



Ethernet PHY Information Model

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Document History

Version	Date	Description of Change
<u>1.0.0-0</u>	2017-12-09	Initial version of the Ethernet PHY Information Model as technology specific extension to the TR-512 ONF Core Information Model [ONF Core IM]
<u>1.0.0-1</u>	2019-02-16	Consolidating all improvements discussed after first implementation and testing during the 5 th ONF PoC; provided for review on project level.
<u>1.0.0-2</u>	<u>2019-03-05</u>	<u>Consolidating all feedback provided during the latest review; provided for review again on project level.</u>

1 Introduction

This ONF Technical Recommendation (ONF TR-541) describes a management interface for vendor agnostic management of the Ethernet OSI Layer 1.

It is mainly based on IEEE 802.3 Standard for Ethernet [IEEE802.3], but consolidates also elements of specifications provided by the SFF Committee (now a Technology Affiliate of the Storage Networking Industry Association) and other sources.

The comprised UML information model represents a technology specific extension to the TR-512 ONF Core Information Model 1.2 [ONF Core IM] and it integrates well with the ONF TR-532v1.1 Microwave Information Model [ONF MW IM] for providing a unified Ethernet transport.

2 Definitions

2.1 Terms

The primary purpose of this document is to define terms and hence terms are defined throughout the document. Key terms are highlighted in section 2.2 Abbreviations and Acronyms.

2.2 Abbreviations and Acronyms

Term	Explanation
CWDM	Coarse Wavelength Division Multiplex
EFM	Ethernet First Mile
EPON	Ethernet Passive Optical Network
MAU	Medium Attachment Unit
ONF	Open Networking Foundation
OSI	Open Systems Interconnection Model
*_Pac	Technology Specific Conditional Package
PHY	Physical Layer
PMD	Physical Medium Dependent
SDN	Software Defined Network
SFF	Small Form Factor
TR	ONF Technical Recommendation

3 Compliance Statement

Completeness

A device's interface must not be denoted as compliant to this Ethernet PHY Information Model, if it doesn't implement all components.

Support

The hardware does not necessarily need to make available all functionalities covered by this modeling. In case some functionality is not available at the hardware, the device's interface shall answer the default values defined in this model. All functionalities, which are available at the hardware and covered by the Ethernet PHY Information Model, must be manageable with this model (to the extent of the comprised attributes).

Proprietary Extensions

Interfaces implementing elements of this Ethernet PHY Information Model plus additional components must not be denoted as compliant. Such interfaces might be called "based on" or "expanding" it.

4 Overview of the Ethernet PHY Information Model

4.1 Coverage

Basically, the structure of the Ethernet PHY Information Model is capable of covering all kinds of point-to-point Physical Medium Dependent (PMD).

The current set of attributes allows managing at least the following PMDs:

1BASE5	100BASE-T4	1000BASE-BX10	10GBASE-LX4	40GBASE-KR4	100GBASE-CR4
10BASE2	100BASE-TX	1000BASE-LX	10GBASE-CX4	40GBASE-CR4	100GBASE-KR4
10BROAD36	100BASE-BX10	1000BASE-LX10	10GBASE-KX4	40GBASE-SR4	100GBASE-KP4
10BASE-T	100BASE-FX	1000BASE-SX	10GBASE-ER	40GBASE-LR4	100GBASE-CR10
10BASE-FP	100BASE-LX10	1000BASE-CX	10GBASE-LR	40GBASE-ER4	100GBASE-SR4
10BASE-FB	100BASE-T2	1000BASE-KX	10GBASE-SR	40GBASE-FR	100GBASE-SR10
10BASE-FL		1000BASE-T	10GBASE-LRM		100GBASE-LR4
			10GBASE-KR		100GBASE-ER4
			10GBASE-PR		

In principle, the Ethernet PHY Information Model allows definition of additional PMDs during implementation, but very sophisticated, highest capacity PMDs might require additional attributes, which are not yet included.

The Ethernet PHY Information Model does not cover any components of the Ethernet MAC layer.

The following PMDs are not yet cover, but might become subject to future expansion, if requested:

- Point-to-multipoint Ethernet for Ethernet Passive Optical Network (EPON)
like 1000BASE-PX and 10/1GBASE-PRX
- PMDs with variable line speed for Ethernet First Mile (EFM)
like 2BASE-TL and 10PASS-TS
- PMDs for Ethernet over SDH
like 10GBASE-W

The Ethernet PHY Information Model provides the necessary attributes for

- the device informing the SDN Controller about its capabilities
- the Controller configuring the device
- the device providing status, problem and performance information

4.2 Overview

The Ethernet PHY Information Model consists of the following three layers, which are represented by *_Pacs (see also chapter 7.1 Attachment of *_Pacs):

Interface

The WireInterface_Pac contains the characteristics of the physical layer of the wire based Ethernet interface. It represents the combination of the interface at the internal Ethernet switch and the "transmitter" (e.g. SFP). It is specified within this document.

Structure

Basic purpose of the Structure layer is segmenting the physical resource provided by the Interface layer into logical pieces that can be booked by Containers. In case of nowadays wire based Ethernet interfaces,

just a single segment is provided. The Ethernet PHY Information Model is not defining any new Structure, but referencing on the PureEthernetStructure_Pac defined in the ONF TR-532v1.1 Microwave Information Model [ONF MW IM].

Container

The Container layer offers transport services to higher protocol layers. It represents the upper demarcation of the modeling. The Ethernet PHY Information Model is not defining any new Container, but referencing on the EthernetContainer_Pac defined within the ONF TR-532v1.1 Microwave Information Model [ONF MW IM].

The following picture shall help understanding the layering of the Technology Specific Conditional Packages (*_Pacs), which are shared between ONF TR-532v1.1 Microwave Information Model [ONF MW IM] and ONF TR-541-v1.0 Ethernet PHY Information Model. (It has to be noted that this picture is for explanatory purposes only. The associations between the *_Pacs are implemented in a more complex way, which is described in chapter 7.1 Attachment of *_Pacs.)

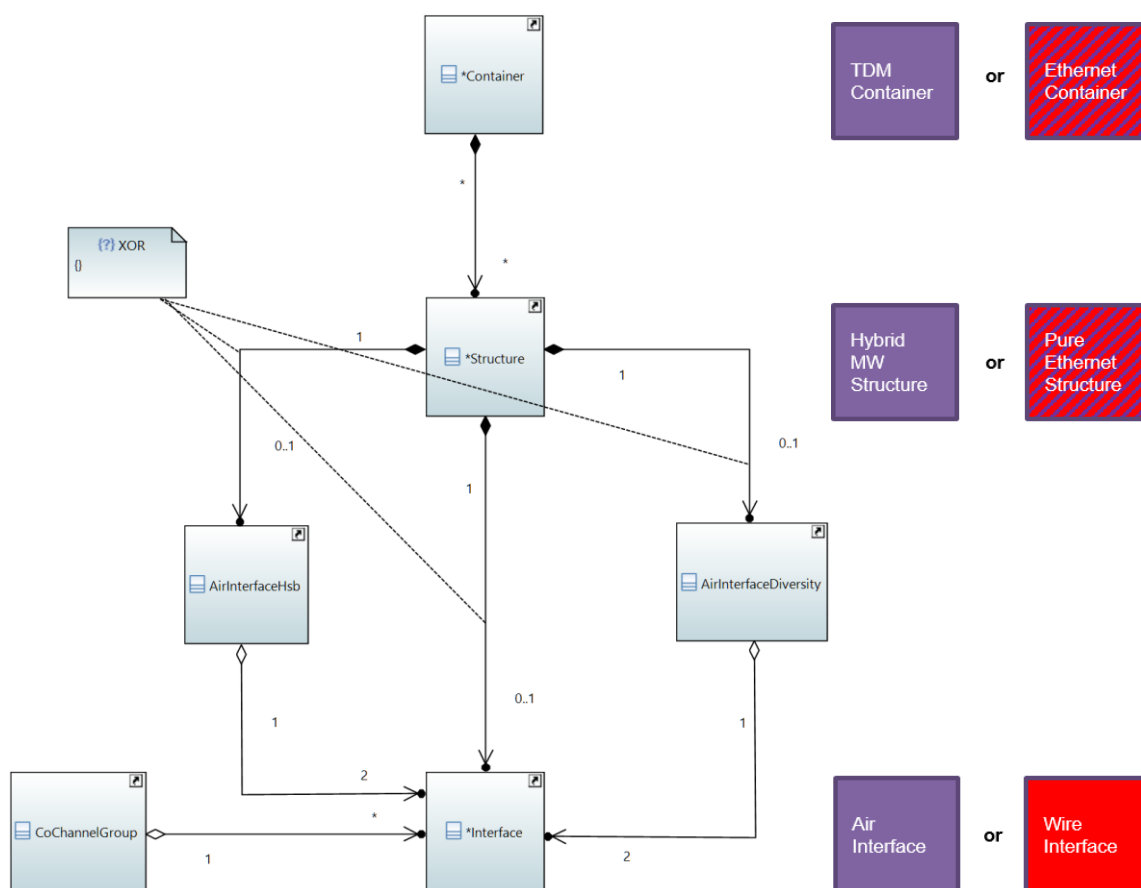


Figure 1: Model Overview

All Technology Specific Conditional Package (*_Pacs) are sub-structured into the following classes:

- Capabilities – The device informs about its features, characteristics and tuning ranges
- Configuration – The Controller configures the device and the device informs about its current configuration
- Status – The device informs about measurement values and its current operational status
- Problems – The device proactively informs about events
- Current Performance – The device informs about the current status of its performance counters

- Historical Performance – The device informs about the status of its performance counters at the end of a well-defined time period

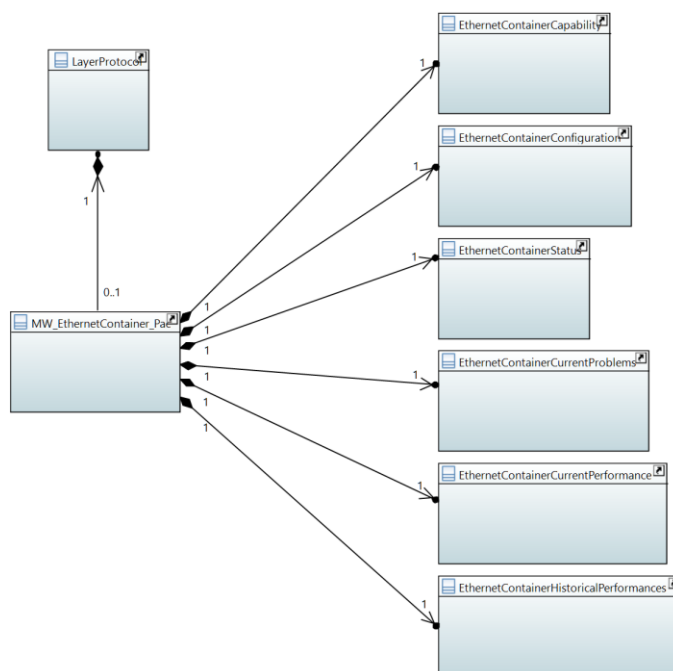


Figure 2: Example for the sub-structuring of *_Pacs

Each Technology Specific Conditional Package (*_Pac) is sufficiently described by one set of capability, configuration, status and current performance attributes, but several current problem and historical performance value sets might be required. Nevertheless, *CurrentProblems and *HistoricalPerformances classes are in a one to one association to the *_Pac. The necessary multiplicity is generated by lists inside these classes. This additional hierarchy is required by the [mediator interface](#) implementation after conversion to YANG.

Equipment

[Existing structures of the TR-512 ONF Core Information Model 1.2 \[ONF Core IM\]](#) are used for documenting equipment information about the "transceiver" (e.g. SFP). Reference tables are provided in this document.

5 Conventions

For seamless integration of components of this ONF TR-541-v1.0 Ethernet PHY Information Model and ONF TR-532v1.1 Microwave Information Model [ONF MW IM] both models are following the same conventions.

As a consequence, this chapter about conventions is identical with chapter 5 Conventions in ONF TR-532v1.1, except the exact content of the unit table in chapter 5.4.6 unit. Because ONF TR-541-v1.0 does not contain alternative Structure_Pacs or alternative Container_Pacs, chapter 5.4.7 Support Qualifier differs from ONF TR-532v1.1, too.

5.1 UML Modeling Conventions

This TR follows the conventions as described in the TR-512 ONF Core Information Model 1.2 [ONF Core IM] and the TR-514 ONF UML Modeling Guidelines [ONF UMGL].

5.2 Default Values

The default values in the Ethernet PHY Information Model have been defined in accordance to the following basic principles:

- Every attribute (except keys, which have to be unique) shall have a default value.
- The default value shall be inside the value range of the data type of the attribute.
- Capability attributes:
 - The default value shall either indicate unavailability of the functionality (if applicable)
 - or be outside the range of reasonable values of the attribute.
- Configuration, status and performance attributes:
 - The default value shall either represent the configuration, status or performance measurement value right after starting the device (in case such a "neutral" value is applicable to the attribute)
 - or be outside the range of reasonable values of the attribute.

Lists of data types shall contain the minimum multiplicity number of elements. This also means that lists of data types with a minimum multiplicity of zero shall ~~have "null"~~just be empty as a default ~~value~~.

5.3 Comments

The comprised comments are meant to explain the attributes in such a way that further documentation is not required for understanding the attributes' meaning.

In rare cases (e.g. Problems) the modeling is open for amending device specific elements. This is done by Capability attributes of data type String, which are foreseen to contain an unspecified number of elements separated by comma. In such cases, the comment field is also used for defining a minimum set of elements, which must be supported. Of course, adding additional elements to these lists is not seen as a Proprietary Extensions according to chapter 3.

Double quotes have been avoided within the comments for supporting the conversion to YANG.

5.4 ONF Stereotypes

5.4.1 attributeValueChangeNotification

This stereotype defines whether a notification has to be raised, when the attribute changes its value.

It has been set on "true" for all attributes, which are comprised in Configuration classes or in data types used by attributes of the Configuration classes.

It has also been set on "true" for status attributes, which might be subject to automated changes, but do not represent gradually changing measurement values.

The attributeValueChangeNotification stereotype has been set on "false" for status attributes, which are exclusively following configuration activities. This is for avoiding double messaging.

5.4.2 objectCreationNotification and objectDeletionNotification

These stereotypes define whether a notification has to be raised when an instance of a class has been created, respectively deleted.

It has been set on "true" for all *_Pac classes, which are potentially attached to the LayerProtocol class of the Core Information Model (see chapter 7.1 Attachment of *_Pacs for details).

5.4.3 isInvariant

This stereotype defines whether the value of the attribute can be changed, or not, after it has been created.

It has been set on "true" (means: cannot be changed) for the following attributes:

- *Ids, which are representing target addressed for referencing data types or classes, (except ContainerIDs, which are required for connecting logical traffic from outside the reach of the modeling with a Container)
- All attributes, which are comprised in Capability classes or in data types used by attributes of the Capability classes
- All attributes, which are comprised in data types that are attached to the CurrentProblems classes.
- All attributes, which are comprised in data types that are attached to the *Performance classes.
- All attributes, which are comprised in Notifications

It has been set on "false" (means: can be changed) for the following attributes:

- All attributes, which are comprised in Configuration classes
- All attributes, which are comprised in Status classes or in data types used by attributes of the Status classes

5.4.4 valueRange

This stereotype identifies the allowed values for the attribute.

It has not been used within the Ethernet PHY Information Model, because of a conflict with the policy defined for default values in chapter 5.2

5.4.5 partOfObjectKey

This stereotype indicates whether the attribute is part of the object key or not. Value "0" (default) means the attribute is not part of the object key. Values > "0" indicate that the attribute is part of the object key and the value defines the order of the attribute in case the key is composed of more than one attribute.

The partOfObjectKey stereotype has been set on "1" for all *Id attributes, which are of data type UniversalId, but not the *IdRef attributes, which are referring on them.

It does also not apply on containerID attributes that represent a configurable string and are required for associating traffic flows to the transport resources (Container) provided by the Ethernet PHY Information Model.

5.4.6 unit

This optional stereotype contains a textual definition of the unit associated with the attribute's value.

The following units have been used in the Ethernet PHY Information Model

Unit	Meaning
%	Percentage
Bytes	Total number of Bytes
Bytes/min	Bytes per minute
Bytes/s	Bytes per second
Celsius	Degree Celsius
dB	Decibel

Unit	Meaning
dBm	Decibel milliwatt
kbit/s	1000 bit per second
kHz	1000 Hertz
m	Meter
mJ	Millijoule
ms	Millisecond
mW	Milliwatt
octets	Total number of Octets
pm	Picometer
ps	Picosecond
s	Second
symbols	Number of symbols

5.4.7 Support Qualifier

The SupportQualifier has always been left on its default value "mandatory":

5.4.8 bitLength

The bitLength stereotype has been used to define Integer primitives smaller than 64bit.

5.4.9 Unsigned, Encoding and Counter

The unsigned, encoding and counter stereotypes have not been applied.

6 Special elements

6.1 PMD Definitions

PMDs are defined by name, speed and duplex type in a separated data type in the Capability section of the Ethernet PHY Information Model. The comment field of the PmdType::pmdName attribute prescribes a list of PMD names (according to [IEEE802.3]). During interface implementation, the supported PMDs have to be named according to this prescription. Only in case additional PMDs, which are not listed in the comment, would be defined, additional names could be applied. In case such additional PMD would be described in any future version of IEEE 802.3 Ethernet [IEEE802.3], the name stated there shall be applied.

6.2 Shared *_Pacs

The PureEthernetStructure_Pac of this ONF TR-541-v1.0 Ethernet PHY Information Model is equivalent to the PureEthernetStructure_Pac of the ONF TR-532v1.1 Microwave Information Model [ONF MW IM].

The EthernetContainer_Pac of this ONF TR-541-v1.0 is equivalent to the EthernetContainer_Pac of the ONF TR-532v1.1.

6.3 Problem Definitions, Associations and Inheritances

The problem definitions, associations and inheritances are identical to the definitions made ONF TR-532v1.1 (see chapter 6.3 of [ONF MW IM]).

6.4 Performance Values

The performance value definitions, associations and inheritances are identical to the definitions made ONF TR-532v1.1 (see chapter 6.4 of [ONF MW IM]).

6.5 Maintenance Attributes

Some features are required for maintenance. Some of these maintenance features potentially break the connection to the Controller. ONF TR-541 facilitates configuring a timer. After this maintenance timer counted to zero, the values of all attributes related to maintenance features have to be set to their default values again. The affected attributes are marked by the phrase "Maintenance Feature." at the beginning of their comments.

<u>Maintenance Attributes</u>
<u>_loopBackKindOn</u>
<u>isolationIsOn</u>

6.6 Transceiver Information

Tracking equipment information about transceivers (e.g. SFPs) is of particular interest to operators, because transceivers can easily be pulled and plugged somewhere else. Prescriptions, which are made in IEEE 802.3 Ethernet [IEEE802.3], cover the necessary equipment information. The following definitions shall assure a common understanding about where to put/find the information about the actual hardware in the equipment part of the Core Information Model 1.2 [ONF Core IM].

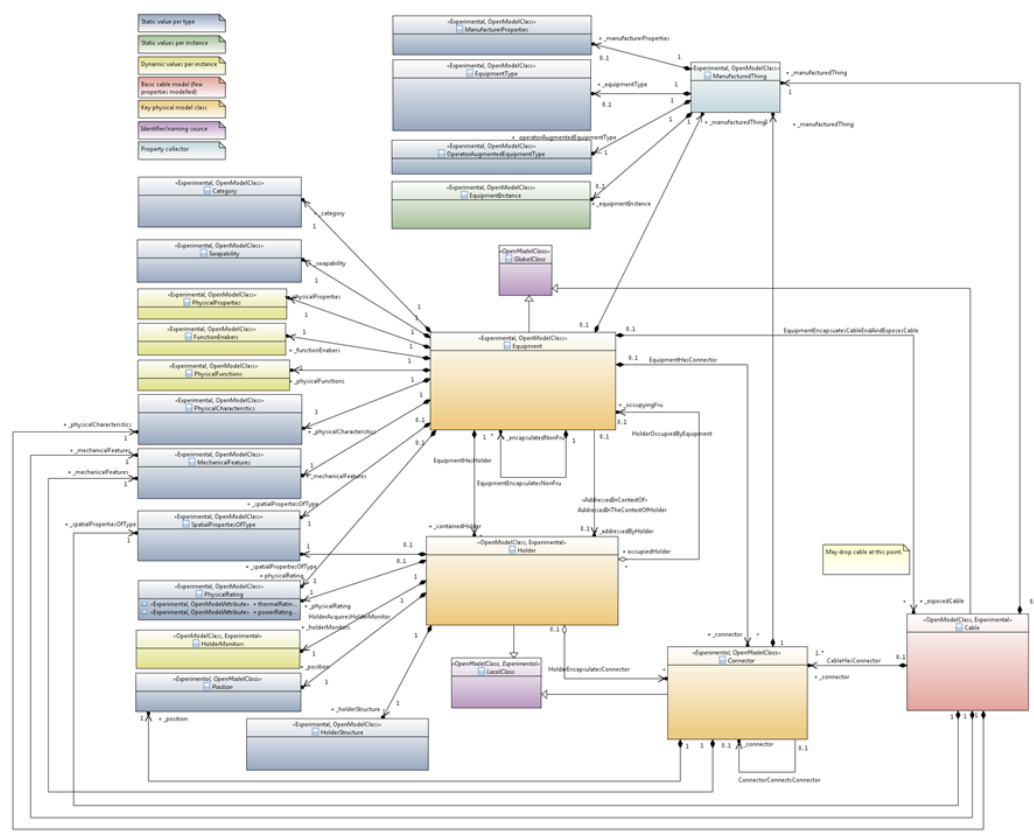


Figure 3: Equipment part of the Core Information Model

Information about the manufacturer of the transceiver shall be located in the ManufacturerProperties Class.

<u>Attribute Name in Core IM</u>	<u>To be filled with following information from 802.3</u>
<u>manufacturerIdentifier</u>	Describes the IEEE Company identifier of the vendor of the transceiver (1st part of 802.3 ResourceTypeID) according to 802.3 22.2.4.3.1 PHY Identifier and also referenced in 45.2.1.13 PMA/PMD package identifier.
<u>manufacturerName</u>	No entry

Table 1: ManufacturerProperties Class

The type of transceiver shall be described in the EquipmentType Class.

<u>Attribute Name in Core IM</u>	<u>To be filled with following information from 802.3</u>
<u>description</u>	Text describing the type of Equipment. The following information shall be provided: <ul style="list-style-type: none"> • Highest PMD • MiiKindType • MdiKindType All values shall be separated by "/".

<u>Attribute Name in Core IM</u>	<u>To be filled with following information from 802.3</u>
	<u>Example:</u> <u>1000BASE-T/SOLDERED_CONNECTOR/RJ45</u>
<u>modelIdentifier</u>	<u>No entry</u>
<u>partTypeIdentifier</u>	<u>Uniquely identifies the transceiver in the vendor's product lists according to 802.3 22.2.4.3.1 PHY Identifier and also referenced in 45.2.1.13 PMA/PMD package identifier as six bit model number.</u>
<u>typeName</u>	<u>No entry</u>
<u>version</u>	<u>Identifies the revision number of the transceiver (3rd part of 802.3 ResourceTypeID) according to 802.3 22.2.4.3.1 PHY Identifier and also referenced in 45.2.1.13 PMA/PMD package identifier as four-bit revision number.</u>

Table 2: EquipmentType Class

The concrete item shall be identified with the values stated in the EquipmentInstance Class.

<u>Attribute Name in Core IM</u>	<u>To be filled with</u>
<u>manufactureDate</u>	<u>Vendor's date code for the transceiver.</u>
<u>serialNumber</u>	<u>Vendor's serial number for the transceiver (0 = not applicable).</u>
<u>assetInstanceIdentifier</u>	<u>This attribute represents the asset identifier of this instance from the manufacturer's perspective.</u>

Table 3: EquipmentInstance Class

The current temperature of the transceiver shall be read from the PhysicalProperties Class.

<u>Attribute Name in Core IM</u>	<u>To be filled with</u>
<u>temperature</u>	<u>Current temperature (in degree Celsius) inside the transceiver.</u>

Table 4: PhysicalProperties Class

6.7 Expected Transceiver

The Capability class of the WireInterface_Pac holds information, which is specific to the type of transceiver. Because the attributes of the Capability class are invariant, the wireInterface_Pac cannot be instantiated before an expected equipment has already been defined.

On the other hand, the actually operative transceiver might break. In this situation, the instance of the wireInterface_Pac shall continue existing. This is why the wireInterface_Pac is associated with the expected equipment, but not with the actual equipment.

If the expected equipment would also contain attributes like manufactureDate or serialNumber, there would be a mismatch between expected and actual equipment after the replacement.

This means that the expected equipment has to hold sufficient information for unambiguously determining the Capability information, respectively assuring compatibility of all attributes of the WireInterface_Pac. On the other hand, as much information as possible has to be masked to allow replacing the hardware as flexibly as possible.

As a compromise the expected equipment shall be exclusively defined by the values of the attributes of the ManufacturerProperties class and the EquipmentType class as they are described above.

7 Attachment to the Core Information Model

The Core Information Model is the basis of the Ethernet PHY Information Model. However not all object classes of the Core Information Model are necessary for a control interface between Devices and SDN Controller. For example the root element of the Ethernet PHY Information Model is the NetworkElement object class. The SdnController object class must not be implemented in network elements, because a network element cannot offer any control for SDN Controllers.

The following classes of the Core Information Model are not used by the Ethernet PHY Information Model:

- SdnController
- NetworkControlDomain
- Link
- LinkPort
- FcRoute

Figure 4 highlights the classes of the Core Information Model, which are part of the Ethernet PHY Information Model.



The following layerProtocolName values have to be applied:

layerProtocolName	Type of *_Pac
ETC	EthernetContainer
MWS	PureEthernetStructure
PHYPS	WireInterface

7.1 Attachment of *_Pacs

Technology specific extensions of the Core Information Model are implemented by extending the LayerProtocol class with conditional packages. These conditional packages are called *_Pacs.

The Ethernet PHY Information Model defines three technology specific conditional packages, pointing to the LayerProtocol:

- The WireInterface_Pac defines an LTP as Ethernet PHY section trail termination point (PHYPS-TTP).
- The PureEthernetStructure_Pac defines an LTP as Ethernet PHY and microwave section trail termination point (MWS-TTP) for pure Ethernet transport systems.
- The EthernetContainer_Pac defines an LTP as a Ethernet PHY and microwave client connection termination point (MW-Client-CTP) for an Ethernet client signal.

Figure 5 shows the associations between the LayerProtocol class of the Core Information Model and the three microwave specific conditional packages. Please note that for simplicity reasons the ForwardingConstruct class is not displayed.

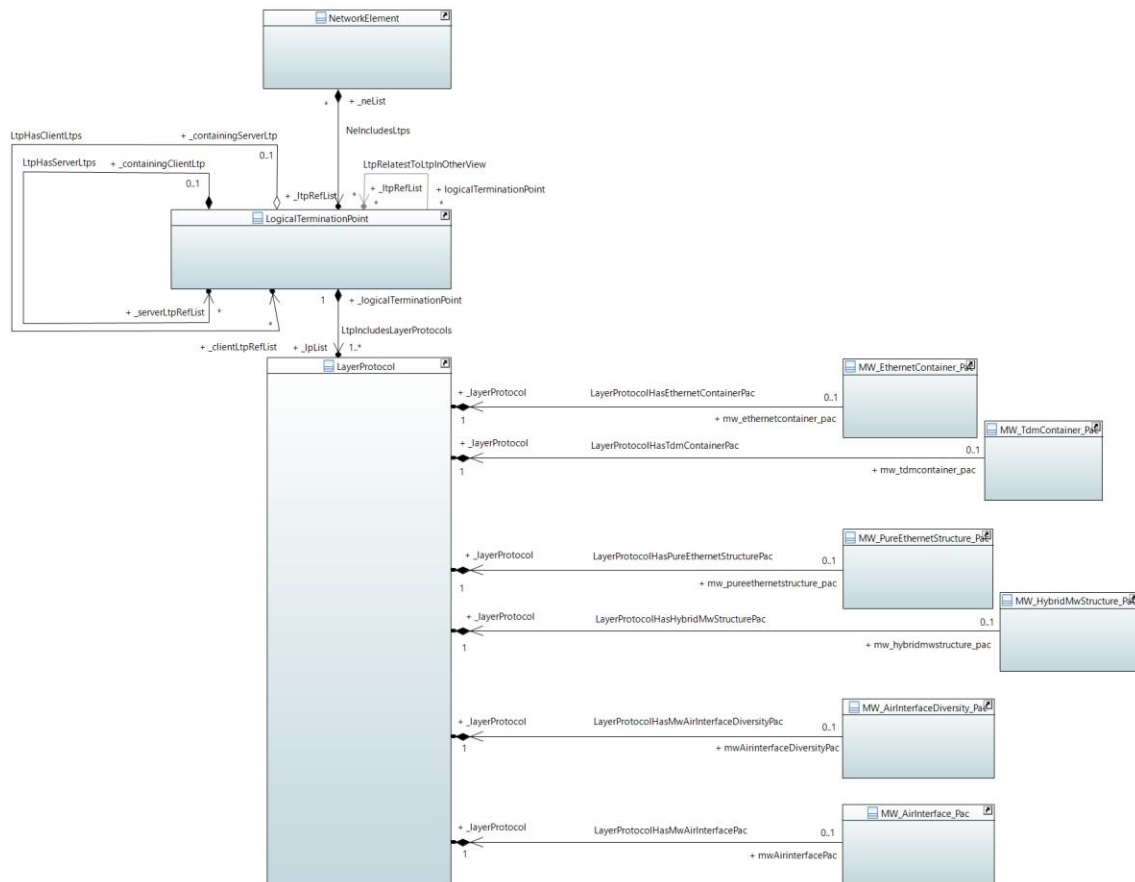


Figure 5: Associations between LayerProtocol and *_Pac

8 Non-Backward Compatibility of the next Version

ONF TR-541-v1.0 comprises not just the technology specific *_Pacs for managing the Ethernet PHY interface, but also elements of the ONF Core Information Model. Because the next version of ONF TR-541

will require to comprise an updated version of the Core Information Model, which is not backward compatible, also the next version of ONF TR-541 will not be backward compatible.

Please, see further information about future work, which will also impact backward compatibility, in chapter 9.

9 Future Work

It is seen as a problem that ONF TR-532 and ONF TR-541 are not disjunctive in regards to `pureEthernetStructure_Pac` and `EthernetContainer_Pac`. It is considered to decompose both information models into `*_Pacs`, make these `*_Pacs` available in separate repositories, and to just reference these `*_Pacs` inside the respective TR documents. Apart from avoiding redundancy, this decomposition would also allow updating the `*_Pacs` independently from each other. As a consequence, each `*_Pac` would be delivered as a separate YANG file.

Current version of ONF TR-541 is limited on technology specific conditional packages to the `LayerProtocol` class of the Core Information Model. This results in a comprehensive model for managing devices. From the controller's and the applications' points of view, these devices have to be connected to describe a network topology. The necessary classes for describing such topologies are also comprised in the Core Information Model, but they require technology specific conditional packages in the same way the `LayerProtocol` class does. It is considered to define Ethernet PHY specific conditional packages also for the `ForwardingConstruct` and to reference them in the next version of ONF TR-541.

The next version of ONF TR-541 shall also take benefit from the more advanced modeling of equipment, connectors and topology in later versions of the Core Information Model. E.g. several attributes, which are detailing characteristics of the SFP, will be replaced to equipment related classes then.

10 UML Model Files

The Papyrus export, which is holding the UML modeling files of the ONF TR-541-v1.0 Ethernet PHY Information Model can be found on

<https://github.com/openBackhaul/wireInterface/tree/TR541v1>

The available .zip file comprises the

- `WireInterface_Pac`

and all related datatypes, notifications and imported artefacts.

Please note that YANG Model files, Data Dictionary (GenDoc export) and Interface Simulator are just implementations of the UML modeling files.

In case of any divergence, the UML modeling files are always the relevant data base.

11 YANG Model Files

The YANG files generated from the UML model referenced in chapter 10 can be found on
not yet generated

12 Interface Simulator

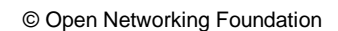
An Interface Simulator is for supporting application development without own hardware. The Interface Simulator, which is implementing the UML model referenced in chapter 10 can be found on

not yet generated

13 Data Dictionary

Please be aware that the following lists are showing not all the attribute's characteristics and stereotypes, e.g. default value and unit are missing.

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13.1.1 WireInterface_Pac

Qualified Name: WireModel::ObjectClasses::WireInterface::WireInterface_Pac

Applied stereotypes:

- OpenModelClass
 - objectCreationNotification: YES
 - objectDeletionNotification: YES
 - support: MANDATORY

Table 5: Attributes for WireInterface_Pac

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
<u>layerProtocol</u> , <u>layerprotocol</u>	LayerProtocol ./.	1	RW	OpenModelAttribute • partOfObjectKey: 1 • AVC: NO • isInvariant: false • valueRange: no range constraint • bitLength: NA • unit: no unit defined • support: MANDATORY	CoreModel-CoreNetworkModule-ObjectClasses:NetworkElement/_ItpRefList/_IpList/uuid See referenced class
<u>wirebasedinterfacecapability</u>	WireInterfaceCapability ./.	1	RW	OpenModelAttribute • partOfObjectKey: 0 • AVC: NO • isInvariant: false • valueRange: no range constraint • bitLength: NA • unit: no unit defined • support: MANDATORY	-See referenced class
<u>wirebasedinterfaceconfiguration</u>	WireInterfaceConfiguration ./.	1	RW	OpenModelAttribute • partOfObjectKey: 0 • AVC: NO • isInvariant: false • valueRange: no range constraint • bitLength: NA • unit: no unit defined • support: MANDATORY	-See referenced class

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
_wirebasedinterfacestatus	WireInterfaceStatus ./.	1	RWR	OpenModelAttribute • partOfObjectKey: 0 • AVC: NO • isInvariant: false • valueRange: no range constraint • bitLength: NA • unit: no unit defined • support: MANDATORY	-See referenced class
_wirebasedinterfacecurrentproblems	WireInterfaceCurrentProblems ./.	1	RWR	OpenModelAttribute • partOfObjectKey: 0 • AVC: NO • isInvariant: false • valueRange: no range constraint • bitLength: NA • unit: no unit defined • support: MANDATORY	-See referenced class
_wirebasedinterfacecurrentperformance	WireInterfaceCurrentPerformance ./.	1	RWR	OpenModelAttribute • partOfObjectKey: 0 • AVC: NO • isInvariant: false • valueRange: no range constraint • bitLength: NA • unit: no unit defined • support: MANDATORY	-See referenced class
_wirebasedinterfacehistoricalperformances	WireInterfaceHistoricalPerformances ./.	1	RWR	OpenModelAttribute • partOfObjectKey: 0 • AVC: NO • isInvariant: false • valueRange: no range constraint • bitLength: NA • unit: no unit defined • support: MANDATORY	-See referenced class

13.1.2 WireInterfaceCapability

Qualified Name: WireModel::ObjectClasses::WireInterface::WireInterfaceCapability

Applied stereotypes:

- OpenModelClass
 - objectCreationNotification: NO
 - objectDeletionNotification: NO

- support: MANDATORY

Table 6: Attributes for WireInterfaceCapability

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
supportedPmdList	PmdType ./.	1..*	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	List of Physical Medium Dependent (PMD) that can be operated
autoPmdNegotiationIsAvail	Boolean false	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	1 = Indicates that device is supporting Auto auto-negotiation
autoNegotiationPmdSelectionIsAvail	Boolean false	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	1 = device is supporting restricting auto- negotiation negotiation on a pre-defined list of PMDs
signalOrderingListsSupportedSignalOrderingList	SignalOrderingType NOT YET DEFINED	1..*	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	Describes the different (e.g. MDI, MDI-X) ways of ordering the signals on the physical medium

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
autoSignalOrderingIsAvail	Boolean false	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	1 = there is a mechanism for automatically crossing over tx and rx implemented
<u>configurationOfRxSyncPreferencesIsAvail</u>	<u>Boolean</u> <u>false</u>	<u>1</u>	<u>R</u>	<u>OpenModelAttribute</u> <ul style="list-style-type: none"> <u>partOfObjectKey: 0</u> <u>AVC: NO</u> <u>isInvariant: true</u> <u>valueRange: no range constraint</u> <u>bitLength: NA</u> <u>unit: no unit defined</u> <u>support: MANDATORY</u> 	<u>1 = Configuration of the behavior during the synchronization of transmitter and receiver is available. This attribute has nothing to do with clock signals.</u>
miiKind	MiiKindType NOT_YET_DEFINED	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	Kind of Medium Independent Interface (MII) provided by this Medium Attachment Unit (MAU) (e.g. SFP, moldered port)
mdiKind	MdiKindType NOT_YET_DEFINED	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	Kind of Medium Dependent Interface (MDI) provided by this Medium Attachment Unit (MAU)
requiredMediumKind	MediumKindType NOT_YET_DEFINED	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	Kind of medium required for operating this Medium Attachment Unit (MAU), more like an information field

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
wavelengthMin	Integer -1	0..3	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: LENGTH_32_BIT unit: pm support: MANDATORY 	Source: SFF-8690. Minimum laser wavelength in pico meter, -1 = not applicable, 0 = not known, <u>if (wavelengthMin==wavelengthMax=)</u> : wavelength cannot be configured; multiplicity=0..3 for 10GBASE-LX4 according to 802.3 53.5. <u>Value to be read from the EPROM of the SFP.</u>
wavelengthMax	Integer -1	0..3	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: LENGTH_32_BIT unit: pm support: MANDATORY 	Source: SFF-8690. Maximum laser wavelength in pico meter, -1 = not applicable, 0 = not known, <u>if (wavelengthMax==wavelengthMin=)</u> : wavelength cannot be configured; multiplicity=0..3 for 10GBASE-LX4 according to 802.3 53.5. <u>Value to be read from the EPROM of the SFP.</u>
wavelengthGridMin	Integer -1	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: LENGTH_32_BIT unit: pm support: MANDATORY 	Source: SFF-8690. Minimum grid spacing supported by the transceiver, -1 = not applicable, 0 = not known
linkLengthMax	Integer -4	4	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: LENGTH_32_BIT unit: m support: MANDATORY 	Indicates the maximum link length that is supported by the transceiver on the medium, which is specified in the standard referenced in TypeDefinitions::phyType::phyKind.
vendorName	String NOT_YET_DEFINED	4	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY LikelyToChange	Name of the vendor of the transceiver Might be moved to CoreModel::CorePhysicalModel-Initial::EquipmentDetail::ObjectClasses::InvariantDetails::ManufacturerProperties::manufacturerName

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
vendorOui	String NOT_YET_DEFINED	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY LikelyToChange	Describes the IEEE Company identifier of the vendor of the transceiver (1st part of 802.3 ResourceTypeID) 802.3-22.2.4.3.1 PHY Identifier; also referenced in 45.2.1.13 PMA/PMD package identifier Might be moved to CoreModel::CorePhysicalModel-Initial::EquipmentDetail::ObjectClasses::InvariantDetails::ManufacturerProperties::manufacturerIdentifier
partNumber	String NOT_YET_DEFINED	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY LikelyToChange	Uniquely identifies the transceiver in the vendor's product lists 802.3-22.2.4.3.1 PHY Identifier; also referenced in 45.2.1.13 PMA/PMD package identifier as six bit model number Might be moved to CoreModel::CorePhysicalModel-Initial::EquipmentDetail::ObjectClasses::InvariantDetails::EquipmentType::partTypeIdentifier
revisionNumber	String NOT_YET_DEFINED	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY LikelyToChange	Identifies the revision number of the transceiver (3rd part of 802.3 ResourceTypeID) Might be moved to CoreModel::CorePhysicalModel-Initial::EquipmentDetail::ObjectClasses::InvariantDetails::EquipmentType::version 802.3-22.2.4.3.1 PHY Identifier; also referenced in 45.2.1.13 PMA/PMD package identifier as four bit revision number
serialNumber	String NOT_YET_DEFINED	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY LikelyToChange	Vendor's serial number for the transceiver. 0 = not applicable Might be moved to CoreModel::CorePhysicalModel-Initial::EquipmentDetail::ObjectClasses::InvariantDetails::EquipmentInstance::serialNumber

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
dateCode	String NOT_YET_DEFINED	4	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY LikelyToChange	Vendor's date code for the transceiver Might be moved to CoreModel::CorePhysicalModel- Initial::EquipmentDetail::ObjectClasses:: InvariantDetails::EquipmentInstance::ma nufactureDate
shortReachModelsAvail	Boolean false	1	R	Experimental OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	1 = Indicates that Short Reach Mode for 10GBASE-T according to 802.3 45.2.1.64 is available
eeelsAvail	Boolean false	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	1 = Indicates that Energy-Efficient Ethernet (EEE) is available at the device.
unidirectionalOperationIsAvail	Boolean false	1	R	Experimental OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	<u>Source: 802.3</u> 1 = Medium Attachment Unit (MAU) able to transmit from Media Independent Interface (MII) regardless of whether the MAU has determined that a valid link has been established, 0 = MAU able to transmit from MII only when the MAU has determined that a valid link has been established 802.3
rxlevelLowThreshold	Integer 99	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: LENGTH_8_BIT unit: dBm support: MANDATORY 	Threshold for alarming low RX levels. Value pre-defined by SFP manufacturer (SFF- 8472)

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
rxlevelHighThreshold	Integer 99	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: LENGTH_8_BIT unit: dBm support: MANDATORY 	Threshold for alarming high RX levels. Value pre-defined by SFP manufacturer (SFF- 8472)
temperatureLowThreshold	Integer -99	1	R	<u>LikelyToChange</u> OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: LENGTH_8_BIT unit: Celsius support: MANDATORY <u>LikelyToChange</u> 	<u>Might move to somewhere in the Physical Segment of the Core IM</u> Threshold for alarming low temperature values. Value pre-defined by SFP manufacturer (SFF- 8472) <u>Might move to somewhere in the Physical Segment of the Core IM</u>
temperatureHighThreshold	Integer -99	1	R	<u>LikelyToChange</u> OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: LENGTH_8_BIT unit: Celsius support: MANDATORY <u>LikelyToChange</u> 	Threshold for alarming high temperature values. Value pre-defined by SFP manufacturer (SFF- 8472) Might move to somewhere in the Physical Segment of the Core IM
supportedAlarmList	String <u>NOT_YET_DEFINEDSupported alarms not yet defined.</u>	61..*	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	Available alarms to be listed. Mandatory: 'rxLos'. Optional: 'txFault', 'rxLos', 'tempHigh', 'tempLow', 'rxLevelHigh', 'rxLevelLow', 'vccHigh', 'vccLow', 'txBiasHigh', 'txBiasLow', 'txPowerHigh', 'txPowerLow', 'laserTempHigh', 'laserTempLow', 'tecCurrentHigh', 'tecCurrentLow'. Further alarms might be added by the device. <u>MW-IM</u>

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
configurationOfNumberOfBipErrorsPerSesIsAvail	Boolean false	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	1 = SET operation on the Line SES threshold defined by aLineSESThreshold in 30.8.1.1.11 of 802.3-2015 is available.
supportedLoopBackKindList	LoopBackType NONE	1..5	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	Source: 802.3 45.2.1.12.1 PMA remote loopback ability. List of supported kinds of looping back of header information to the remote site.
maintenanceTimerRange	String Range of the maintenance timer not yet defined.	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: s support: MANDATORY 	Available time periods for maintenance configurations (e.g. the loop back) to be described. Concrete values shall be separated by commas (e.g. '10, 60, 360'). Ranges shall be expressed as two values separated by a minus (e.g. '10-360').

13.1.3 WireInterfaceConfiguration

Qualified Name: WireModel::ObjectClasses::WireInterface::WireInterfaceConfiguration

Applied stereotypes:

- OpenModelClass
 - objectCreationNotification: NO
 - objectDeletionNotification: NO
 - support: MANDATORY

Table 7: Attributes for WireInterfaceConfiguration

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
wireInterfaceName	String <u>NotWire interface name</u> not yet defined.	1	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: YES isInvariant: false valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	Text field for the wire interface being named by the operator. Ideally used for entering unique numbers or names for unambiguously identifying the connection within the network
remoteWireInterfaceName	String <u>NotRemote wire interface</u> name not yet defined.	1	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: YES isInvariant: false valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	Text field for defining the wire interface this one is connected with. Ideally used for entering unique numbers or names for unambiguously identifying the connection within the network
interfacelsOn	Boolean true	1	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: YES isInvariant: false valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	Source: 802.3 according 30.3.2.2.1 acPhyAdminControl. 1 = Activation of the interface (it gets powered and can be managed even if the transceiver is not yet transmitting or receiving). In case there is no Medium Attachment Unit (MAU) (e.g. no SFP in the cage) SETting (interfacelsOn=1) must be ignored and GETting must return (interfacelsOn=0)
transceiverIsOnList	Boolean false	1..11	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: YES isInvariant: false valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	Source: 802.3 45.2.1.8 PMD transmit disable register (Register 1.9). 1 = Activation of the transmitter and receiver (e.g. laser) of the PHY; transceiverIsOnList[0]:total interface; transceiverIsOnList[1..10] different lanes of a multilane Medium Attachment Unit (MAU)
autoPmdNegotiationIsOn	Boolean false	1	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: YES isInvariant: false valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	<u>Only relevant if</u> (autoPmdNegotiationIsAvail == 1). 1 = Auto-negotiation is switched on

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
_fixedPmd	PmdType ./.	1	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: YES isInvariant: false valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	If (autoPmdNegotiationIsOn==0) configuration : Configuration of the concrete kind of Physical Medium Dependent (PMD). If (autoNegotiationIsOn=1) value of this field becomes irrelevant
_autoNegotiationPmdList	PmdType ./.	0..*	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: YES isInvariant: false valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	If (autoPmdNegotiationIsOn==1) AND (autoNegotiationPmdSelectionIsAvail==1), this list defines the selection of PMDs the automated negotiation process is allowed to choose from. If no entry, the automated negotiation process is allowed to choose from all available PMDs.
autoSignalOrderingIsOn	Boolean false	1	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: YES isInvariant: false valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	<u>Only relevant if (autoSignalOrderingIsAvail == 1).</u> 1 = e.g. auto-MDI-X is switched on
fixedSignalOrderingKind	SignalOrderingType NOT_YET_DEFINED	1	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: YES isInvariant: false valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	If (autoSignalOrderingIsOn==0) configuration of the concrete kind of signal ordering on the media (e.g. MDI, or MDI-X). If (autoSignalOrderingIsOn=1) value of this field becomes irrelevant
<u>wavelengthList</u>	<u>Integer</u> -1	<u>0..3</u>	<u>RW</u>	<u>OpenModelAttribute</u> <ul style="list-style-type: none"> <u>partOfObjectKey: 0</u> <u>AVC: YES</u> <u>isInvariant: false</u> <u>valueRange: no range constraint</u> <u>bitLength: LENGTH_32_BIT</u> <u>unit: pm</u> <u>support: MANDATORY</u> 	<u>Source: SFF-8690. Wavelength of the signal of laser in pico meter; multiplicity=0..3 for 10GBASE-LX4 according to 802.3 53.5</u>

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
<u>rxSyncPreference</u>	RxSyncPreferenceType NOT_YET_DEFINED	1	RW	Experimental OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: YES isInvariant: false valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	Source: 802.3. <u>Only relevant if (configurationOfRxSyncPreferencesAvailable == 1).</u> Configuration of the behaviour behavior during the negotiation of the wire interface (master), which is sending a continuous stream of symbols for the remote site (slave) synchronizing its receiver on it to <u>synchronize its receiver on it. This attribute is for synchronizing transmitter and receiver and has nothing to do with clock signals.</u>
shortReachModelsOn	Boolean false	1	RW	Experimental OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: YES isInvariant: false valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	<u>Only relevant if (shortReachModelsAvailable == 1).</u> Activation of the Short Reach Mode for 10GBASE-T according to 802.3 45.2.1.64
<u>eeelsOn</u>	<u>Boolean</u> <u>false</u>	<u>1</u>	<u>RW</u>	<u>OpenModelAttribute</u> <ul style="list-style-type: none"> <u>partOfObjectKey: 0</u> <u>AVC: YES</u> <u>isInvariant: false</u> <u>valueRange: no range constraint</u> <u>bitLength: NA</u> <u>unit: no unit defined</u> <u>support: MANDATORY</u> 	<u>Only relevant if (eeelsAvailable == 1). 1 = Energy Efficient Ethernet is activated</u>
unidirectionalOperationsOn	Boolean false	1	RW	Experimental OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: YES isInvariant: false valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	Source: 802.3. If (autoNegotiationIsOn=1) OR (manualDuplexSelection=0 (=half duplex)), this bit is ignored. When autoNegotiationIsOn=0 AND manualDuplexSelection=1 (=full duplex): Source: 802.3. <u>Only relevant if (unidirectionalOperationsAvailable == 1).</u> 1 = Enable transmit from media independent interface regardless of whether the PHY has determined that a valid link has been established, 0 = Enable transmit from media independent interface only when the PHY has determined that a valid link has been established

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
wavelengthList	Integer 1	0..4	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: YES isInvariant: false valueRange: no range constraint bitLength: LENGTH_32_BIT unit: pm support: MANDATORY 	Source: SFF-8690. Wavelength of the signal of laser in pico meter; multiplicity=0..3 for 10GBASE-LX4 according to 802.3-53.5
loopBackKindOnProblemKindSeverityList	WireInterfaceProblemSeverityType LoopBackType NONE	1..*	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: YES isInvariant: false valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	Severity of the problem to be configured. Source: 802.3 according 22.2.4.1.2 Loopback. Maintenance Feature. The currently configured type of looping back of the wire interface header shall be expressed here. The received header is returned to the remote site.
isolationIsOnnumberOfBipErrorsPerSes	Integer 1 Boolean false	1	RW	Experimental OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: YES isInvariant: false valueRange: no range constraint bitLength: NALENGTH_16_BIT unit: no unit defined support: MANDATORY 	Only relevant if (configurationOfNumberOfBipErrorsPerSesIsAvail == 1). SET operation on the Line SES threshold defined by aLineSESThreshold in 30.8.1.1.11 of 802.3-2015. This attribute configures the minimum number of BIP errors that have to occur in one second to count this second as a SES instead of an ES. According to 802.3, a value of 9835 should be the hardware default value, which should also apply after restarting the interface. Source: 802.3-1 = Activation of the separation of the PHY from higher network layers
restartPmdNegotiationIsOn	Boolean false	1	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: YES isInvariant: false valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	Source: 802.3. Restarts the auto negotiation process

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
loopBackKindOn	LoopBackType NONE	1	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: YES isInvariant: false valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	Maintenance Feature. Source:802.3 according 22.2.4.1.2 Loopback. The currently configured type of looping back of the wire interface header shall be expressed here. The received header is returned to the remote site.
isolationIsOn	Boolean false	1	RW	Experimental OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: YES isInvariant: false valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	Maintenance Feature. Source: 802.3. 1 = Activation of the separation of the PHY from higher network layers. Maintenance feature.
maintenanceTimer	Integer -1	1	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: YES isInvariant: false valueRange: no range constraint bitLength: LENGTH_32_BIT unit: s support: MANDATORY 	Time of existence of any maintenance configuration (e.g. the loop back). Valid values are defined in WireInterface::WireInterfaceCapability::maintenanceTimerRange. In case the hardware would implement just a single timer for maintenance at all kinds and instances of interfaces, this attribute should affect this single timer. -and MW-IM
problemKindSeverityList	WireInterfaceProblemSeverityType -/-	6..*	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: YES isInvariant: false valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	Severity of the problem to be configured.

13.1.4 WireInterfaceStatus

Qualified Name: WireModel::ObjectClasses::WireInterface::WireInterfaceStatus

Applied stereotypes:

- OpenModelClass
 - objectCreationNotification: NO
 - objectDeletionNotification: NO
 - support: MANDATORY

Table 8: Attributes for WireInterfaceStatus

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
interfacelsUp	Boolean false	1	R	OpenModelAttribute <ul style="list-style-type: none"> • partOfObjectKey: 0 • AVC: YES • isInvariant: false • valueRange: no range constraint • bitLength: NA • unit: no unit defined • support: MANDATORY 	Source: 802.3 according 30.3.2.1.7 aPhyAdminState. 1 = A Physical layer entity (PHY) exists (including Medium Attachment Unit (e.g. SFP)) and it is powered and can be managed
receiveSignallsDetected	Boolean false	1..11	R	OpenModelAttribute <ul style="list-style-type: none"> • partOfObjectKey: 0 • AVC: YES • isInvariant: false • valueRange: no range constraint • bitLength: NA • unit: no unit defined • support: MANDATORY 	Source: 802.3 45.2.1.9 PMD receive signal detect. 1 = Receiver (e.g. laser) detects signal; receiveSignallsDetected[0]:total interface; receiveSignallsDetected[1..10] different lanes of a multilane Medium Attachment Unit (MAU)
pmdIsUp	Boolean false	4	R	OpenModelAttribute <ul style="list-style-type: none"> • partOfObjectKey: 0 • AVC: YES • isInvariant: false • valueRange: no range constraint • bitLength: NA • unit: no unit defined • support: MANDATORY 	Source: Inverse of 802.3 45.2.1.2.3 Fault (1.1.7). If (interfacelsUp=1) BUT 0 = there is a fault in either transmit or receive path
pmdNegotiationState	pmdNegotiationStateType NOT_YET_DEFINED	1	R	Experimental OpenModelAttribute <ul style="list-style-type: none"> • partOfObjectKey: 0 • AVC: YES • isInvariant: false • valueRange: no range constraint • bitLength: NA • unit: no unit defined • support: MANDATORY 	Source: 802.3. Status of the Physical Medium Dependent (PMD) negotiation process (auto-neg)

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
<u>pmdIsUp</u>	Boolean false	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: YES isInvariant: false valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	Source: Inverse of 802.3 45.2.1.2.3 Fault (1.1.7). If (interfacelsUp==1) BUT (pmdIsUp==0) : there is a fault in either transmit or receive path
_pmdCur	PmdType ./.	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: YES isInvariant: false valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	Indicates the kind of Physical Medium Dependent (PMD) currently operated at this interface
<u>_signalOrderingKindCur</u>	SignalOrderingType NOT_YET_DEFINED	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: YES isInvariant: false valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	Reference on a SignalOrderingType for expressing the currently active way of ordering the signals on the physical medium.
rxSyncRole	RxSyncRoleType NOT_YET_DEFINED	1	R	Experimental OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: YES isInvariant: false valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	Indicates the result of the negotiation of the wire interface (master), which is sending a continuous stream of symbols for the remote site (slave) synchronizing its receiver on it
eeelsUp	Boolean false	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: YES isInvariant: false valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	1 = Energy Efficient Ethernet is supported at both ends of the link and it is activated

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
linkIsUp	Boolean false	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: YES isInvariant: false valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	Parameter 1=If (transceiverIsUp==1) AND (linkIsUp==1) : communication is established to the remote site
linkIsIdle	Boolean false	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: YES isInvariant: false valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	1=If (linkIsUp==1) AND (eeelsAvail==1) AND (eeelsOn==1) AND (linkIsIdle==1) AND: link is currently in idle mode. If Energy Efficient Ethernet is not supported or switched off, this attribute must be 0.
txLevelCur	Integer 99	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: false valueRange: no range constraint bitLength: LENGTH_8_BIT unit: dBm support: MANDATORY 	Current transmit power
rxLevelCur	Integer 99	1..4	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: false valueRange: no range constraint bitLength: LENGTH_8_BIT unit: dBm support: MANDATORY 	Current receive power; Also used for receive signal power measured at the Medium Dependent Interface (MDI) of 10GBASE-T during training as described in 802.3 55.4.3.1
tempCur	Integer -99	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: false valueRange: no range constraint bitLength: LENGTH_8_BIT unit: Celsius support: MANDATORY LikelyToChange	Current temperature (in degree-Celsius) inside the transceiver To be moved to CoreModel::CorePhysicalModel-Initial::EquipmentDetail::ObjectClasses::DynamicDetails::PhysicalProperties

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
loopBackKindUp	LoopBackType NONE	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: YES isInvariant: false valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	The currently active (not just configured) type of looping back of the wire interface header shall be expressed here. The received header is returned to the remote site. Paramter and MW-IM

13.1.5 WireInterfaceCurrentProblems

Qualified Name: WireModel::ObjectClasses::WireInterface::WireInterfaceCurrentProblems

Applied stereotypes:

- OpenModelClass
 - objectCreationNotification: NO
 - objectDeletionNotification: NO
 - support: MANDATORY

Table 9: Attributes for WireInterfaceCurrentProblems

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
currentProblemList	WireInterfaceCurrentProblemType ./.	0..*	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: false valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	

13.1.6 WireInterfaceCurrentPerformance

Qualified Name: WireModel::ObjectClasses::WireInterface::WireInterfaceCurrentPerformance

Aggregated performance information of the air interface at a particular moment.

Applied stereotypes:

- OpenModelClass
 - objectCreationNotification: NO
 - objectDeletionNotification: NO
 - support: MANDATORY

Table 10: Attributes for WireInterfaceCurrentPerformance

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
currentPerformanceDataList	WireInterfaceCurrentPerformanceType ./.	1..2	R	OpenModelAttribute • partOfObjectKey: 0 • AVC: NO • isInvariant: false • valueRange: no range constraint • bitLength: NA • unit: no unit defined • support: MANDATORY	At least values of the counters, which are reset every 15 minutes, are to be provided. If available, the current values of the counters, which are reset every 24 hour, can be provided, too.

13.1.7 WireInterfaceHistoricalPerformances

Qualified Name: WireModel::ObjectClasses::WireInterface::WireInterfaceHistoricalPerformances

Aggregated performance information of the air interface for a pre-defined measurement interval.

Applied stereotypes:

- OpenModelClass
 - objectCreationNotification: NO
 - objectDeletionNotification: NO
 - support: MANDATORY

Table 11: Attributes for WireInterfaceHistoricalPerformances

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
historicalPerformanceDataList	WireInterfaceHistoricalPerformanceType ./.	0..*	R	OpenModelAttribute • partOfObjectKey: 0 • AVC: NO • isInvariant: false • valueRange: no range constraint • bitLength: NA • unit: no unit defined • support: MANDATORY	

13.2 PureEthernetStructure_Pac

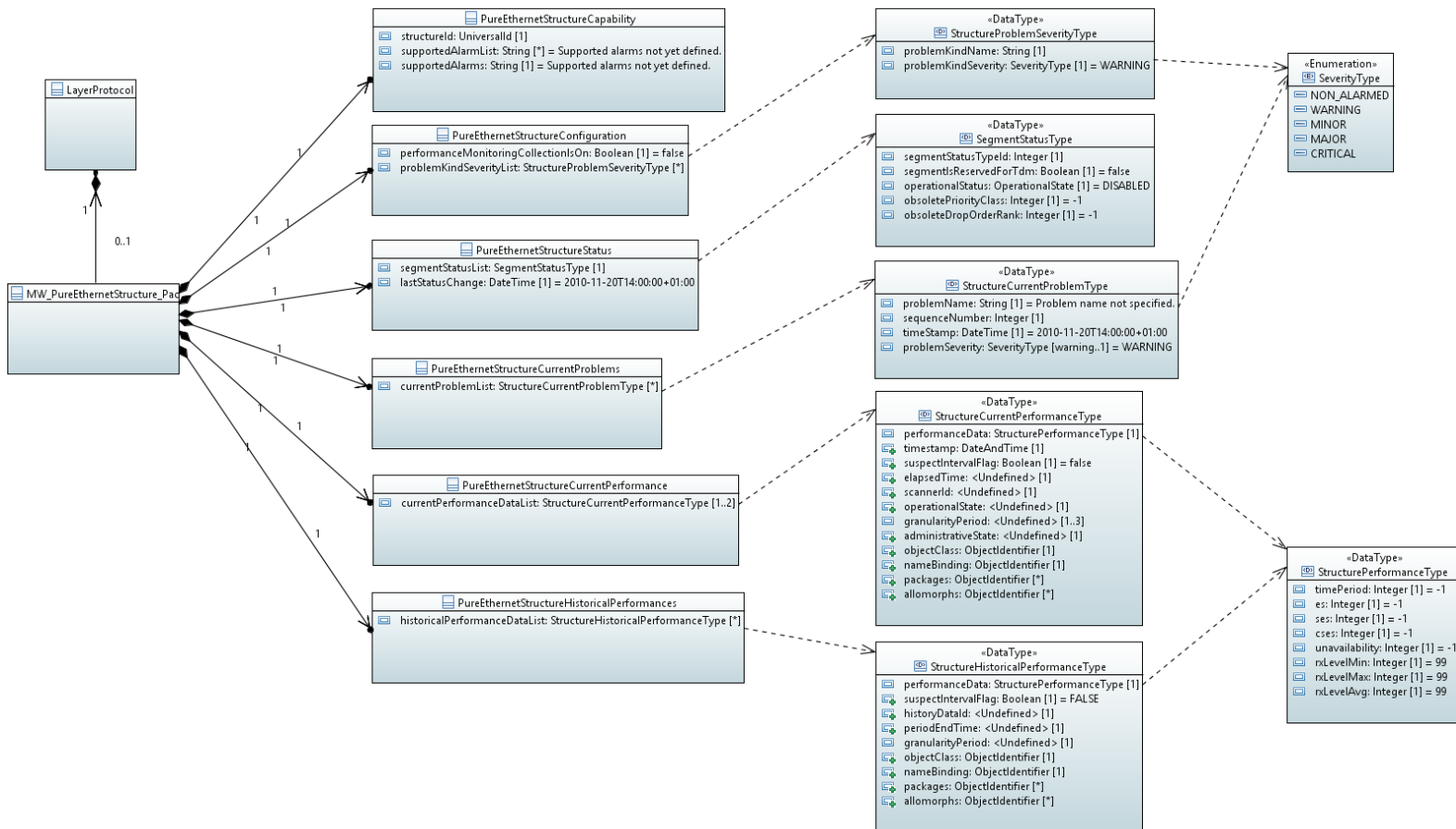


Figure 7: Exemplary PureEthernetStructure_Pac

Please, see chapter 15.2.1 in ONF TR-532v1.1 Microwave Information Model [ONF MW IM] for the exact definition of the **PureEthernetStructure_Pac**.

13.3 EthernetContainer_Pac

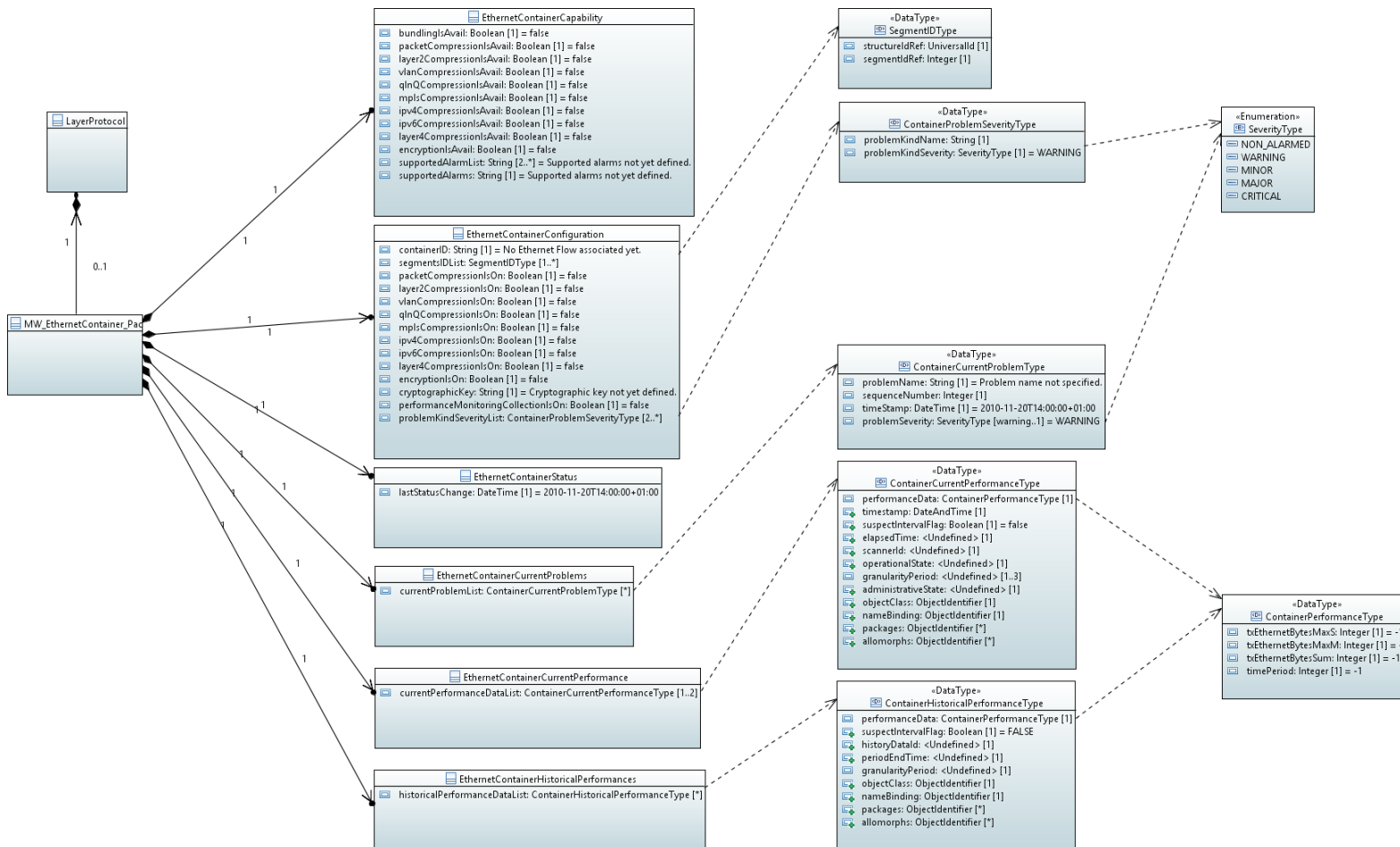


Figure 8: Exemplary EthernetContainer_Pac

Please, see chapter 15.3.1 in ONF TR-532v1.1 Microwave Information Model [ONF MW IM] for the exact definition of the EthernetContainer_Pac.

13.4 Data Types

13.4.1 PmdType

Qualified Name: WireModel::TypeDefinitions::PmdType

Table 12: Attributes for PmdType

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
pmName	String Name of the PMP not yet defined	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 1 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	<p>The following PMD are not supported: '2BASE-TL', '10PASS-TS', '1000BASE-PX10-D', '1000BASE-PX10-U', '1000BASE-PX20-D', '1000BASE-PX20-U', '1000BASE-PX30-D', '1000BASE-PX30-U', '1000BASE-PX40-D', '1000BASE-PX40-U', '10GBASE-W', '10GBASE-EW', '10GBASE-LW', '10GBASE-SW', '10/1GBASE-PRX-D1', '10/1GBASE-PRX-D2', '10/1GBASE-PRX-D3', '10/1GBASE-PRX-D4', '10/1GBASE-PRX-U1', '10/1GBASE-PRX-U2', '10/1GBASE-PRX-U3' and '10/1GBASE-PRX-U4'</p> <p>To be chosen from the following list of PMD names according to IEEE 802.3 '10BASE5', 'FOIRL', '10BASE2', '10BROAD36', '10BASE-T', '10BASE-FP', '10BASE-FB', '10BASE-FL', '100BASE-T4', '100BASE-TX', '100BASE-BX10D', '100BASE-BX10U', '100BASE-FX', '100BASE-LX10', '100BASE-T2', '1000BASE-X', '1000BASE-BX10D', '1000BASE-BX10U', '1000BASE-LX', '1000BASE-LX10', '1000BASE-SX', '1000BASE-CX', '1000BASE-KX', '1000BASE-T', '10GBASE-X', '10GBASE-LX4', '10GBASE-KX4', '10GBASE-R', '10GBASE-ER', '10GBASE-LR', '10GBASE-SR', '10GBASE-LRM', '10GBASE-KR', '10GBASE-T', '10GBASE-PR-D1', '10GBASE-PR-D2', '10GBASE-PR-D3', '10GBASE-PR-D4', '10GBASE-PR-U1', '10GBASE-PR-U2', '10GBASE-PR-U3', '10GBASE-PR-U4', '40GBASE-R', '40GBASE-KR4', '40GBASE-CR4', '40GBASE-SR4', '4x10GBASE-SR', '40GBASE-LR4', '40GBASE-ER4', '40GBASE-FR', '100GBASE-R', '100GBASE-CR4', '100GBASE-KR4', '100GBASE-KP4', '100GBASE-CR10', '100GBASE-SR4', '100GBASE-SR10', '2x40GBASE-SR', '10x10GBASE-SR', '12x10GBASE-SR', '100GBASE-LR4', '100GBASE-ER4' and 'NOT_YET_DEFINED'</p>

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
speed	String Speed of the PMP not yet defined	1	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: Mbit/s support: MANDATORY 	Line speed of the PMD. Value to be chosen from '2Mbit/s', '10Mbit/s', '100Mbit/s', '1000Mbit/s', '10Gbit/s', '40Gbit/s' or '100Gbit/s'
duplex	DuplexType NOT_YET_DEFINED	1	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	To be expressed, whether the PMD is full duplex or just half duplex

13.4.2 WireInterfaceProblemSeverityType

Qualified Name: WireModel::TypeDefinitions::WireInterfaceProblemSeverityType

Table 13: Attributes for WireInterfaceProblemSeverityType

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
problemKindName	String Problem kind name not defined.	1	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	Name of the alarm according to WireInterface::WireInterfaceCapability::supportedAlarms

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
problemKindSeverity	SeverityType WARNING	1	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: YES isInvariant: false valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	Severity of this type of alarm.

13.4.3 WireInterfaceCurrentProblemType

Qualified Name: WireModel::TypeDefinitions::WireInterfaceCurrentProblemType

Table 14: Attributes for WireInterfaceCurrentProblemType

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
problemName	String Problem name not specified.	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	Name of the alarm according to supportedAlarmList attribute in MauType datatype

13.4.4 WireInterfacePerformanceType

Qualified Name: WireModel::TypeDefinitions::WireInterfacePerformanceType

Table 15: Attributes for WireInterfacePerformanceType

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
es	Integer -1	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: LENGTH_32_BIT unit: s support: MANDATORY 	Number of errored seconds according to 802.3 30.8.1.1.13 aLineESs
ses	Integer -1	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: LENGTH_32_BIT unit: s support: MANDATORY 	Number of severely errored seconds according to 802.3 30.8.1.1.12 aLineSESS
symbolErrorDuringCarrier	Integer -1	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	Source: 802.3 according to 30.3.2.1.5 aSymbolErrorDuringCarrier. Number of times when valid carrier was present and an invalid data symbol occurred.
lowPowerIdleTransmitterMs	Integer -1	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: ms support: MANDATORY 	Source: 802.3 similar to 30.3.2.1.8 aTransmitLPIMicroseconds. Number of milliseconds (original counter expresses microseconds), during which the transmitter was in power save mode
lowPowerIdleReceiverMs	Integer -1	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: ms support: MANDATORY 	Source: 802.3 similar to 30.3.2.1.9 aReceiveLPIMicroseconds. Number of milliseconds (original counter expresses microseconds), during which the receiver was in power save mode

13.4.5 WireInterfaceCurrentPerformanceType

Qualified Name: WireModel::TypeDefinitions::WireInterfaceCurrentPerformanceType

Turns performance information into current performance information by inheriting from OTN_CurrentData.

Table 16: Attributes for WireInterfaceCurrentPerformanceType

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
performanceData	WireInterfacePerformance Type ./.	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: false valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	

13.4.6 WireInterfaceHistoricalPerformanceType

Qualified Name: WireModel::TypeDefinitions::WireInterfaceHistoricalPerformanceType

Turns performance information into historical performance information by inheriting from OTN_HistoryData.

Table 17: Attributes for WireInterfaceHistoricalPerformanceType

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
performanceData	WireInterfacePerformance Type ./.	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	

13.5 Enumeration Types

13.5.1 LoopBackType

Qualified Name: WireModel::TypeDefinitions::LoopBackType

Contains Enumeration Literals:

- NONE:
- EXTERNAL:
 - Parameter
 - If the internal loopback test succeeds but the external loopback fails, the Medium Attachment Unit (MAU) is faulty (e.g. SFP has to be replaced)
- INTERNAL:
 - If the internal loopback test fails, the Data Terminal Equipment (DTE) is faulty (e.g. board has to be replaced)
 - Parameter
- NOT_YET_DEFINED:

13.5.2 SeverityType

Qualified Name: WireModel::TypeDefinitions::SeverityType

According to ITU-T M.3160

Contains Enumeration Literals:

- NON_ALARMED:
- WARNING:
- MINOR:
- MAJOR:
- CRITICAL:

13.5.3 MdiKindType

Qualified Name: WireModel::TypeDefinitions::MdiKindType

Contains Enumeration Literals:

- SC:
 - Subscriber Connector

- FIBRE_CHANNEL_STYLE_1:
 - Copper connector
- FIBRE_CHANNEL_STYLE_2:
 - Copper connector
- BNC_TNC:
 - Bayonet/Threaded Neill-Concelman
- FC:
 - Fibre Channel coax headers
- FIBER_JACK:
- LC:
 - Lucent Connector
- MT_RJ:
 - Mechanical Transfer - Registered Jack
- MU:
 - Multiple Optical
- SG:
- OPTICAL_PIGTAIL:
- MPO1x12:
 - Multifiber Parallel Optic
- MPO2x16:
 - Multifiber Parallel Optic
- HSSDC_II:
 - High Speed Serial Data Connector
- COPPER_PIGTAIL:
- RJ45:
 - 8P8C, according to Clause 3 and Figures 1 through 5 of IEC 60603-7
- NO_SEPERABLE_CONNECTOR:
- MXC2x16:
- ST:
 - according to IEC 60874-10:1992, also often called BFOC/2.5
- NOT_YET_DEFINED:

13.5.4 MediumKindType

Qualified Name: WireModel::TypeDefinitions::MediumKindType

Contains Enumeration Literals:

- TP_CAT3:
- TP_CAT5:
- TP_CAT6:
- TP_CAT8:
- SINGLE_MODE:
- MULTI_MODE:
- NOT_YET_DEFINED:

13.5.5 MiiKindType

Qualified Name: WireModel::TypeDefinitions::MiiKindType

Contains Enumeration Literals:

- GBIC:
- SOLDERED_CONNECTOR:
- SFP_SFP+_SFP28:
- XBI_300_PIN:
- XENPAK:
- XFP:
- XFP_E:
- XPAK:
- X2:
- DWDM_SFP_SFP+:
- QSFP:
- QSFP+:
- CXP:
- SHIELDED_MINI_MULTILANE_HD_4X:
- SHIELDED_MINI_MULTILANE_HD_(X:
- QSFP28:
- CXP2:
- CDFP_STYLE1_STYLE2:
- SHIELDED_MINI_MULTILANE_HD_4X_FAN_OUT:
- SHIELDED_MINI_MULTILANE_HD_8X_FAN_OUT:
- CDFP_STYLE3:
- QSFP_MICRO:

- QSFP_DD:
- QSFP+_RATE_SELECT_V1:
- QSFP+_RATE_SELECT_V2:
- NOT_YET_DEFINED:

13.5.6 DuplexType

Qualified Name: WireModel::TypeDefinitions::DuplexType

Contains Enumeration Literals:

- HALF_DUPLEX:
- FULL_DUPLEX:
- NOT_YET_DEFINED:

13.5.7 RxSyncPreferenceType

Qualified Name: WireModel::TypeDefinitions::RxSyncPreferenceType

- Experimental

Contains Enumeration Literals:

- AUTO_MULTIPORT_DEVICE:
 - Master/Slave relation is determined by auto-negotiation and this device has a preference for being Master
- AUTO_SINGLE_PORT_DEVICE:
 - Master/Slave relation is determined by auto-negotiation and this device has a preference for being Slave
- MANUAL_MASTER:
 - Master/Slave relation is determined by manual configuration and this device shall be Master
- MANUAL_SLAVE:
 - Master/Slave relation is determined by manual configuration and this device shall be Slave
- NOT_YET_DEFINED:

13.5.8 RxSyncRoleType

Qualified Name: WireModel::TypeDefinitions::RxSyncRoleType

- Experimental

Contains Enumeration Literals:

- MASTER:
- SLAVE:
- FAULT:
- NOT_YET_DEFINED:

13.5.9 SignalOrderingType

Qualified Name: WireModel::TypeDefinitions::SignalOrderingType

Contains Enumeration Literals:

- MDI:
- MDI_X:
- NOT_YET_DEFINED:

13.5.10 pmdNegotiationStateType

Qualified Name: WireModel::TypeDefinitions::pmdNegotiationStateType

- Experimental

Contains Enumeration Literals:

- NONE:
 - Device does not support auto negotiation
- DISABLED:
 - Auto negotiation is disabled.
- ENABLED:
 - Auto negotiation is enabled, but currently nothing is connected
- IN_PROGRESS:
 - The auto-negotiation protocol is running and negotiation is currently in-progress
- COMPLETE:
 - The auto-negotiation protocol has completed successfully
- FAILED:
 - The auto-negotiation protocol has failed
- NOT_YET_DEFINED:
 - Device supports autonegotiation, but state is currently unknown, e.g. because device just booted

13.6 Super Classes

13.6.1 WireCurrentProblem

Qualified Name: WireModel::ObjectClasses::SuperClasses::WireCurrentProblem

Applied stereotypes:

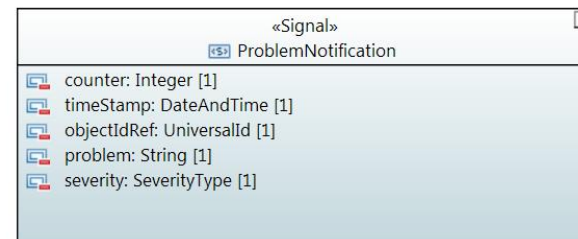
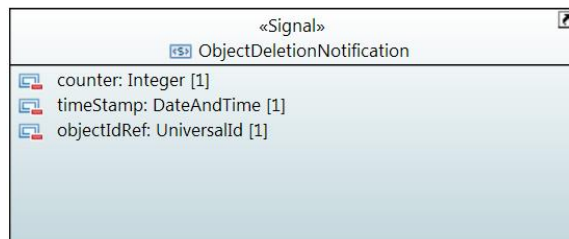
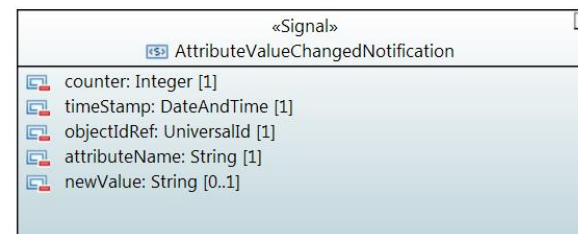
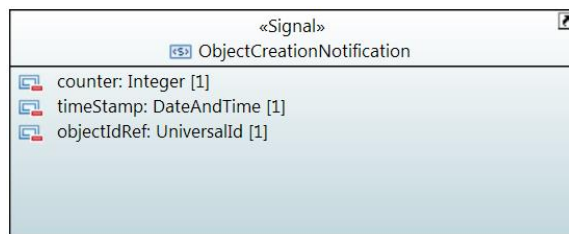
- OpenModelClass
 - objectCreationNotification: NO
 - objectDeletionNotification: NO
 - support: MANDATORY

Table 18: Attributes for WireCurrentProblem

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
sequenceNumber	Integer ./.	1	R	OpenModelAttribute <ul style="list-style-type: none"> • partOfObjectKey: 1 • AVC: NO • isInvariant: true • valueRange: no range constraint • bitLength: NA • unit: no unit defined • support: MANDATORY 	Unique sequence number of the current problem object.
timeStamp	DateAndTime 20101120140000.0Z+1	1	R	OpenModelAttribute <ul style="list-style-type: none"> • partOfObjectKey: 0 • AVC: NO • isInvariant: true • valueRange: no range constraint • bitLength: NA • unit: no unit defined • support: MANDATORY 	Time and date of the problem. _format:yyyyMMddhhmmss.s[Z {+ -}HH Mm]; yyyy='0000'..'9999' year; MM='01'..'12' month; dd='01'..'31' day; hh='00'..'23' hour; mm='00'..'59' minute; ss='00'..'59' second; s='0'..'9'tenth of second (set to '0' if EMS or NE cannot support this granularity); Z='Z' indicates UTC (rather than local time); {+ -}='+' or '-' delta from UTC; HH='00'..'23' time zone difference in hours; Mm='00'..'59' time zone difference in minutes.

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
problemSeverity	SeverityType WARNING	1	R	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	Severity of the alarm.

13.7 Notifications



13.7.1 AttributeValueChangedNotification

Qualified Name: WireModel::Notifications::AttributeValueChangedNotification

To be sent when the value of an attribute has changed.

Applied stereotypes:

- OpenModelNotification
- triggerConditionList: invalid

- support: MANDATORY

Table 19: Attributes for AttributeValueChangedNotification

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
counter	Integer -1	1	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: LENGTH_32_BIT unit: no unit defined support: MANDATORY 	Counts attribute value changed notifications.
timeStamp	DateAndTime 20101120140000.0Z+1	1	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	
objectIdRef	UniversalId ./.	1	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	ID of the affected *_Pac.
attributeName	String Attribute name not specified.	1	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	Name of the attribute that has been changed.

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
newValue	String New value not specified.	0..1	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	Attribute value converted to a string (xml, json, ...)

13.7.2 ObjectCreationNotification

Qualified Name: WireModel::Notifications::ObjectCreationNotification

To be sent when a new *_Pac has been instanciated.

Applied stereotypes:

- OpenModelNotification
 - triggerConditionList: invalid
 - support: MANDATORY

Table 20: Attributes for ObjectCreationNotification

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
counter	Integer -1	1	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: LENGTH_32_BIT unit: no unit defined support: MANDATORY 	Counts object creation notifications.
timeStamp	DateAndTime 20101120140000.0Z+1	1	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
objectIdRef	UniversalId ./.	1	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	ID of the affected *_Pac.
objectType	String Type of created object not specified.	1	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	Type of Object to be chosen from the following list of values: 'WireInterface_Pac', 'MW_PureEthernetStructure_Pac' or 'MW_EthernetContainer_Pac'.

13.7.3 ObjectDeletionNotification

Qualified Name: WireModel::Notifications::ObjectDeletionNotification

To be sent when an instance of a *_Pac has been deleted.

Applied stereotypes:

- OpenModelNotification
 - triggerConditionList: invalid
 - support: MANDATORY

Table 21: Attributes for ObjectDeletionNotification

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
counter	Integer -1	1	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: LENGTH_32_BIT unit: no unit defined support: MANDATORY 	Counts object deletion notifications.

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
timeStamp	DateAndTime 20101120140000.0Z+1	1	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	
objectIdRef	UniversalId ./.	1	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	ID of the affected *_Pac.

13.7.4 ProblemNotification

Qualified Name: WireModel::Notifications::ProblemNotification

To be sent when a problem occurred.

Applied stereotypes:

- OpenModelNotification
 - triggerConditionList: invalid
 - support: MANDATORY

Table 22: Attributes for ProblemNotification

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
counter	Integer -1	1	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: LENGTH_32_BIT unit: no unit defined support: MANDATORY 	Counts problem notifications

Attribute Name	Type DefaultValue	Multiplicity	Access	Stereotypes	Description
timeStamp	DateAndTime 20101120140000.0Z+1	1	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	
objectIdRef	UniversalId ./.	1	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	ID of the affected *_Pac.
problem	String Problem name not specified.	1	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	Name of the problem according to WireInterface::WireInterfaceCapability::supportedAlarmList.
severity	SeverityType WARNING	1	RW	OpenModelAttribute <ul style="list-style-type: none"> partOfObjectKey: 0 AVC: NO isInvariant: true valueRange: no range constraint bitLength: NA unit: no unit defined support: MANDATORY 	Severity of the problem according to WireInterface::wireInterfaceConfiguration::problemSeverityList.

14 References

Reference	Comment
[IEEE802.3]	IEEE 802.3-2018 IEEE Standard for Ethernet, June 2018 (https://standards.ieee.org/standard/802_3-2018.html)
[ONF Core IM]	TR-512 ONF Core Information Model Version 1.2, September 2016 (https://www.opennetworking.org/images/stories/downloads/sdn-resources/technical-reports/TR-512_CIM_(CoreModel)_1.2.zip)
[ONF UMGL]	TR-514 UML Modeling Guidelines; Version 1.2, September 2016 (https://www.opennetworking.org/images/stories/downloads/sdn-resources/technical-reports/TR-514_UML_Modeling_Guidelines_v1.2.pdf and https://www.opennetworking.org/images/stories/downloads/sdn-resources/technical-reports/IISOMI_514_UML_Modeling_Guidelines_v1.2.pdf)

15 Back matter

15.1 Editors

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15.2 Contributors

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