware per ANSI T1.213. This is the same CLEI Code that is included in the bar code or 2D symbol and in the human readable on the label placed on the plug-in card. COMMON LANGUAGE is a registered trademark and CLEI is a trademark of Telcordia Technologies.

(2) Unique Serial Identification (USI): The Unique Serial Identification of the hardware as defined in TCIF-98-005, Product Serialization Guideline. This TCIF recommendation is following ISO/IEC 15418 [5] and 15459 [6], [7].

(3) Software Version: The manufacturer specified version of the software. The Software Version defines a set of features or functions to a software product announced and available to the service provider. This Software Version should indicate the most detailed release level specified by the manufacturer (i.e. lowest "dot" release).

(5) Manufacture Date: The date of manufacture of the product in the format of MMYYYY where MM = the 2 digit month and YYYY = the 4-digit year of manufacture.

(6) The name of the manufacturer for this plug-in card.

(7) Manufacturer Product Identifier: The product identifier (also called a Product ID) is what singularly identifies and is normally stamped on the product. It is basically made up of a part number and a manufacturing version or release number. For manufacturers that use equipment drawings, the product identifier will consist of the equipment drawing along with the associated list or group combinations.

# Annex C (informative): Mapping with IETF RFC 2737

Source document: IETF RFC 2737 [9].

The IETF RFC 2737 [9] was being reviewed with the parameters agreed as being of interest for the "Information in the MIB" as a comparasing measure. In addition of the identified equalents additional parameters exists which is being judged as interesting and useful.

**Table C.1**

| Equipment Information as defined in the present document | RFC2737 equivalent | Comparison |
|---|---|---|
| Equipment Identity | entPhysicalMfgName (8) + entPhysicalModelName (4) + entPhysicalHardwareRev (9) | Compliant |
| UID | entPhysicalSerialNum (2) | Compliant |
| Manufacture Software Part Number and Version | entPhysicalModelName (4) + entPhysicalSoftwareRev (3) | Compliant |
| Manufacturer Product name | entPhysicalDescr (1) | Compliant |
| Manufacturer Date | Not specified | Not Applicable |
| Operator Equipment name | entPhysicalAlias (5) | Compliant |
| Geographic Location | Not Specified | Not Applicable |
| Physical Location | In chassis (hierarchy structure) entPhysicalContainedIn (6) entPhysicalParentRelPos (7) | Compliant |
| Manufacturer Name | entPhysicalMfgName (8) | Identical |
| Manufacturer Part Number and Version | entPhysicalModelName (4) + entPhysicalHardwareRev (9) | Compliant |

(1) A textual description of physical entity. This object should contain a string which identifies the manufacturer's name for the physical entity, and should be set to a distinct value for each version or model of the physical entity.

(2) The vendor-specific serial number string for the physical entity. The preferred value is the serial number string actually printed on the component itself (if present).

(3) The vendor-specific software revision string for the physical entity.

(4) The vendor-specific model name identifier string associated with this physical component. The preferred value is the customer-visible part number, which may be printed on the component itself.

(5) This object is an "alias" name for the physical entity as specified by a network manager, and provides a non-volatile "handle" for the physical entity.

(6) 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.

(7) An indication of the relative position of this "child" component among all its "sibling" components. Sibling components are defined as entPhysicalEntries which share the same instance values of each of the entPhysicalContainedIn and entPhysicalClass objects. An NMS can use this object to identify the relative ordering for all sibling components of a particular parent (identified by the entPhysicalContainedIn instance in each sibling entry). This value should match any external labelling of the physical component if possible. For example, for a container (e.g. card slot) labelled as "slot #3", entPhysicalParentRelPos should have the value "3".

(8) The name of the manufacturer of this physical component. The preferred value is the manufacturer name string actually printed on the component itself (if present).

(9) The vendor-specific hardware revision string for the physical entity. The preferred value is the hardware revision identifier actually printed on the component itself (if present).

(10) 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.

NOTE: Comparisons between instances of the entPhysicalModelName, entPhysicalFirmwareRev, entPhysicalSoftwareRev, and the entPhysicalSerialNum objects, are only meaningful amongst entPhysicalEntries with the same value of entPhysicalMfgName. If the manufacturer name string associated with the physical component is unknown to the agent, then this object will contain a zero-length string.

# Annex D (informative): Mapping with MTMN version 3.5 and MTOSI version 1.0

MTMN v3.5 and MTOSI v1 were reviewed with the parameters agreed as being of interest for the "Information in the MIB" as a comparasing measure.

**Table D.1**

| Equipment Information as defined in the ETSI TISPAN WG8 model | TM Forum MTNM Equipment Model | Comment |
|---|---|---|
| Equipment Identity | Manufacturer (7)<br>installedPartNumber (4)<br>installedVersion (5) | Compliant |
| UID | installedSerialNumber (6) | Compliant |
| Manufacturer Software Part Number and Version | installedVersion (5) | Compliant<br>NOTE: Under the condition that MTNM installedVersion attribute is overloaded to include the software part number as well as the version. |
| Manufacturer Product name | installedEquipmentObjectType (3) | Compliant |
| Manufacture Date | ManufacturerDate | Compliant |
| Operator Equipment name | userLabel (2) | Compliant |
| Geographic Location | Location | Compliant |
| Physical Location | Name (1) | Compliant<br>NOTE: The MTNM name of the equipment should identify the containing equipment hierarchy. |
| Manufacturer Name | Manufacturer (7) | Compliant |
| Manufacturer Part Number and Version | installedPartNumber (4) | Compliant<br>NOTE: Under the condition that MTNM installedPartNumber attribute is overloaded to include the software part number as well as the version. |

(1) name: The name represents the name of the Equipment which is assigned by the EMS upon creation. The EMS is responsible for guaranteeing the uniqueness of the name within the context of the ManagedElement. The naming attribute structure follows the containment hierarchy of the equipment model. When the Equipment Holder object is named by the Managed Element, the Equipment Holder objects are named recursively, (Rack, Shelf, Subshelf, Slot, and Subslot) and the Equipment objects are named by the Equipment Holder object directly containing it. For example, the name of an equipment instance in a daughter board could be, for example.

"ManagedElement" "abc"

"EquipmentHolder" "[/rack=<r>]/shelf=<sh>[/sub_shelf=<ssh>]/slot=<sl>/sub_slot=<ssl>"

"Equipment" "1"

Note that the MTNM equipment model allows only equipment instance in an equipment holder.

(2) userLabel: This attribute represents a provisionable, user friendly name for the object. It is initialized to the value in the attribute nativeEMSName by the EMS; however, the userLabel attribute is owned and may be set by the NMS.

(3) installedEquipmentObjectType: Defines the type of installed equipment. This is an empty string if there is no installed equipment.

(4) installedPartNumber: This is the resource Part Number (PN) of the installed equipment. If not available (or there is no installed equipment), an empty string shall be used. If the part and serial number are both non-null then the part+serial number together shall be unique.

(5) installedVersion: Firmware version of the installed equipment. If not available (or there is no installed equipment), an empty string shall be used.

(6) installedSerialNumber: Defines the serial number of the installed equipment. If not available (or there is no installed equipment), an empty string shall be used. At least one serialNumber has to be provided.

(7) Manufacturer: Identifies the manufacturer name of the equipment instance.

# Annex E (informative): Other international bodies/Fora

The following international bodies/Fora are doing related work. Currently no mappings are provided.

- ITU-T;
- DMTF (Distributed Management Task Force, Inc);
- DCML (Data Center Markup Language);
- ITIL (IT Infrastructure Library);
- RosettaNet;
- EDIFICE.

# Annex F (informative): Bibliography

American National Standards Institute (ANSI) T1.220: "Manufacturer/Supplier/Related Service Company Code".

DMTF (Distributed Management Task Force, Inc.): "Management information models".

ANSI T1.213: "Coded identification of equipment entities in the North American telecommunication systems for information exchange".

ANSI ANS MH10.8.2 (2002): "Data Identifier and Application Identifier Standard".

TCIF 02-004: "Guidelines for data elements included in the Management Information Base".

ETSI TS 132 300: "Universal Mobile Telecommunications System (UMTS); Telecommunication management; Configuration Management (CM); Name convention for Managed Objects (3GPP TS 32.300)".

TCIF-98-005: " Product Serialization Guideline".

TM Forum, MTMN: "Multi Technology Network Management (MTMN)", version 3.5.

TM Forum, MTOSI: "Multi Technology Operations Systems Interface (MTOSI)", version 1.0.

# History

| Document history | | |
|---|---|---|
| V1.1.1 | October 2004 | Publication |
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