
# Microwave Information Model

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# Table of Contents

**Disclaimer** ..... **2**

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**Table of Contents** ..... **3**

**List of Figures** ..... **7**

**List of Tables** ..... **7**

**Document History** ..... **10**

**1 Introduction** ..... **10**

**2 Definitions** ..... **10**

2.1 Terms ..... 10
2.2 Abbreviations and Acronyms ..... 10

**3 Compliance Statement** ..... **12**

**4 Overview of the Microwave Information Model** ..... **12**

4.1 Coverage ..... 12
4.2 Overview ..... 13

**5 Conventions** ..... **14**

5.1 UML Modeling Conventions ..... 14
5.2 Default Values ..... 15
5.3 Comments ..... 15
5.4 ONF Stereotypes ..... 15
5.4.1 attributeValueChangeNotification ..... 15
5.4.2 objectCreationNotification and objectDeletionNotification ..... 15
5.4.3 isInvariant ..... 16
5.4.4 valueRange ..... 16
5.4.5 partOfObjectKey ..... 16
5.4.6 unit ..... 16
5.4.7 Support Qualifier ..... 17
5.4.8 bitLength ..... 17
5.4.9 Unsigned, Encoding and Counter ..... 17

**6 Special elements** ..... **17**

6.1 Capabilities of the Radio Interface ..... 17
6.2 Multiple Structure Classes ..... 19



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6.3 Problem Definitions, Associations and Inheritances ..... 20
6.4 Performance Values ..... 21
6.5 TDM Containers ..... 22
6.6 TxPower Interpretation ..... 23
6.7 Adaptive Modulation Performance Data Interpretation ..... 23
6.8 Capacity Calculation ..... 24

**7 Attachment to the Core Information Model ..... 25**
7.1 Attachment of the Co-Channel Group Class ..... 28
7.2 Attachment of the HSB Pac ..... 28

**8 Backward Compatibility of this Version ..... 29**

**9 Changes in this Version ..... 30**

**10 Non-Backward Compatibility of the next Version ..... 30**

**11 Future Work ..... 30**

**12 UML Model Files ..... 31**

**13 YANG Model Files ..... 31**

**14 Interface Simulator ..... 31**

**15 Data Dictionary ..... 31**
15.1 AirInterface_Pac and CoChannelGroup ..... 32
15.1.1 MW_AirInterface_Pac ..... 32
15.1.2 AirInterfaceCapability ..... 34
15.1.3 AirInterfaceConfiguration ..... 38
15.1.4 AirInterfaceStatus ..... 47
15.1.5 AirInterfaceCurrentProblems ..... 53
15.1.6 AirInterfaceCurrentPerformance ..... 53
15.1.7 AirInterfaceHistoricalPerformances ..... 54
15.1.8 CoChannelGroup ..... 54
15.2 Structure_Pacs ..... 56
15.2.1 PureEthernetStructure_Pac ..... 56
15.2.1.1 MW_PureEthernetStructure_Pac ..... 56
15.2.1.2 PureEthernetStructureCapability ..... 58
15.2.1.3 PureEthernetStructureConfiguration ..... 59
15.2.1.4 PureEthernetStructureStatus ..... 60
15.2.1.5 PureEthernetStructureCurrentProblems ..... 61
15.2.1.6 PureEthernetStructureCurrentPerformance ..... 62
15.2.1.7 PureEthernetStructureHistoricalPerformances ..... 62


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15.2.2 HybridMwStructure_Pac ..... 64
15.2.2.1 MW_HybridMwStructure_Pac ..... 64
15.2.2.2 HybridMwStructureCapability ..... 66
15.2.2.3 HybridMwStructureConfiguration ..... 68
15.2.2.4 HybridMwStructureStatus ..... 69
15.2.2.5 HybridMwStructureCurrentProblems ..... 70
15.2.2.6 HybridMwStructureCurrentPerformance ..... 71
15.2.2.7 HybridMwStructureHistoricalPerformances ..... 71
15.3 Container_Pacs ..... 73
15.3.1 EthernetContainer_Pac ..... 73
15.3.1.1 MW_EthernetContainer_Pac ..... 73
15.3.1.2 EthernetContainerCapability ..... 75
15.3.1.3 EthernetContainerConfiguration ..... 78
15.3.1.4 EthernetContainerStatus ..... 81
15.3.1.5 EthernetContainerCurrentProblems ..... 82
15.3.1.6 EthernetContainerCurrentPerformance ..... 83
15.3.1.7 EthernetContainerHistoricalPerformances ..... 83
**15.3.2 TdmContainer_Pac** ..... 85
**15.3.2.1 MW_TdmContainer_Pac** ..... 85
**15.3.2.2 TdmContainerCapability** ..... 87
**15.3.2.3 TdmContainerConfiguration** ..... 88
**15.3.2.4 TdmContainerStatus** ..... 90
**15.3.2.5 TdmContainerCurrentProblems** ..... 90
**15.3.2.6 TdmContainerCurrentPerformance** ..... 91
**15.3.2.7 TdmContainerHistoricalPerformances** ..... 92
15.4 AirInterfaceHsb ..... 93
15.4.1 MW_AirInterfaceHsbFcSwitch_Pac ..... 93
15.4.2 MW_AirInterfaceHsbEndPoint_Pac ..... 95
15.5 AirInterfaceDiversity_Pac ..... 96
15.5.1 MW_AirInterfaceDiversity_Pac ..... 96
15.5.2 AirInterfaceDiversityCapability ..... 98
15.5.3 AirInterfaceDiversityConfiguration ..... 99
15.5.4 AirInterfaceDiversityStatus ..... 101
15.5.5 AirInterfaceDiversityCurrentProblems ..... 102
15.5.6 AirInterfaceDiversityCurrentPerformance ..... 102
15.5.7 AirInterfaceDiversityHistoricalPerformances ..... 103
15.6 Data Types ..... 104
15.6.1 ChannelPlanType ..... 104
15.6.2 TransmissionModeType ..... 105
15.6.3 AirInterfaceProblemSeverityType ..... 108


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15.6.4 AirInterfaceCurrentProblemType ..... 109
15.6.5 AirInterfacePerformanceType ..... 109
15.6.6 AirInterfaceCurrentPerformanceType ..... 119
15.6.7 AirInterfaceHistoricalPerformanceType ..... 119
15.6.8 DiversityType ..... 120
15.6.9 AirInterfaceDiversityProblemSeverityType ..... 120
15.6.10 AirInterfaceDiversityCurrentProblemType ..... 121
15.6.11 AirInterfaceDiversityPerformanceType ..... 121
15.6.12 AirInterfaceDiversityCurrentPerformanceType ..... 122
15.6.13 AirInterfaceDiversityHistoricalPerformanceType ..... 123
15.6.14 TdmStructureType ..... 123
15.6.15 StructureProblemSeverityType ..... 124
15.6.16 StructureCurrentProblemType ..... 125
15.6.17 StructurePerformanceType ..... 125
15.6.18 StructureCurrentPerformanceType ..... 128
15.6.19 StructureHistoricalPerformanceType ..... 129
15.6.20 TdmContainerType ..... 129
15.6.21 SegmentIDType ..... 130
15.6.22 SegmentStatusType ..... 131
15.6.23 ContainerProblemSeverityType ..... 132
15.6.24 ContainerCurrentProblemType ..... 132
15.6.25 ContainerPerformanceType ..... 133
15.6.26 ContainerCurrentPerformanceType ..... 134
15.6.27 ContainerHistoricalPerformanceType ..... 134
15.6.28 ThresholdCrossAlarmType ..... 135
15.6.29 TimeXStatesType ..... 136
15.7 Enumeration Types ..... 137
15.7.1 LoopBackType ..... 137
15.7.2 SeverityType ..... 138
15.7.3 PolarizationType ..... 138
15.7.4 ProtectionType ..... 139
15.7.5 RoleType ..... 139
15.7.6 AirInterfaceDiversityStatusType ..... 139
15.7.7 GranularityPeriodType ..... 139
15.7.8 G826Type ..... 140
15.8 Super Classes ..... 140
15.8.1 MwCurrentProblem ..... 140
15.9 Notifications ..... 142
15.9.1 AttributeValueChangedNotification ..... 142
15.9.2 ObjectCreationNotification ..... 143
15.9.3 ObjectDeletionNotification ..... 145
15.9.4 ProblemNotification ..... 146

**16 Translation Table Functional Model ..... 148**


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**17 References ..... 148**

**18 Back matter ..... 148**

18.1 Editors ..... 148

18.2 Contributors ..... 149

# List of Figures

Figure 1: Model Overview ..... 13

Figure 2: Exemplary Structure of *_Pacs ..... 14

Figure 3: Tree Structure of AirInterface Capabilities ..... 19

Figure 4: Example for Current Problems Associations and Inheritances ..... 20

Figure 5: Example for Current Problems Definition ..... 21

Figure 6: Example for Performance Associations and Inheritances ..... 22

Figure 7: TDM Container Capabilities ..... 23

Figure 8: TDM Container Configuration ..... 23

Figure 9: Usage of ONF Core Information Model 1.2 ..... 26

Figure 10: Associations between LayerProtocol and *_Pac ..... 28

Figure 11: Associations between CoChannelGroup and LTP ..... 28

Figure 12: HSB is covered by the ForwardingConstruct of the Core Information Model ..... 29

# List of Tables

Table 1: Examples for supportedChannelPlan values ..... 18

Table 2: Attributes for MW_AirInterface_Pac ..... 33

Table 3: Attributes for AirInterfaceCapability ..... 34

Table 4: Attributes for AirInterfaceConfiguration ..... 38

Table 5: Attributes for AirInterfaceStatus ..... 47

Table 6: Attributes for AirInterfaceCurrentProblems ..... 53

Table 7: Attributes for AirInterfaceCurrentPerformance ..... 53

Table 8: Attributes for AirInterfaceHistoricalPerformances ..... 54

Table 9: Attributes for CoChannelGroup ..... 55

Table 10: Attributes for MW_PureEthernetStructure_Pac ..... 57

Table 11: Attributes for PureEthernetStructureCapability ..... 58


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Table 12: Attributes for PureEthernetStructureConfiguration ..... 59
Table 13: Attributes for PureEthernetStructureStatus ..... 60
Table 14: Attributes for PureEthernetStructureCurrentProblems ..... 61
Table 15: Attributes for PureEthernetStructureCurrentPerformance ..... 62
Table 16: Attributes for PureEthernetStructureHistoricalPerformances ..... 63
Table 17: Attributes for MW_HybridMwStructure_Pac ..... 65
Table 18: Attributes for HybridMwStructureCapability ..... 67
Table 19: Attributes for HybridMwStructureConfiguration ..... 68
Table 20: Attributes for HybridMwStructureStatus ..... 69
Table 21: Attributes for HybridMwStructureCurrentProblems ..... 70
Table 22: Attributes for HybridMwStructureCurrentPerformance ..... 71
Table 23: Attributes for HybridMwStructureHistoricalPerformances ..... 72
Table 24: Attributes for MW_EthernetContainer_Pac ..... 74
Table 25: Attributes for EthernetContainerCapability ..... 75
Table 26: Attributes for EthernetContainerConfiguration ..... 78
Table 27: Attributes for EthernetContainerStatus ..... 82
Table 28: Attributes for EthernetContainerCurrentProblems ..... 82
Table 29: Attributes for EthernetContainerCurrentPerformance ..... 83
Table 30: Attributes for EthernetContainerHistoricalPerformances ..... 84
Table 31: Attributes for MW_TdmContainer_Pac ..... 86
Table 32: Attributes for TdmContainerCapability ..... 88
Table 33: Attributes for TdmContainerConfiguration ..... 89
Table 34: Attributes for TdmContainerStatus ..... 90
Table 35: Attributes for TdmContainerCurrentProblems ..... 91
Table 36: Attributes for TdmContainerCurrentPerformance ..... 91
Table 37: Attributes for TdmContainerHistoricalPerformances ..... 92
Table 39: Attributes for MW_AirInterfaceHsbFcSwitch_Pac ..... 93
Table 38: Attributes for MW_AirInterfaceHsbEndPoint_Pac ..... 95
Table 40: Attributes for MW_AirInterfaceDiversity_Pac ..... 97
Table 41: Attributes for AirInterfaceDiversityCapability ..... 98
Table 42: Attributes for AirInterfaceDiversityConfiguration ..... 100
Table 43: Attributes for AirInterfaceDiversityStatus ..... 101
Table 44: Attributes for AirInterfaceDiversityCurrentProblems ..... 102


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Table 45: Attributes for AirInterfaceDiversityCurrentPerformance ..... 103
Table 46: Attributes for AirInterfaceDiversityHistoricalPerformances ..... 103
Table 47: Attributes for ChannelPlanType ..... 104
Table 48: Attributes for TransmissionModeType ..... 106
Table 49: Attributes for AirInterfaceProblemSeverityType ..... 108
Table 50: Attributes for AirInterfaceCurrentProblemType ..... 109
Table 51: Attributes for AirInterfacePerformanceType ..... 110
Table 52: Attributes for AirInterfaceCurrentPerformanceType ..... 119
Table 53: Attributes for AirInterfaceHistoricalPerformanceType ..... 120
Table 54: Attributes for DiversityType ..... 120
Table 55: Attributes for AirInterfaceDiversityProblemSeverityType ..... 121
Table 56: Attributes for AirInterfaceDiversityCurrentProblemType ..... 121
Table 57: Attributes for AirInterfaceDiversityPerformanceType ..... 122
Table 58: Attributes for AirInterfaceDiversityCurrentPerformanceType ..... 122
Table 59: Attributes for AirInterfaceDiversityHistoricalPerformanceType ..... 123
Table 60: Attributes for TdmStructureType ..... 123
Table 61: Attributes for StructureProblemSeverityType ..... 124
Table 62: Attributes for StructureCurrentProblemType ..... 125
Table 63: Attributes for StructurePerformanceType ..... 125
Table 64: Attributes for StructureCurrentPerformanceType ..... 128
Table 65: Attributes for StructureHistoricalPerformanceType ..... 129
Table 66: Attributes for TdmContainerType ..... 129
Table 67: Attributes for SegmentIDType ..... 130
Table 68: Attributes for SegmentStatusType ..... 131
Table 69: Attributes for ContainerProblemSeverityType ..... 132
Table 70: Attributes for ContainerCurrentProblemType ..... 132
Table 71: Attributes for ContainerPerformanceType ..... 133
Table 72: Attributes for ContainerCurrentPerformanceType ..... 134
Table 73: Attributes for ContainerHistoricalPerformanceType ..... 135
Table 74: Attributes for ThresholdCrossAlarmType ..... 135
Table 75: Attributes for TimeXStatesType ..... 137
Table 76: Attributes for MwCurrentProblem ..... 140
Table 77: Attributes for AttributeValueChangedNotification ..... 142


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Table 78: Attributes for ObjectCreationNotification ..... 144

Table 79: Attributes for ObjectDeletionNotification ..... 145

Table 80: Attributes for ProblemNotification ..... 146

## Document History

| Version | Date | Description of Change |
|---|---|---|
| 0.1 | 2016-07-08 | Initial version of the Microwave Information Model as technology specific extension to the TR-512 ONF Core Information Model 1.1 [ONF CM] |
| 0.2 | 2016-18-11 | Consolidating review comments and findings of the 3rd MW PoC. Version for ONF-wide review. |
| 1.0 | 2016-15-12 | Consolidating comments of the ONF-wide review and finalizing for approval by ONF Tech Council. Version for official publishing. |
| 1.1.0-1 | 2019-02-15 | Consolidating all improvements discussed in the wireless transport project since publishing version 1.0, incorporating the information and data models of the 5th ONF PoC, provided for review on project level. |
| 1.1.0-2 | 2019-03-04 | Consolidating all feedback from review on project level, provided for review on working group level. |
| 1.1.0 | 2019-03-20 | Finalized and published |

# 1 Introduction

This ONF Technical Recommendation (TR) is a technology specific extension to the TR-512 ONF Core Information Model 1.2 [ONF CM]. In accordance with the SDN architecture for wireless transport networks [ONF SDN Arch WL], this management-control is expected to be achieved by wireless devices and SDN applications within or on top of an SDN Controller.

The provided version 1.1 consolidates a couple of improvements that have been implemented in a backward compatible manner.

# 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 of this document and of the TR-512 ONF Core Information Model 1.2 [ONF CM] by referring to the section in this document where the term is defined.

## 2.2 Abbreviations and Acronyms

| Term | Explanation |
|---|---|
| ALIC | Adjacent Link Interference Cancelation |


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| Term | Explanation |
|---|---|
| ATPC | Automatic Transmit Power Control |
| CEPT | European Conference of Postal and Telecommunications Administrations |
| CPRI | Common Public Radio Interface |
| CTP | Connection Termination Point |
| Cur | Current |
| DCN | Data Communication Network |
| E1 | TDM frame containing 30 digital voice channels |
| ERC | European Research Council |
| FDD | Frequency Division Duplexer |
| Hsb | Hot stand-by |
| ID | Identifier |
| Int | Integer |
| LTP | Logical Termination Point |
| MIMO | Multiple Input Multiple Output Transmission |
| MW | Point-to-point microwave, including millimeter wave |
| MWPS | Microwave Physical Section |
| MWS | Microwave Section |
| NGFI | Next Generation Fronthaul Interface |
| *_Pac | Technology Specific Conditional Package |
| PDH | Plesiochronous Digital Hierarchy |
| PmP | Point-to-multipoint |
| REC | Recommendation |
| Ref | Reference |
| Rx | Receive |
| SDH | Synchronous Digital Hierarchy |
| SDN | Software Defined Network |
| SNCP | Sub-Network Connection Protection |
| TDD | Time-Division Duplexer |
| TDM | Time-Division Multiplexing |
| TTP | Trail Termination Point |
| TR | ONF Technical Recommendation |
| tx | Transmit |
| UUID | Universally Unique Identifier |


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| Term | Explanation |
|---|---|
| XPIC | Cross Polarization Interference Cancelation |

# 3 Compliance Statement

**Completeness**

A device's interface must not be denoted as compliant to this Microwave 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 Microwave Information Model, must be manageable with this model (to the extent of the comprised attributes).

**Options**

This Microwave Information Model offers two alternative modeling of the logical structuring of the physical resource provided by the radio link. The device's interface must at least implement the alternative, which is specific to its device type (e.g. pure Ethernet, Ethernet+TDM Hybrid).

**Proprietary Extensions**

Interfaces implementing elements of this Microwave 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 Microwave Information Model

## 4.1 Coverage

The Microwave Information Model covers the following aspects:

- The radio link with its analogue characteristics like center frequency, channel bandwidth, modulation etc.
- Grouping of radio links into diversity or protection configurations
- Segmentation of the transport resources provided by a radio link
- Allocation of higher layer traffic flows (e.g. Ethernet, E1, CPRI) on these segments
- Bundling of several radio links' resources for Ethernet transport
- Header compression on the transmission path

It does not cover e.g. synchronization, user management, DCN, TDM multiplexing or Ethernet.

The Microwave 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


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## 4.2 Overview

The Microwave Information Model comprises the following three most important elements:

- AirInterface_Pac – Contains the analogue characteristics of the physical layer of a single radio link; represents the combination of modem and radio
- Structure_Pac – Segments the physical resource provided by the AirInterface into logical pieces that can be booked by Containers
- Container_Pac – Offers transport services to higher protocol layers, e.g. fixed size containers for TDM or containers of dynamic size for Ethernet

The following three additional elements are required for modeling microwave features based on bundling of radio links into specific types of groups:

- AirInterfaceHsb – Provides hot-stand-by protection
- AirInterfaceDiversity_Pac – Required for space and frequency diversity
- CoChannelGroup – Groups AirInterface_Pacs for modeling XPIC, MIMO and ALIC

The following picture shall help understanding the logical concept, but it has to be noted that the associations between the *_Pacs are implemented in a more complex way, which is described in chapter 7 Attachment to the Core Information Model.

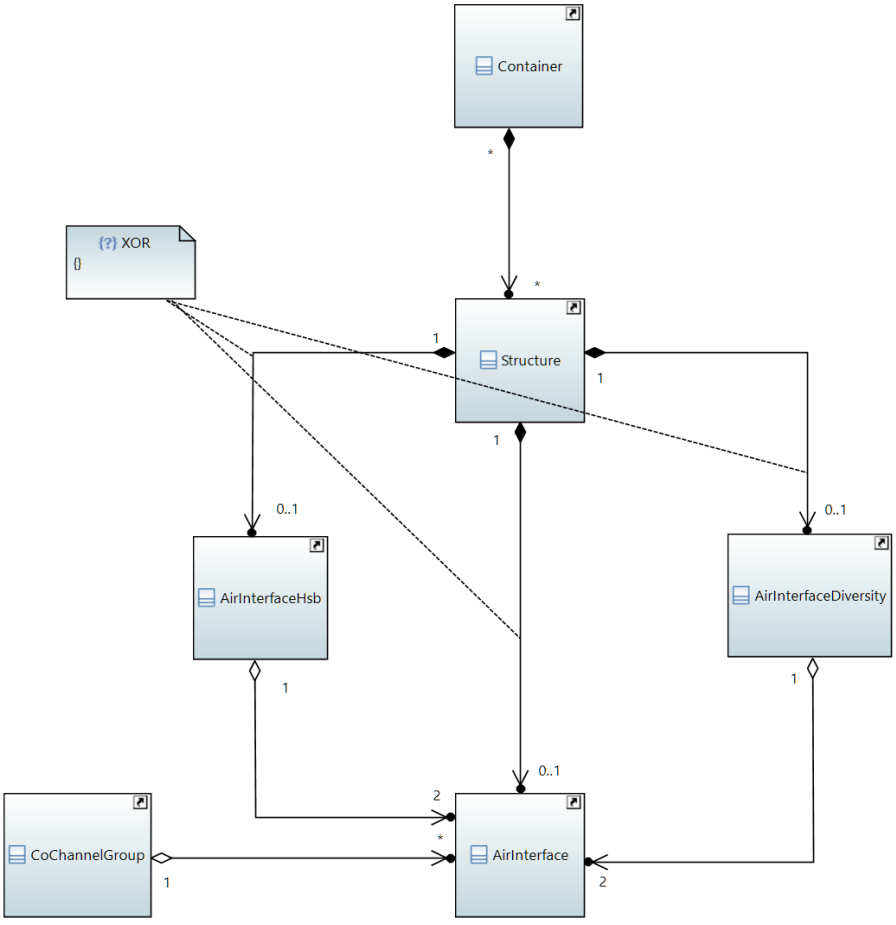


**Figure 1: Model Overview**


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All *_Pacs are sub-structured into the following classes:

- Capabilities – The device informs about its features, characteristics and parameter value 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 informs about the problems currently active at the device
- Current Performance – The device informs about the current values of its performance counters
- Historical Performance – The device informs about the values of its performance counters at the end of a well-defined time period

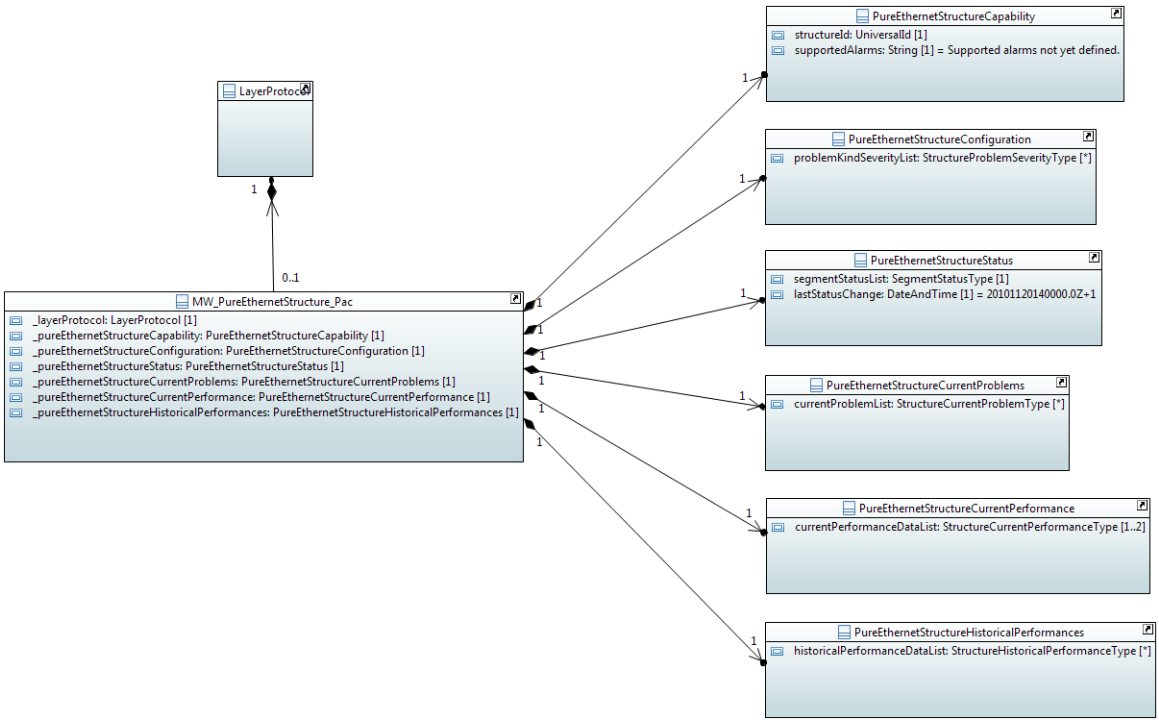


**Figure 2: Exemplary Structure of *_Pacs**

Each *_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 interface implementation after conversion to YANG.

# 5 Conventions

## 5.1 UML Modeling Conventions

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


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## 5.2 Default Values

The default values in the Microwave 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 just be empty as a default.

## 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 Attachment to the Core Information Model for details).


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### 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 Microwave 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 Microwave 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 Microwave Information Model

| **Unit** | **Meaning** |
|---|---|
| % | Percentage |
| Bytes | Total number of Bytes |
| Bytes/min | Bytes per minute |
| Bytes/s | Bytes per second |


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| Unit | Meaning |
|---|---|
| Celsius | Degree Celsius |
| dB | Decibel |
| dBm | Decibel milliwatt |
| kbit/s | 1000 bit per second |
| kHz | 1000 Hertz |
| s | Second |
| symbols | Number of symbols |

### 5.4.7 Support Qualifier

This stereotype qualifies the support of the object class at the management interface.

Aside the following exceptions, the SupportQualifier has always been left on its default value "mandatory":

- The MW_PureEthernetStructure_Pac class is "conditional_mandatory" for device types transporting pure Ethernet.
- The MW_HybridMwStructure_Pac class is "conditional_mandatory" for device types transporting Ethernet + TDM.

### 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 Capabilities of the Radio Interface

The value ranges of the devices' parameters, which are for configuring the analogue characteristics of the physical layer, are depending from each other.

Example 1: The availability of XPIC depends (in some cases) on the channel bandwidth, which depends on the center frequency.

Example 2: The maximum and minimum configurable transmit power are depending on the adjusted modulation scheme.

The number of permutations of value ranges can reach the area of several thousand depending on the number of center frequencies, channel bandwidths and modulation schemes adjustable at the device.

To limit the volume of capability information, it has been decided not to describe the radio characteristics for each and every explicit center frequency, but to reference on an external description of the allowed center frequencies and to describe the transmission modes, which are adjustable based on this channel plan.

Example: ECC/REC/(01) 04 Annex 5 is describing 7MHz, 14MHz, 28MHz, 56MHz, 112MHz and 224MHz channels. In case a device would not support 224MHz channels, the list of supported transmission modes shall just not contain any element with a channel bandwidth of 224MHz.


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The supportedChannelPlan attribute is used for unambiguously referencing a single channel plan description. The following list shows a couple of non-binding examples for official documents, which are relevant for Europe.

**Table 1: Examples for supportedChannelPlan values**

| supportedChannelPlan | Frequency Band | Comment |
|---|---|---|
| ECC/REC/(04)05 | 3.4-3.6GHz | |
| ECC/REC/(04)05 | 3.6-3.8GHz | |
| ERC/REC14-01 | 5.925-6.425GHz | |
| CEPT/ERC/REC 12-05E_Annex_A | 10.0-10.68GHz | 1,75-28MHz |
| CEPT/ERC/REC 12-05E_Annex_B | 10.0-10.68GHz | 56MHz |
| CEPT/ERC/REC12-02E_Annex_A | 12.75-13.25GHz | 1,75-28MHz |
| CEPT/ERC/REC12-02E_Annex_B | 12.75-13.25GHz | 56MHz |
| CEPT/ERC/REC12-07E_Annex_A | 14.5-15.35GHz | |
| CEPT/ERC/REC12-03E | 17.7-19.7GHz | |
| T/R13-02 | 22.0-29.5GHz | |
| T/R13-02_Annex_A1 | 22.0-22.6GHz | |
| T/R13-02_Annex_A1 | 23.0-23.6GHz | |
| T/R13-02_Annex_A2 | 22.59075-22.75875GHz | |
| T/R13-02_Annex_A2 | 22.84275-23.01075GHz | |
| T/R13-02_Annex_A3 | 22.75875-22.84275GHz | |
| T/R13-02_Annex_B | 24.5-26.5GHz | |
| T/R13-02_Annex_C | 27.5-29.5GHz | |
| ECC/REC/(02)02 | 31.0-31.3GHz | |
| ERC/REC/(01)02_Annex_B | 31.8-33.4GHz | FDD |
| T/R12-01E | 37.0-39.5GHz | |
| ECC/REC/(01)04_Annex_2 | 40.5-43.5GHz | Block |
| ECC/REC/(01)04_Annex_5 | 40.5-43.5GHz | Channels |
| ERC/REC12-11_Annex_2 | 48.5-50.2GHz | |
| ERC/REC12-11_Annex_1 | 51.4-52.6GHz | |
| ERC/REC12-12_Annex_2 | 55.78-57.0GHz | FDD |
| ECC/REC/(09)01 | 57-64GHz | |
| ECC/REC/(05)02 | 64-66GHz | |
| ECC/REC/(05)07_Annex_1 | 71-76GHz | |
| ECC/REC/(05)07_Annex_2 | 81-86GHz | |
| ECC/REC/(14)01_Annex_2 | 92-95GHz | FDD |

For handling the dependencies, the description of the capabilities of the radio interface has been organized in three layers:

- The Capability class, which is common to all *_Pacs, contains several characteristics that are specific to the combination of modem and radio, but applicable to all modes the radio link could operate. Further on, it contains a list of supported channel plans.
- The ChannelPlanType data type mainly contains the supportedChannelPlan attribute, which is a String containing the name of a channel plan description, and a list of transmission modes, which can be operated on the referenced channel plan.
- The TransmissionModeType data type contains the attributes required to describe the analogue characteristics of the radio link.


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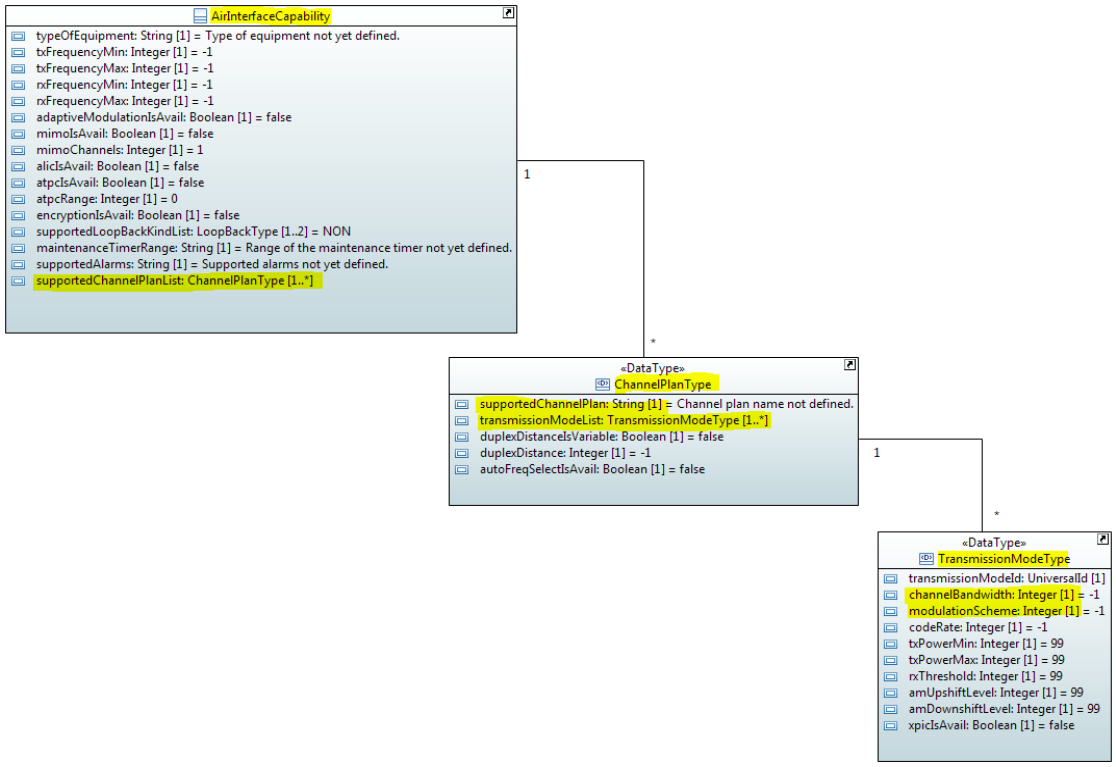


**Figure 3: Tree Structure of AirInterface Capabilities**

The attributes of the Capability class and its associated data types are expressing the capabilities of the hardware type. This applies also to the xpicIsAvail attribute, which is contained in the TransmissionModeType data type and does not give any information about the operational capability of the individual installation on site.

## 6.2 Multiple Structure Classes

The Microwave Information Model supports allocating traffic flows on the physical resources of the radio interface. The allocation is modeled by associating *Container classes with sub-segments provided by the *Structure classes.

The methods of sub-segmenting and allocating depend on the implementation of the wireless transport device (e.g. time division duplex vs. frequency division duplex, point-to-point vs. shared medium).

Due to the very basic differences of these methods and the ways of modeling them, the Microwave Information Model offers several Structure_Pacs that must be alternatively applied depending on the devices type (see also chapter 3).

The current version of the modeling offers Structure_Pacs for point-to-point links, which are implementing frequency division duplex and are distinguishing Pure Ethernet and Hybrid microwave links.

- The PureEthernetStructure_Pac offers a single segment, which might vary in size, if adaptive modulation is activated. One or several (only in case the value of the EthernetContainerCapability: bundlingIsAvail attribute is set on "1") of those segments can be linked to an EthernetContainer_Pac.
- The HybridMwStructure_Pac provides multiple TDM segments, which are of fixed size, and an additional segment for Ethernet that is of variable size. There is a one to one relation between TdmContainer_Pac and TDM segment. The Ethernet segment behaves equally to the one provided by the PureEthernetStructure_Pac.


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Besides allowing definition of much simpler *Structure classes, this way of modeling is also seen to be more flexible in regards to future expansions.

## 6.3 Problem Definitions, Associations and Inheritances

As already stated in chapter 4.2, the multiplicity of the associations between *_Pac and *CurrentProblems classes are always one and *CurrentProblems classes contain a list of *CurrentProblemType data type.

Problem statements, respectively alarms contain generic attributes. Usually, generic attributes are consolidated in classes belonging to the Core Information Model and are inherited from these classes.

Since no such super class is available in the applied version of the Core Information Model, an individual super class has been defined as a preliminary substitute.

So the *CurrentProblemType data types contain a problemName attribute. problemSeverity, sequenceNumber and timestamp attributes are inherited from the generic MwCurrentProblem super class.

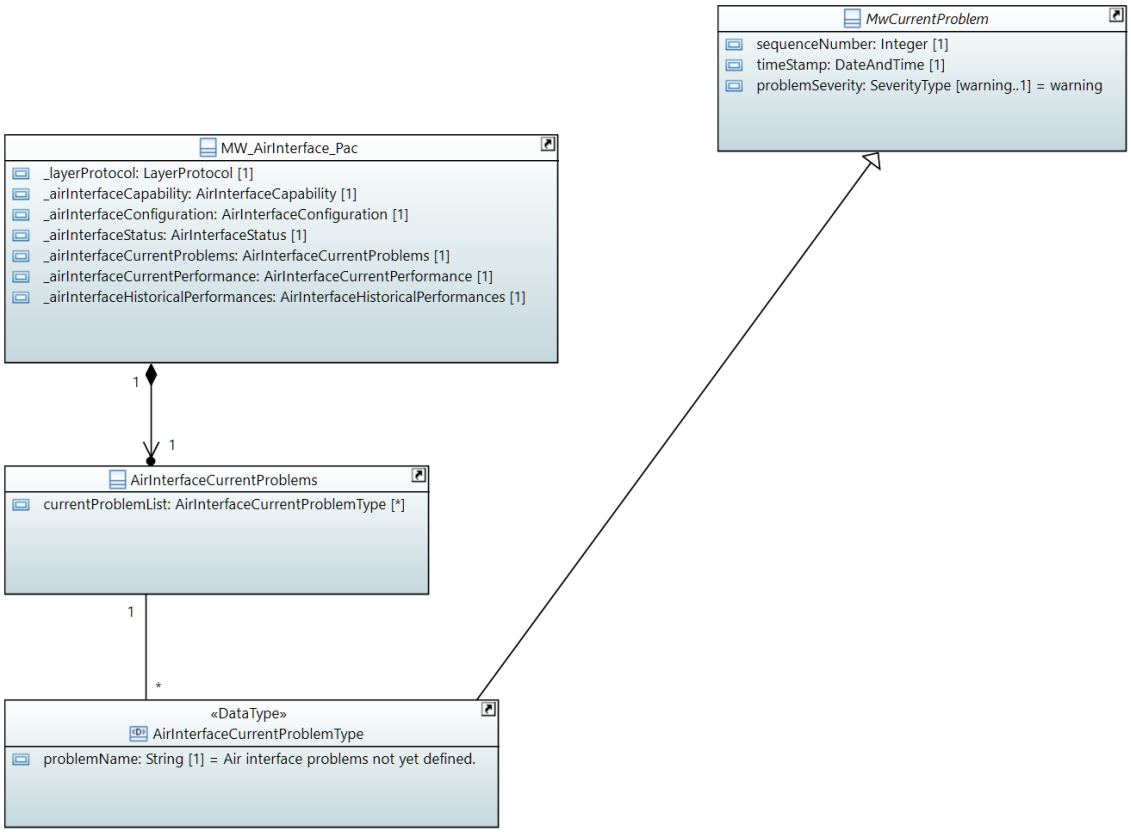


**Figure 4: Example for Current Problems Associations and Inheritances**

The problemName attributes are just seemingly identical in all *CurrentProblemType data types. The problemName attributes cannot be inherited from the MwCurrentProblem super class, because corresponding supportedAlarms attributes in *Capability classes are referenced in their respective comment fields.

The severity of a kind of problem shall be configurable. A problemKindSeverityList attribute is added to each of the *Configuration classes for that purpose. The severity defined in *ProblemSeverityType data types shall then be applied to all instances of the *CurrentProblemType data type comprising the same problem name.


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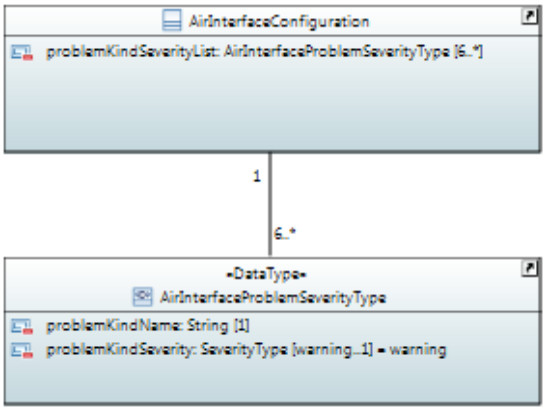


**Figure 5: Example for Current Problems Definition**

The multiplicity of the association towards the *ProblemSeverityType data type is determined by the number of problem types specified in the corresponding supportedAlarms attribute in the *Capability class. The number of problem types, which are prescribed in the comment field of the corresponding supportedAlarms attribute is always given as the minimum multiplicity.

## 6.4 Performance Values

As already stated in chapter 4.2, the multiplicities of the associations between *_Pac and *CurrentPerformance respectively *HistoricalPerformances classes are always one and *CurrentPerformance respectively *HistoricalPerformances classes contain a *CurrentPerformanceType respectively *HistoricalPerformanceType data type list.

Technology specific performance value attributes have been put into *PerformanceType data types for being able of referencing them as current performance values as well as historical performance values. Generic performance value attributes are inherited from super classes provided by the Core Information Model and a modeling of ITU-T G874.1.


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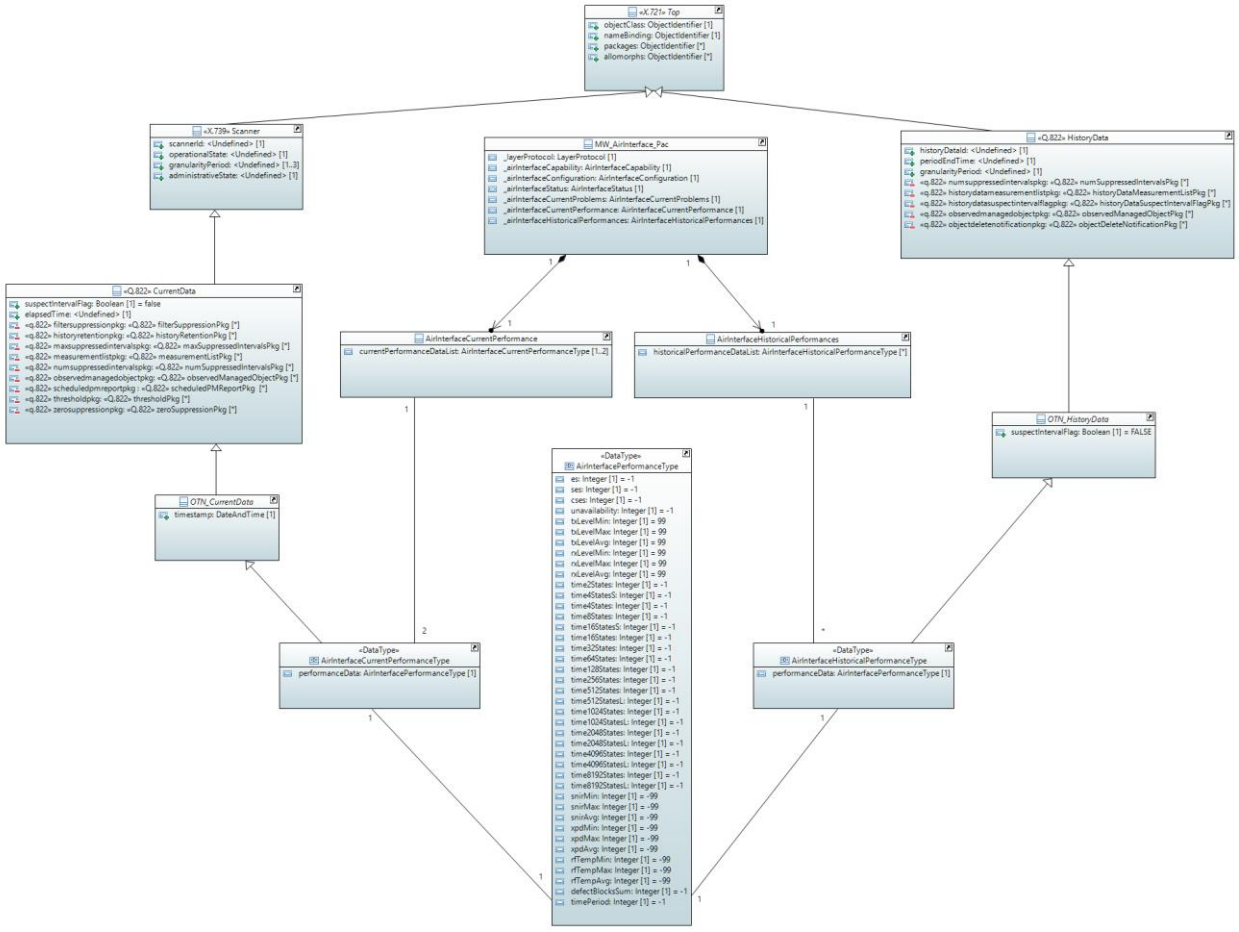


**Figure 6: Example for Performance Associations and Inheritances**

The isInvariant stereotype of the attributes, which are contained in the *PerformanceType data types, are set on 'true'. This applies also on the current performance values. As a consequence, current performance values have to be readout as a complete, new instance of the *PerformanceType data type. This matches also with the inherited timestamp attribute.

The *PerformanceType data types also inherit a granularityPeriod attribute. Since there is no filtering of 15min or 24h performance values at the device or mediator, data for both granularity periods is uploaded and has to be sorted based on this attribute on application level.

## 6.5 TDM Containers

The Microwave Information Model basically allows transporting any kinds of TDM signals. This is possible, because neither TDM containers nor TDM segments are fixedly predefined in the modeling.

Instead the Capability class of the TdmContainer_Pac is associated with a list of TdmContainerType data types. Name and bandwidth consumption of container types can be defined within the TdmContainerType data type. Prescriptions for names and sizes are made within the comments at the corresponding attributes.


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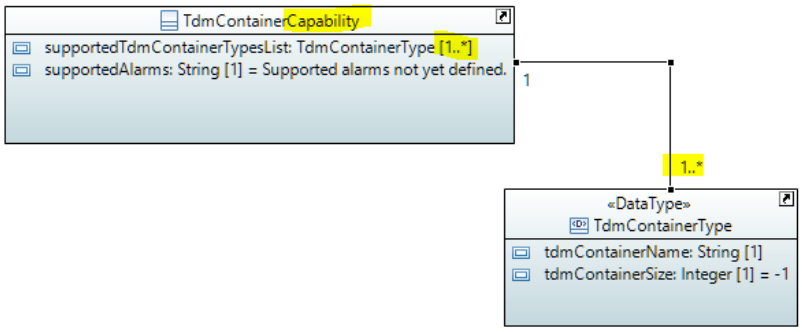


**Figure 7: TDM Container Capabilities**

The actual type of an instance of a TDM container can then be chosen from the defined types.

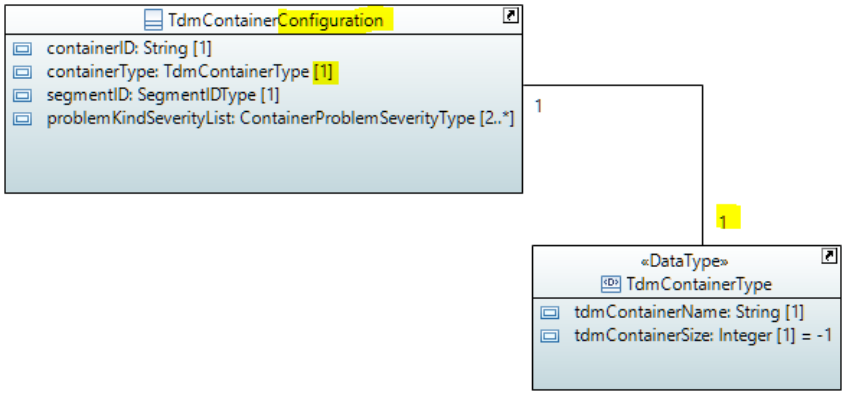


**Figure 8: TDM Container Configuration**

The modeling of the HybridMwStructure class is very similar. Obviously, bandwidth consumption of the container (tdmContainerSize attribute in TdmContainerType data type) and size of the transport resource (tdmSegmentSize attribute in TdmStructureType data type) have to have the same value for successful allocation.

## 6.6 TxPower Interpretation

AirInterface::AirInterfaceConfiguration::txPower shall be interpreted as a maximum value. Independently from any adaptive modulation or automated transmit power control (ATPC) configuration, the actually operated transmit power shall never exceed this value.

While adaptive Modulation is increasing the operated modulation scheme, the transmit power, which is available as a maximum at the device, is declining. In case the transmit power, which is available as a maximum at the device, is falling below the configured txPower, the device shall operate at the maximum possible transmit power.

The validation process of the Netconf server inside the device shall accept an adaptive modulation configuration, if the txPower value is lower or equal to the maximum possible transmit power in at least one of the modulation schemes, which are included in the chosen modulation range.

## 6.7 Adaptive Modulation Performance Data Interpretation

Modeling of the performance values in regards with adaptive modulation has changed with TR-532v1.1. The former explicit listing of combinations of modulation and coding schemes has been found to be too inflexible and has been marked deprecated.


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A new data type (TimeXStatesType) is combining the definition of a transmission mode from the capabilities segment of the model with an Integer describing the length of the time period, in which this transmission mode had been operated. And the performance data holds a list of this data type.

This modeling is much more flexible, because it does not outdate when vendors offer new combinations of modulation and coding scheme at their devices, but it has also some ambiguity to be ruled.

The number of the transmission modes, which is determined by all available combinations of channelBandwidth, modulationScheme, codeRate and symbolRateReductionFactor is assumed to usually exceed the number of TimeXStates, which is determined by the number of combinations of available performance values.

Example: In case a device does not collect performance data about the operated channelBandwidth it cannot differentiate corresponding TimeXStates. It is not clear, to which transmission mode some operation time period has to be associated, because the operated channelBandwidth has not been documented.

The following prescription is made to overcome this ambiguity:

The transmission mode, which is to be referenced in an instance of the TimeXStatesType data type, shall be chosen at first from the available performance data and after that still undefined channelBandwidth, modulationScheme, codeRate or symbolRateReductionFactor shall be chosen according to their status value at the end of the measurement period.

(txPowerMin, txPowerMax, rxThreshold, amUpshiftLevel, amDownshiftLevel and xpicIsAvail are determined by the combination of channelBandwidth, modulationScheme, codeRate and symbolRateReductionFactor, but do not contribute to the total number of different transmission modes.)

## 6.8 Capacity Calculation

The Microwave Information Model intentionally does not contain any attribute expressing a capacity. This is because interpretation of such value is differing a lot and misinterpretation is easily leading to errors of up to 20%.

Instead it is recommended that the operator defines its own way of calculating capacities and applies this method on all kinds of media, including microwave. The Microwave Information Model comprises all necessary data for such calculation, even about packet compression, if wished to be regarded.

In case some operator or application provider would require some starting point for own considerations, the following proposal might be helpful.

Air interface capacity =

(channel bandwidth of the currently operated transmission mode)

/ (symbol rate reduction factor of the currently operated transmission mode)

* log2(number of states in the modulation scheme of the currently operated transmission mode)

* (code rate of the currently operated transmission mode)

/ 1.15

The symbol rate reduction factor is expressing a reduced symbol rate like 4 for ¼ BPSK or 2 for ½ BPSK. The code rate is to be calculated as the ratio of number of symbols carrying payload information to number of transmitted symbols, while the number of symbols carrying payload information equals the number of transmitted symbols - (number of symbols carrying overhead information + number of redundant symbols for forward error correction).


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# 7 Attachment to the Core Information Model

The Core Information Model is the basis of the Microwave Information Model. However not all object classes of the Core Information Model are necessary for a control interface between microwave devices and SDN Controller. For example the root element of the Microwave 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 Microwave Information Model:

- SdnController
- NetworkControlDomain
- Link
- LinkPort
- FcRoute

Figure 9 highlights the classes of the Core Information Model, which are part of the Microwave Information Model.


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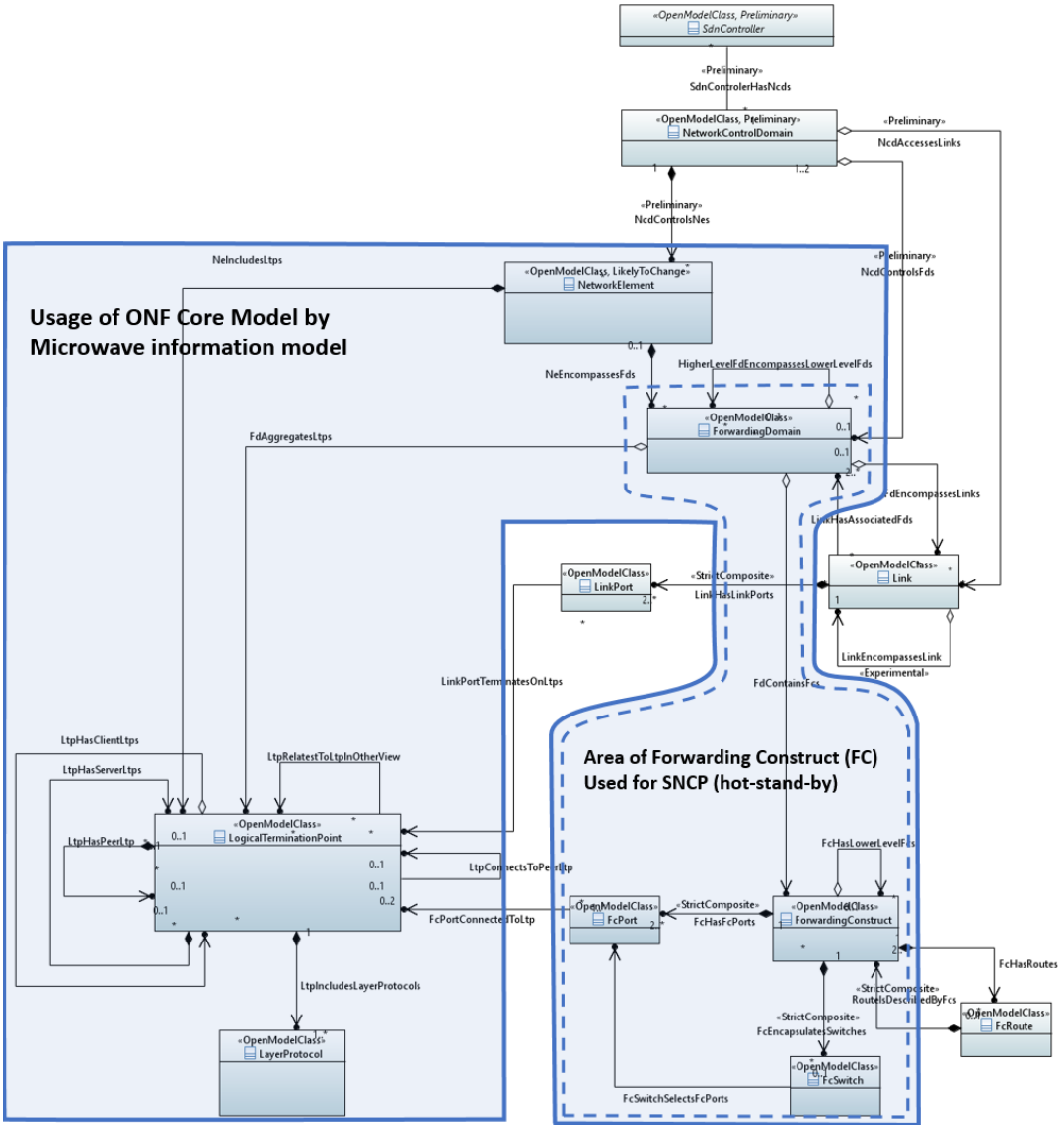


**Figure 9: Usage of ONF Core Information Model 1.2**

The LogicalTerminationPoints (LTP) is the most important class. Its associations allow complex hierarchies of LTPs. A LayerProtocol class provides content to the generic LTP class and describes its function.

The following layerProtocolName values have to be applied:

| **layerProtocolName** | **Type of *_Pac** |
|---|---|
| ETC | Ethernet Container |
| MWPS | Air Interface |
| MWS | Pure Ethernet Structure, Hybrid Microwave Structure and Diversity |
| TDM | TDM Container |


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

An attribute for referencing these *_Pacs was missing in the LayerProtocol class of the version of the Core Information Model, which had been used for the TR-532v1.0.

Instead, the extension attribute has been used to define the following additional attributes for referencing the *_Pac classes:

| **value-name** | **Example value** |
|---|---|
| revision | 2017-03-24 |
| conditional-package | mw-ethernet-container-pac |
| capability | urn:onf:params:xml:ns:yang:microwave-model?module=microwave-model |

The Microwave Information Model defines six technology specific conditional packages, which are pointing to the LayerProtocol:

- The MW_AirInterface_Pac defines an LTP as microwave physical section trail termination point (MWPS-TTP).
- The MW_AirInterfaceDiversity_Pac defines an LTP as microwave section connection termination point (MWS-CTP). This conditional package is only required, while SpaceDiversity or FrequencyDiversity is used.
- The MW_PureEthernetStructure_Pac defines an LTP as microwave section trail termination point (MWS-TTP) for pure Ethernet microwave systems.
- The MW_HybridMWStructure_Pac defines an LTP as microwave section trail termination point (MWS-TTP) for microwave systems transporting Ethernet and TDM containers.
- The MW_EthernetContainter_Pac defines an LTP as a microwave client connection termination point (MW-Client-CTP) for an Ethernet client signal.
- The MW_TdmContainter_Pac defines an LTP as a microwave client connection termination point (MW-Client-CTP) for any type of TDM client signal.

Figure 10 shows the associations between the six microwave specific conditional packages and the LayerProtocol class of the Core Information Model. Please note that for simplicity reasons the ForwardingConstruct class is not displayed.


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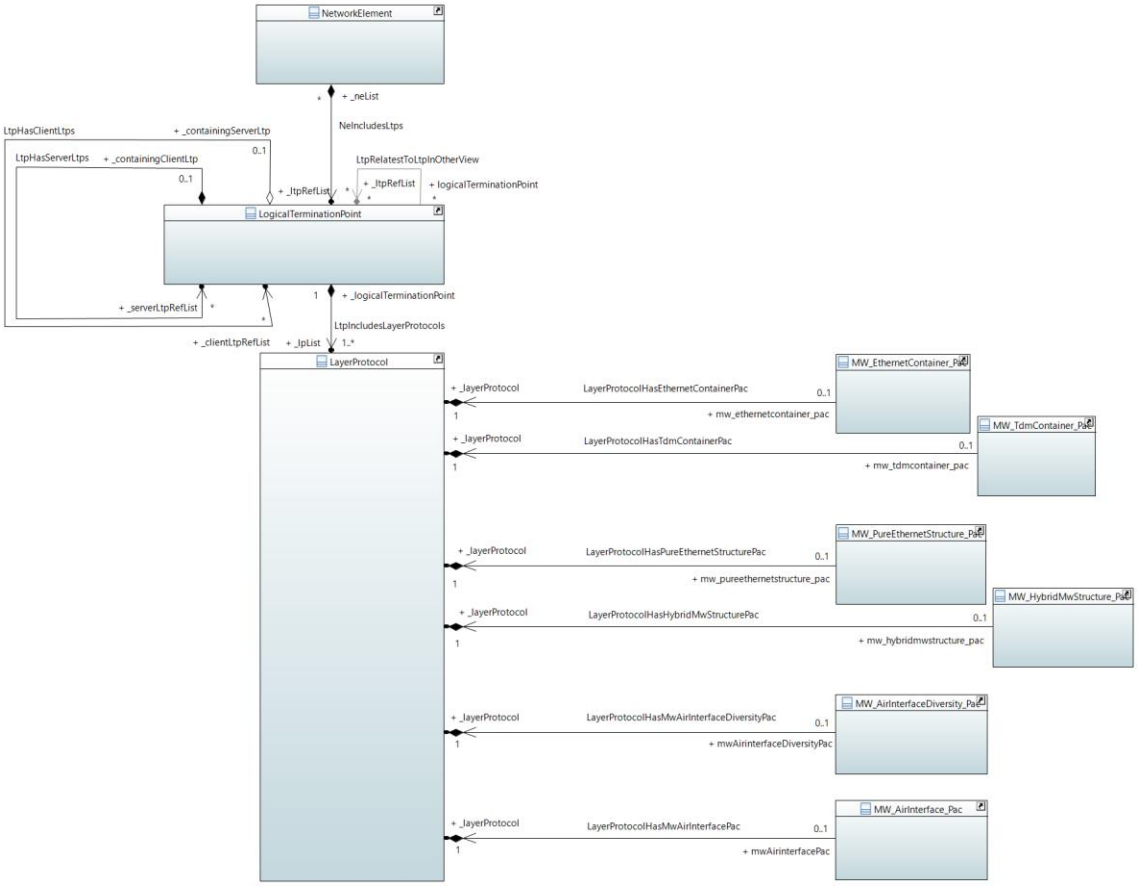


**Figure 10: Associations between LayerProtocol and *_Pac**

## 7.1 Attachment of the Co-Channel Group Class

The CoChannelGroup class is for modeling XPIC, MIMO and ALIC, which are required for operating groups of air interfaces that are sharing the same frequency channel. The grouping is done by a list of LogicalTerminationPoint (LTPs) with associated AirInterface_Pacs.

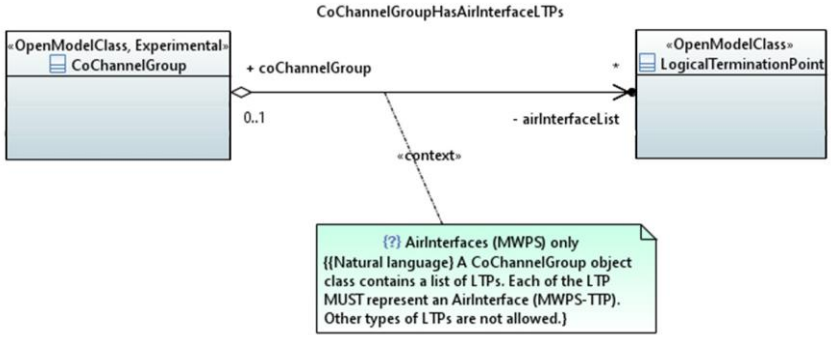


**Figure 11: Associations between CoChannelGroup and LTP**

## 7.2 Attachment of the HSB Pac

The hot-stand-by (HSB) functionality of microwave devices is a 1+1 SNCP of the microwave section (MWS). The Core Information Model covers such protection function by the ForwardingConstruct class.


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Therefore the Microwave Information Model has no technology specific conditional package for that purpose.

It needs to be mentioned that not all required protection control functions are yet defined. Future versions of the Core Information Model or the Microwave Information Model will define those functions. Please see also a corresponding entry in chapter 11 Future Work.

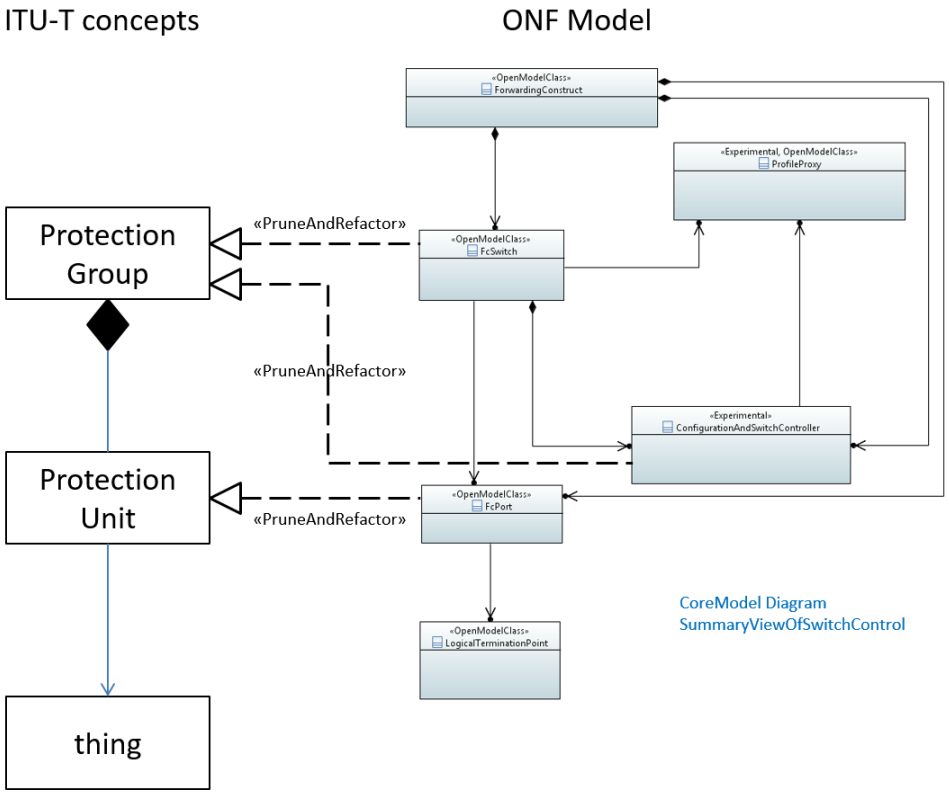


**Figure 12: HSB is covered by the ForwardingConstruct of the Core Information Model**

# 8 Backward Compatibility of this Version

The changes, which have been made while preparing version 1.1., do not cause interoperability problems between a client using an original version and a server using an updated version. No existing artifact (e.g. class, data type or attribute) has been altered or deleted. For some artifacts better alternatives have been added. Outdated artifacts have been marked with the lifecycle statement "deprecated".

The changes, which have been made while preparing version 1.1., do not cause interoperability problems between a server using an original version and a client using an updated version. The SupportQualifier [section 5.9 of ONF UMLG], which results in feature [section 7.20.1 of RFC 7950] and if-feature [section 7.20.2 of RFC 7950] statements in YANG, has been used to mark new artifacts to be feature "revision1_1".

A new revision statement [section 7.1.9 of RFC 7950] has been included in the YANG Microwave Data Model in front of the existing revision statements and all modifications comply with the constraints for updating YANG modules [section 11 of RFC 7950].


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# 9 Changes in this Version

All changes from TR-532v1.0 to TR-532v1.1 plus background information about the underlying issues have been documented in the Wireless Transport Project's decision register for this purpose on https://wiki.opennetworking.org/display/OTCC/WT+Decision+register.

# 10 Non-Backward Compatibility of the next Version

TR-532 comprises not just the technology specific *_Pacs for managing the microwave radio interface, but also the Core Information Model itself. Because the next version of TR-532 will require to comprise an updated version of the Core Information Model, which is not backward compatible, also the next version of TR-532 will not be backward compatible.

Please, see further information about future work, which will also impact backward compatibility, in chapter 11.

# 11 Future Work

The pureEthernetStructure_Pac and the EthernetContainer_Pac would also be comprised in TR-541, which is describing the Ethernet PHY information model. Neither redundancy, which would arise from putting these two *_Pacs into both TR documents, nor asymmetry, with would come from referencing TR-532 in TR-541, seem to be adequate to deal with this favorable re-use. Instead, it is considered to decompose the current Microwave Information Model into the comprised *_Pacs, make these *_Pacs available on a separate repository, 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 TR-532 is limited on technology specific conditional packages to the LayerProtocol class of the Core Information Model. This results in a comprehensive model for managing the microwave devices. From the controller's and the applications' points of view, these microwave 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 microwave specific conditional packages also for the ForwardingConstruct and to reference them in the next version of TR-532.

Additional aspects and functionality will incrementally be added to the Microwave Information Model in future versions. The following areas for potential amendments have been identified:

- Aligning the modeling of *CurrentProblemType data types to the Core Information Model after provisioning of corresponding super classes
- Aligning the modeling of protection after planed changes at the Core Information Model.
- Adding additional attributes (e.g. "coChannelConfigurationIsComplete") for expressing the operational readiness for operating e.g. XPIC.
- Enriching modeling of MIMO according to hardware implementations
- Adding Structure classes for covering point-to-multipoint (PmP) systems
- Adding automatic neighbor discovery and its relation to trail trace identifier according to ITU-T REG 7714.1
- Adding relations to the Equipment Model
- Adding Structure classes for covering Time-Division Duplexer (TDD) systems
- Adding Structure classes for covering Next Generation Fronthaul Interface (NGFI)


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# 12 UML Model Files

The Papyrus export, which is holding the UML modeling files of the TR-532v1.1 can be found on

https://github.com/openBackhaul/airInterface

The available .zip file comprises the

- AirInterface_Pac (incl. CoChannelGroup)
- AirInterfaceDiversity_Pac
- HybridMwStructure_Pac
- PureEthernetStructure_Pac
- TdmContainer_Pac
- EthernetContainer_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.

# 13 YANG Model Files

The YANG files generated from the UML model referenced in chapter 12 can be found on

https://github.com/openBackhaul/airInterface

Remark: The offered YANG files are identical to the ones, which have been implemented and tested within framework of the 5th ONF PoC in November 2018.

# 14 Interface Simulator

An Interface Simulator is for supporting application development without own hardware. The Interface Simulator, which has been used within framework of the 5th ONF PoC for developing applications based on the UML model referenced in chapter 12, can be found on

https://github.com/openBackhaul/airInterface

# 15 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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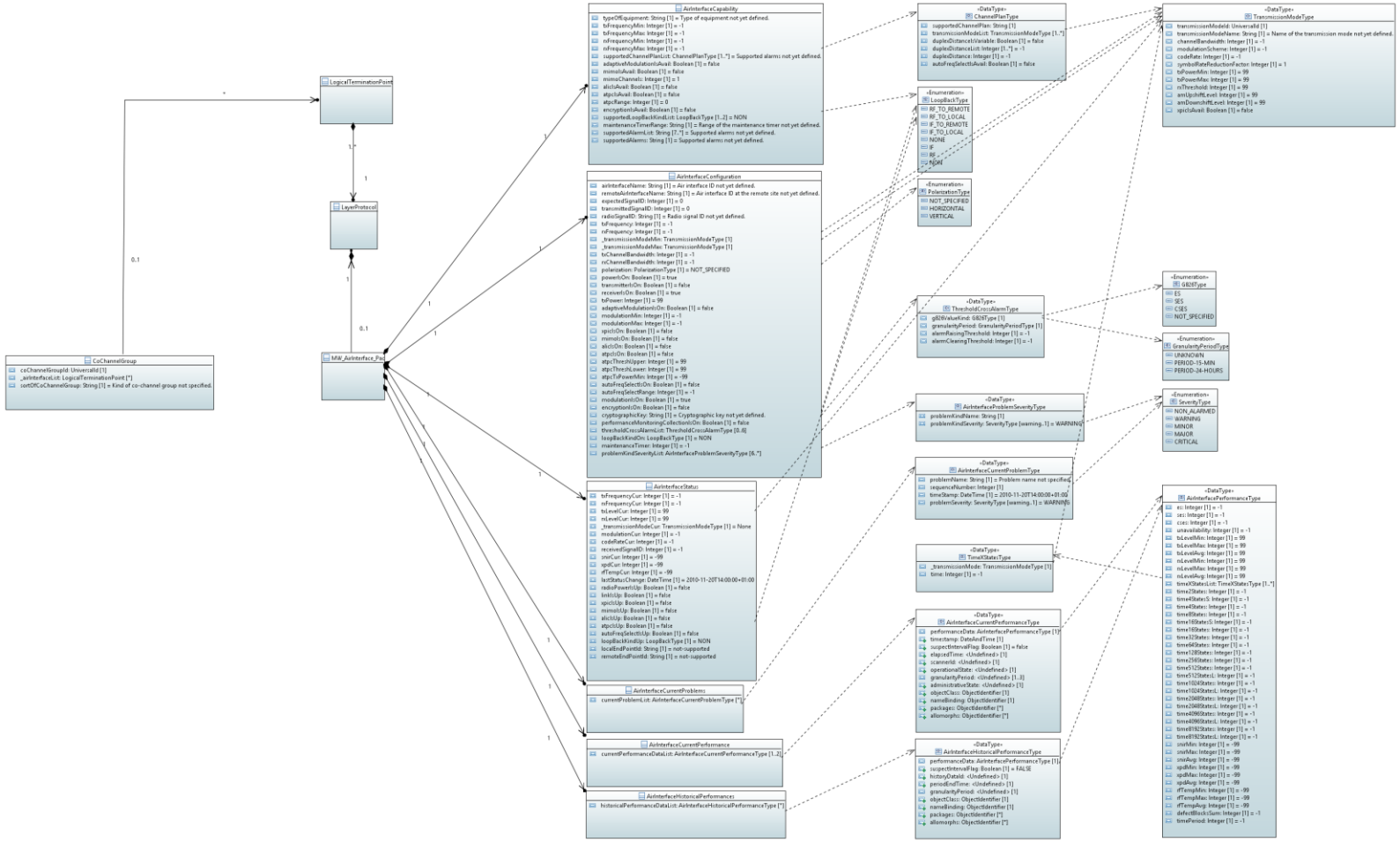
## 15.1 AirInterface_Pac and CoChannelGroup



### 15.1.1 MW_AirInterface_Pac

Qualified Name: MicrowaveModel::ObjectClasses::AirInterface::MW_AirInterface_Pac



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Applied stereotypes:

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

**Table 2: Attributes for MW_AirInterface_Pac**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| _layerProtocol | LayerProtocol<br>./. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 1<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | CoreModel-CoreNetworkModule-ObjectClasses:NetworkElement/_ltpRefList/_lpList/uuid |
| _airInterfaceCapability | AirInterfaceCapability<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |
| _airInterfaceConfiguration | AirInterfaceConfiguration<br>./. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |
| _airInterfaceStatus | AirInterfaceStatus<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| _airInterfaceCurrentProblems | AirInterfaceCurrentProblems<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |
| _airInterfaceCurrentPerformance | AirInterfaceCurrentPerformance<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |
| _airInterfaceHistoricalPerformances | AirInterfaceHistoricalPerformances<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |

## 15.1.2 AirInterfaceCapability

Qualified Name: MicrowaveModel::ObjectClasses::AirInterface::AirInterfaceCapability

Describes the 'analog' capabilities of modem and transmitter of the microwave device. Value ranges of attributes are not independently (e.g. min. and max. transmit power depends on modulation). Legal combinations of values are expressed in transmissionModeTypes.

Applied stereotypes:

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

**Table 3: Attributes for AirInterfaceCapability**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| typeOfEquipment | String<br>Type of equipment not yet defined. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | This parameter indicates the equipment type. Instead of uploading the complete set of capabilities, capabilities of the same equipment type could be reused. Should be unique for a combination of modem, radio and their respective firmware. |
| txFrequencyMin | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: kHz<br>• support: MANDATORY | Value of the minimum transmit frequency tunable at the air interface. |
| txFrequencyMax | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: kHz<br>• support: MANDATORY | Value of the maximum transmit frequency tunable at the air interface. |
| rxFrequencyMin | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: kHz<br>• support: MANDATORY | Value of the minimum receive frequency tunable at the air interface. |
| rxFrequencyMax | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: kHz<br>• support: MANDATORY | Value of the maximum receive frequency tunable at the air interface. |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| supportedChannelPlanList | ChannelPlanType<br>Supported alarms not yet defined. | 1..* | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | List of channel spacing that are supported by the device. |
| adaptiveModulationIsAvail | Boolean<br>false | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | In case the device is capable of adaptive modulation, this field shall contain a 'true'. |
| mimoIsAvail | Boolean<br>false | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | In case the device is capable of MIMO, this field shall contain a 'true'. |
| mimoChannels | Integer<br>1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: channels<br>• support: MANDATORY | Maximum number (n) of spatial multiplexing streams that can be conveyed by an n x n MIMO configuration. |
| alicIsAvail | Boolean<br>false | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | In case the microwave radio is capable of Adjacent Link Interference Cancelation (canceling of interference cause by transmitters located at the same site), this field shall contain a 'true'. |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| atpcIsAvail | Boolean<br>false | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | In case the microwave radio is capable of ATPC, this field shall contain a 'true'. |
| atpcRange | Integer<br>0 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: dB<br>• support: MANDATORY | Extent of the ATPC range. This value represents a device specific maximum value. The actual range of the ATPC at a specific link might be limited by the difference between configured transmit power (AirInterface::AirInterfaceConfiguration::txPower) and minimum transmit power of the device (TypeDefinitions::TransmissionModeType::txPowerMin). |
| encryptionIsAvail | Boolean<br>false | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Shall be marked 'true', if payload encryption is available. |
| supportedLoopBackKindList | LoopBackType<br>NON | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | List of supported kinds of looping back of header information to the remote site. |
| maintenanceTimerRange | String<br>Range of the maintenance timer not yet defined. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: s<br>• support: MANDATORY | Available time periods for maintenance configurations (e.g. the loop back of microwave header information) 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'). |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| supportedAlarmList | String<br><br>Supported alarms not yet defined. | 7..* | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | Available alarms to be listed. Mandatory:'signalIsLost','rslIsExceeded', 'signalIDMismatching','temperatureIsExceeded','modemIsFaulty','radioIsFaulty' and 'modulationIsDownShifted'. Further alarms might be added by the vendor. |
| supportedAlarms | String<br><br>Supported alarms not yet defined. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY<br>Deprecated | Available alarms to be listed. Mandatory:'signalIsLost','rslIsExceeded', 'temperatureIsExceeded','modemIsFaulty','radioIsFaulty' and 'modulationIsDownShifted'. Further alarms might be added by the device. Names are to be separated by commas. |

### 15.1.3 AirInterfaceConfiguration

Qualified Name: MicrowaveModel::ObjectClasses::AirInterface::AirInterfaceConfiguration

Configuration of the radio link.

Applied stereotypes:

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

**Table 4: Attributes for AirInterfaceConfiguration**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| airInterfaceName | String<br>Air interface ID not yet defined. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Operator specific microwave link ID (often used for coding area, type of element and sequential number). |
| remoteAirInterfaceName | String<br>Air interface ID at the remote site not yet defined. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | Name of the air interface, which belongs to the same link, at the remote site. |
| expectedSignalID | Integer<br>0 | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: LENGTH_16_BIT<br>• unit: no unit defined<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | If set on '0', the receiver ignores the signal ID of the received signal. If set on any other value, the receiver exclusively synchronizes on signals with the same signal ID. |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| transmittedSignalID | Integer<br>0 | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: LENGTH_16_BIT<br>• unit: no unit defined<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | Transmitted radio signal ID for synchronizing the receiver. |
| radioSignalID | String<br>Radio signal ID not yet defined. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY<br>Deprecated | The radioSignalId is transmitted on the air interface so the remote site of the link synchronizes on the correct transmitter. The local radio MUST NOT synchronize on a radio signal with a different radioSignalId. The link ID is neither an ID necessary to span the model nor an ID referencing external data. It is just some sort of name of the link transmitted so the correct remote site can be identified in an interference situation. The value zero might be used to make the microwave to disable the link ID check. |
| txFrequency | Integer<br>-1 | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: kHz<br>• support: MANDATORY | Center frequency of the transmit channel. The values to be configured have to exactly match the values listed in the international agreement referenced in channelPlanID. In case of automated selection of the transmit frequency this field shall describe the lowest center frequency selectable. |
| rxFrequency | Integer<br>-1 | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: kHz<br>• support: MANDATORY | Center frequency of the receive channel. |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| _transmissionModeMin | TransmissionModeType<br>./. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | Minimum transmission mode to be configured (in case adaptive modulation is not used, this value represents also the fixed transmission mode). |
| _transmissionModeMax | TransmissionModeType<br>./. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | Maximum transmission mode to be configured. |
| txChannelBandwidth | Integer<br>-1 | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: kHz<br>• support: MANDATORY<br>Deprecated | Bandwidth of the transmit channel. The value shall be expressed explicitly (means in kHz) not as a reference to an international agreement. The values shall be chosen from the following _list: 3.500, 7.000, 14.000, 27.500, 28.000, 29.000, 29.650, 30.000, 40.000, 50.000, 55.000, 56.000, 59.300, 60.000, 80.000, 100.000, 112.000, 120.000, 150.000, 200.000, 250.000, 500.000, 750.000, 1.000.000, 1.250.000, 1.500.000, 1.750.000, 2.000.000; |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| rxChannelBandwidth | Integer<br>-1 | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: kHz<br>• support: MANDATORY | Bandwidth of the receive channel. The value shall be expressed explicitly (means in kHz) not as a reference to an international agreement. The values shall be chosen from the following _list: 3.500, 7.000, 14.000, 27.500, 28.000, 29.000, 29.650, 30.000, 40.000, 50.000, 55.000, 56.000, 59.300, 60.000, 80.000, 100.000, 112.000, 120.000, 150.000, 200.000, 250.000, 500.000, 750.000, 1.000.000, 1.250.000, 1.500.000, 1.750.000, 2.000.000; |
| polarization | PolarizationType<br>NOT_SPECIFIED | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Allows documenting the polarization of the air interface. |
| powerIsOn | Boolean<br>true | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Power ON. Activation of the entire radio in a split mount configuration shall be expressed as a 'true'. |
| transmitterIsOn | Boolean<br>false | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Activation of the transmitter inside the radio shall be expressed as a 'true'. |
| receiverIsOn | Boolean<br>true | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Maintenance Feature. Activation of the receiver inside the radio shall be expressed as a 'true'. Attribute shall also be used for RX main and RX diversity squelches in case of diversity configurations. |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| txPower | Integer<br>99 | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: dBm<br>• support: MANDATORY | Transmit power to be configured on the microwave link. Signed Byte is required. The actually operated transmit power might be lower depending on adaptive modulation and ATPC. |
| adaptiveModulationIsOn | Boolean<br>false | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Adaptive Modulation. Activation of adaptive modulation shall be expressed as a 'true'. |
| modulationMin | Integer<br>-1 | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: LENGTH_16_BIT<br>• unit: symbols<br>• support: MANDATORY<br>Deprecated | Minimum modulation to be configured (in case adaptive modulation is not used, this value represents also the fixed modulation). The modulation scheme shall be described by the number of states in the phase diagram (e.g. BPSK->'2' or 256QAM->'256'). Allowed values are defined in TypeDefinitions::transmissionModeType ::modulationScheme. |
| modulationMax | Integer<br>-1 | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: LENGTH_16_BIT<br>• unit: symbols<br>• support: MANDATORY<br>Deprecated | Maximum modulation to be configured. The value of this field is only relevant, if Adaptive Modulation has been activated. The modulation scheme shall be described by the number of states in the phase diagram (e.g. BPSK->'2' or 256QAM->'256'). Allowed values are defined in TypeDefinitions::transmissionModeType ::modulationScheme. |
| xpicIsOn | Boolean<br>false | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Activation of Cross Polarization Interference Cancelation shall be expressed as a 'true'. In case XPIC is not available for the current combination of channel bandwidth and modulation or the hardware in general, this parameter shall always be set to 'false'. |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| mimoIsOn | Boolean<br>false | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Activation of Multiple Input Multiple Output (MIMO) shall be expressed as a 'true'. |
| alicIsOn | Boolean<br>false | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Activation of Adjacent Link Interference Cancelation (ALIC) shall be expressed as a 'true'. |
| atpcIsOn | Boolean<br>false | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | ATPC. Activation of Automated Transmit Power Control shall be expressed as a 'true'. |
| atpcThreshUpper | Integer<br>99 | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: LENGTH_16_BIT<br>• unit: dBm<br>• support: MANDATORY | If the receive level is higher than the upper threshold value, the transmitter is notified to decrease transmit power. |
| atpcThreshLower | Integer<br>99 | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: LENGTH_16_BIT<br>• unit: dBm<br>• support: MANDATORY | If the receive level is lower than the lower threshold value, the transmitter is notified to increase transmit power. |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| atpcTxPowerMin | Integer<br>-99 | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: dBm<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | Transmit power, which is not to be undercut, while operating ATPC. |
| autoFreqSelectIsOn | Boolean<br>false | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Activation of automatically selecting the transmit frequency in unlicensed bands shall be expressed as a 'true'. |
| autoFreqSelectRange | Integer<br>-1 | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: channels<br>• support: MANDATORY | Number of transmit channels (starting at the center frequency defined in txFrequency and with channel bandwidth according to txChannelBandwidth) that define the range within the transmit frequency can automatically been chosen. |
| modulationIsOn | Boolean<br>true | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Maintenance Feature. De-activation of the modulation of the carrier signal for fault management shall be expressed as a 'false'. |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| encryptionIsOn | Boolean<br>false | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Activates encryption of the payload. |
| cryptographicKey | String<br>Cryptographic key not yet defined. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Key for transforming plaintext into ciphertext data. |
| performanceMonitoringCollectionIsOn | Boolean<br>false | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | Enables measurement, collection, storage and access to performance data. |
| thresholdCrossAlarmList | ThresholdCrossAlarmType<br>./. | 0..6 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | List of threshold cross alarms to be configured. |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| loopBackKindOn | LoopBackType<br>NON | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Maintenance Feature. The currently configured type of looping back of the air interface header shall be expressed here. The received header is returned to the remote site. |
| maintenanceTimer | Integer<br>-1 | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: MANDATORY | Time of existence of any maintenance configuration (e.g. the loop back of microwave header information). Valid values are defined in AirInterface::AirInterfaceCapability::maintenanceTimerRange. |
| problemKindSeverityList | AirInterfaceProblemSeverityType<br>./. | 6..* | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Severity of the problem to be configured. |

### 15.1.4 AirInterfaceStatus

Qualified Name: MicrowaveModel::ObjectClasses::AirInterface::AirInterfaceStatus

Measurements of current values on the air interface and operational status of the device.

Applied stereotypes:

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

**Table 5: Attributes for AirInterfaceStatus**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| txFrequencyCur | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: kHz<br>• support: MANDATORY | Center frequency of the currently operated transmit channel. |
| rxFrequencyCur | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: kHz<br>• support: MANDATORY | Center frequency of the currently operated receive channel. |
| txLevelCur | Integer<br>99 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: dBm<br>• support: MANDATORY | Current transmit level. |
| rxLevelCur | Integer<br>99 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: dBm<br>• support: MANDATORY | Current receive level. |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| _transmissionModeCur | TransmissionModeType<br>None | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | Currently operated transmission mode according to definitions in Capabilities. |
| modulationCur | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: LENGTH_16_BIT<br>• unit: symbols<br>• support: MANDATORY<br>Deprecated | Currently operated modulation on transmit path. The modulation scheme shall be described by the number of states in the phase diagram (e.g. BPSK->'2' or 256QAM->'256'). Allowed values are defined in TypeDefinitions::transmissionModeType ::modulationScheme. |
| codeRateCur | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: %<br>• support: MANDATORY<br>Deprecated | Code rate of the currently operated coding scheme (Net bit rate ≤ Gross bit rate · code rate). |
| receivedSignalID | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: LENGTH_16_BIT<br>• unit: no unit defined<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | ID of the signal, which the receiver is currently synchronized on. |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| snirCur | Integer<br>-99 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: dB<br>• support: MANDATORY | Currently measured signal to (noise+interference) ratio. |
| xpdCur | Integer<br>-99 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: dB<br>• support: MANDATORY | Currently measured cross polarization discrimination. |
| rfTempCur | Integer<br>-99 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: Celsius<br>• support: MANDATORY | Current temperature (in degree Celsius) of the radio module inside the outdoor unit. |
| lastStatusChange | DateTime<br>2010-11-20T14:00:00+01:00 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Time the Air Interface entered its current operational status. _format:yyyyMMddhhmmss.s[Z\|{+\|-}HHMm]; 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. |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| radioPowerIsUp | Boolean<br>false | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | If the radio unit has power and is switched on, this shall be expressed as a 'true'. |
| linkIsUp | Boolean<br>false | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | If connection is established to the remote site with the same linkID, this shall be expressed as a 'true'. |
| xpicIsUp | Boolean<br>false | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | If XPIC is currently actually working (not just configured), this shall be expressed as a 'true'. |
| mimoIsUp | Boolean<br>false | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | If MIMO is currently actually working (not just configured), this shall be expressed as a 'true'. |
| alicIsUp | Boolean<br>false | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | If Adjacent Link Interference Cancelation (ALIC) is currently actually working (not just configured), this shall be expressed as a 'true'. |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| atpcIsUp | Boolean<br>false | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | If ATPC is currently actually working (not just configured), this shall be expressed as a 'true'. |
| autoFreqSelectIsUp | Boolean<br>false | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | If automated frequency selection is currently actually working (not just configured), this shall be expressed as a 'true'. |
| loopBackKindUp | LoopBackType<br>NON | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | The currently active (not just configured) type of looping back of the air interface header shall be expressed here. The received header is returned to the remote site. |
| localEndPointId | String<br>not-supported | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | The value of the localEndPointId is a vendor specific identifier of the air interface, used by the node to discover a microwave radio link. |
| remoteEndPointId | String<br>not-supported | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | The value of the remoteEndPointId is a vendor specific identifier or the airinterface at the remote side, used to by the node to discover a microwave radio link. |


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### 15.1.5 AirInterfaceCurrentProblems

Qualified Name: MicrowaveModel::ObjectClasses::AirInterface::AirInterfaceCurrentProblems

Applied stereotypes:

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

**Table 6: Attributes for AirInterfaceCurrentProblems**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| currentProblemList | AirInterfaceCurrentProblemType<br>./. | 0..* | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | |

### 15.1.6 AirInterfaceCurrentPerformance

Qualified Name: MicrowaveModel::ObjectClasses::AirInterface::AirInterfaceCurrentPerformance

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

Applied stereotypes:

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

**Table 7: Attributes for AirInterfaceCurrentPerformance**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| currentPerformanceDataList | AirInterfaceCurrentPerformanceType<br>./. | 1..2 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• 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. |

## 15.1.7 AirInterfaceHistoricalPerformances

Qualified Name: MicrowaveModel::ObjectClasses::AirInterface::AirInterfaceHistoricalPerformances

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

Applied stereotypes:

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

**Table 8: Attributes for AirInterfaceHistoricalPerformances**

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

## 15.1.8 CoChannelGroup

Qualified Name: MicrowaveModel::ObjectClasses::AirInterface::CoChannelGroup

Required for configuring XPIC, MIMO and ALIC.

Applied stereotypes:


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

**Table 9: Attributes for CoChannelGroup**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| coChannelGroupId | UniversalId<br>./. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 1<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | |
| _airInterfaceList | LogicalTerminationPoint<br>./. | 0..* | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | List of air interfaces, which are part of the co-channel (XPIC, MIMO, ALIC) group. |
| sortOfCoChannelGroup | String<br>Kind of co-channel group not specified. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Type of group of air interfaces with the same transmit and receive frequency. The values shall be chosen from the following _list:'XPIC', 'MIMO', 'ALIC'; |
| _logicalterminationpoint | LogicalTerminationPoint<br>./. | 0..* | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NA<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY<br>Deprecated | See referenced class |


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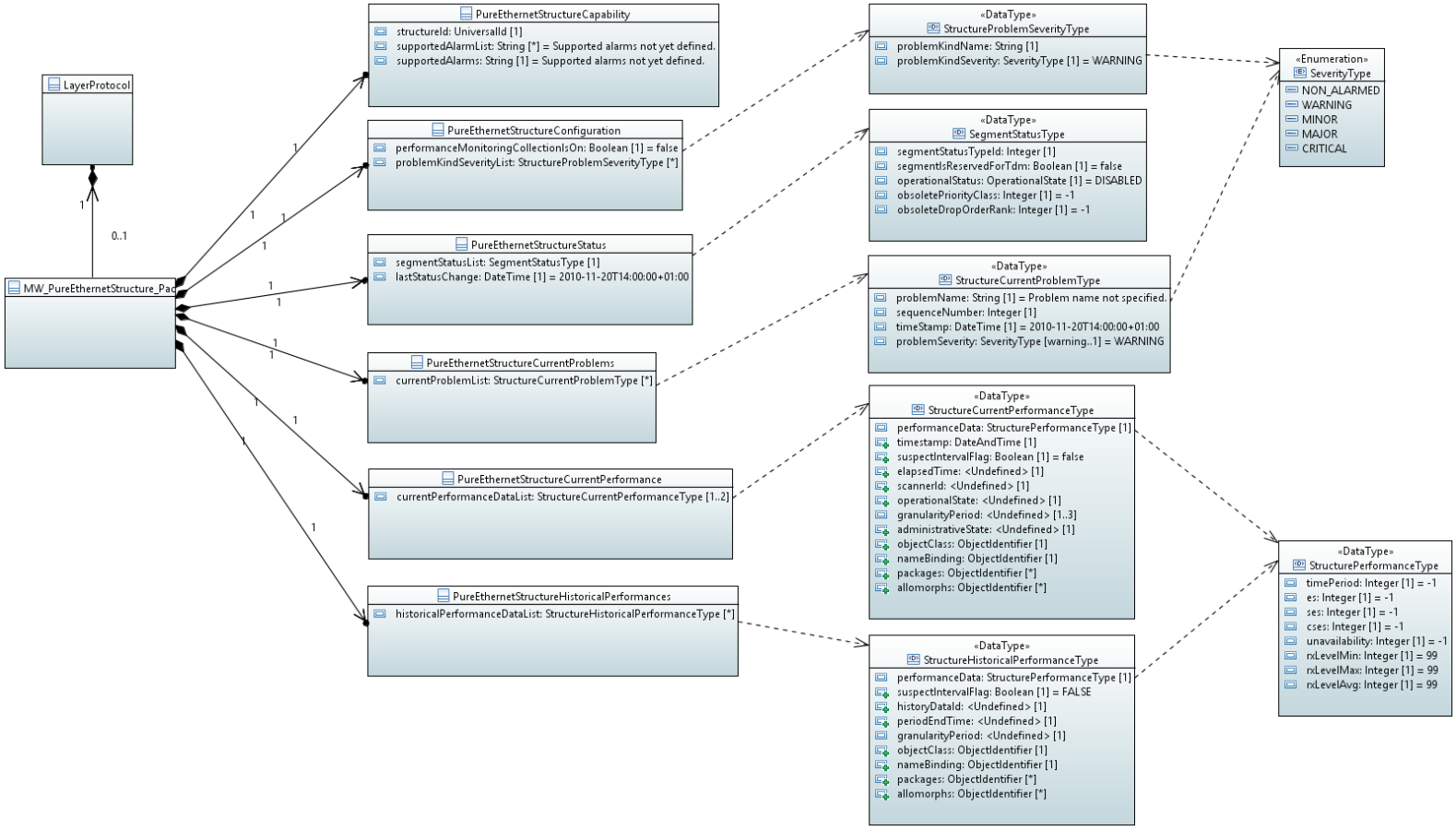
# 15.2 Structure_Pacs

## 15.2.1 PureEthernetStructure_Pac




### 15.2.1.1 MW_PureEthernetStructure_Pac

Qualified Name: MicrowaveModel::ObjectClasses::PureEthernetStructure::MW_PureEthernetStructure_Pac

The pureEthernetStructure_Pac and its attached classes MUST be provided on management interfaces of microwave devices, which are transporting Ethernet traffic only.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Applied stereotypes:

- OpenModelClass
  - objectCreationNotification: YES
  - objectDeletionNotification: YES
  - support: CONDITIONAL_MANDATORY
  - condition: pure-ethernet In case the microwave device allows using the entire air interface capacity for Ethernet transport only, it has to support this feature on its management interface.

**Table 10: Attributes for MW_PureEthernetStructure_Pac**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| _layerProtocol | LayerProtocol<br>./. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 1<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | CoreModel-CoreNetworkModule-ObjectClasses:NetworkElement/_ltpRefList/_lpList/uuid |
| _pureEthernetStructureCapability | PureEthernetStructureCapability<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |
| _pureEthernetStructureConfiguration | PureEthernetStructureConfiguration<br>./. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |
| _pureEthernetStructureStatus | PureEthernetStructureStatus<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| _pureEthernetStructureCurrentProblems | PureEthernetStructureCurrentProblems<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |
| _pureEthernetStructureCurrentPerformance | PureEthernetStructureCurrentPerformance<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |
| _pureEthernetStructureHistoricalPerformances | PureEthernetStructureHistoricalPerformances<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |

### 15.2.1.2 PureEthernetStructureCapability

Qualified Name: MicrowaveModel::ObjectClasses::PureEthernetStructure::PureEthernetStructureCapability

Describes the logical structuring of the physical capacity provided by a pure Ethernet microwave device. Segmentation is not available. No fixed segment size. No TDM transport.

Applied stereotypes:

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

**Table 11: Attributes for PureEthernetStructureCapability**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| structureId | UniversalId<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 1<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Identifies the Structure for bundling and container. |
| supportedAlarmList | String<br>Supported alarms not yet defined. | 0..* | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | Available alarms to be listed. Mandatory:non. Names are to be separated by commas. Further alarms might be added by the vendor. |
| supportedAlarms | String<br>Supported alarms not yet defined. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY<br>Deprecated | Available alarms to be listed. Mandatory:non. Names are to be separated by commas. Further alarms might be added by the device. |

### 15.2.1.3 PureEthernetStructureConfiguration

Qualified Name: MicrowaveModel::ObjectClasses::PureEthernetStructure::PureEthernetStructureConfiguration

Applied stereotypes:

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

**Table 12: Attributes for PureEthernetStructureConfiguration**


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| performanceMonitoringCollectionIsOn | Boolean<br><br>false | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | Enables measurement, collection, storage and access to performance data. |
| problemKindSeverityList | StructureProblemSeverityType<br><br>./. | 0..* | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Severity of the type of problem to be configured. |

### 15.2.1.4 PureEthernetStructureStatus

Qualified Name: MicrowaveModel::ObjectClasses::PureEthernetStructure::PureEthernetStructureStatus

Applied stereotypes:

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

**Table 13: Attributes for PureEthernetStructureStatus**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| segmentStatusList | SegmentStatusType<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Status of the Ethernet transport segment. Always just one segment. |
| lastStatusChange | DateTime<br>2010-11-20T14:00:00+01:00 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Time and date of the last update of the status information. _format:yyyyMMddhhmmss.s[Z\|{+\|-}HHMm]; 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. |

### 15.2.1.5 PureEthernetStructureCurrentProblems

Qualified Name: MicrowaveModel::ObjectClasses::PureEthernetStructure::PureEthernetStructureCurrentProblems

Applied stereotypes:

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

**Table 14: Attributes for PureEthernetStructureCurrentProblems**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| currentProblemList | StructureCurrentProblemType<br>./. | 0..* | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | |

### 15.2.1.6 PureEthernetStructureCurrentPerformance

Qualified Name: MicrowaveModel::ObjectClasses::PureEthernetStructure::PureEthernetStructureCurrentPerformance

Aggregated performance information of the structure of an pure Ethernet microwave at a particular moment.

Applied stereotypes:

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

**Table 15: Attributes for PureEthernetStructureCurrentPerformance**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| currentPerformanceDataList | StructureCurrentPerformanceType<br>./. | 1..2 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• 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. |

### 15.2.1.7 PureEthernetStructureHistoricalPerformances

Qualified Name: MicrowaveModel::ObjectClasses::PureEthernetStructure::PureEthernetStructureHistoricalPerformances

Aggregated performance information of the structure of an pure Ethernet microwave for a pre-defined measurement interval.

Applied stereotypes:


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

**Table 16: Attributes for PureEthernetStructureHistoricalPerformances**

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


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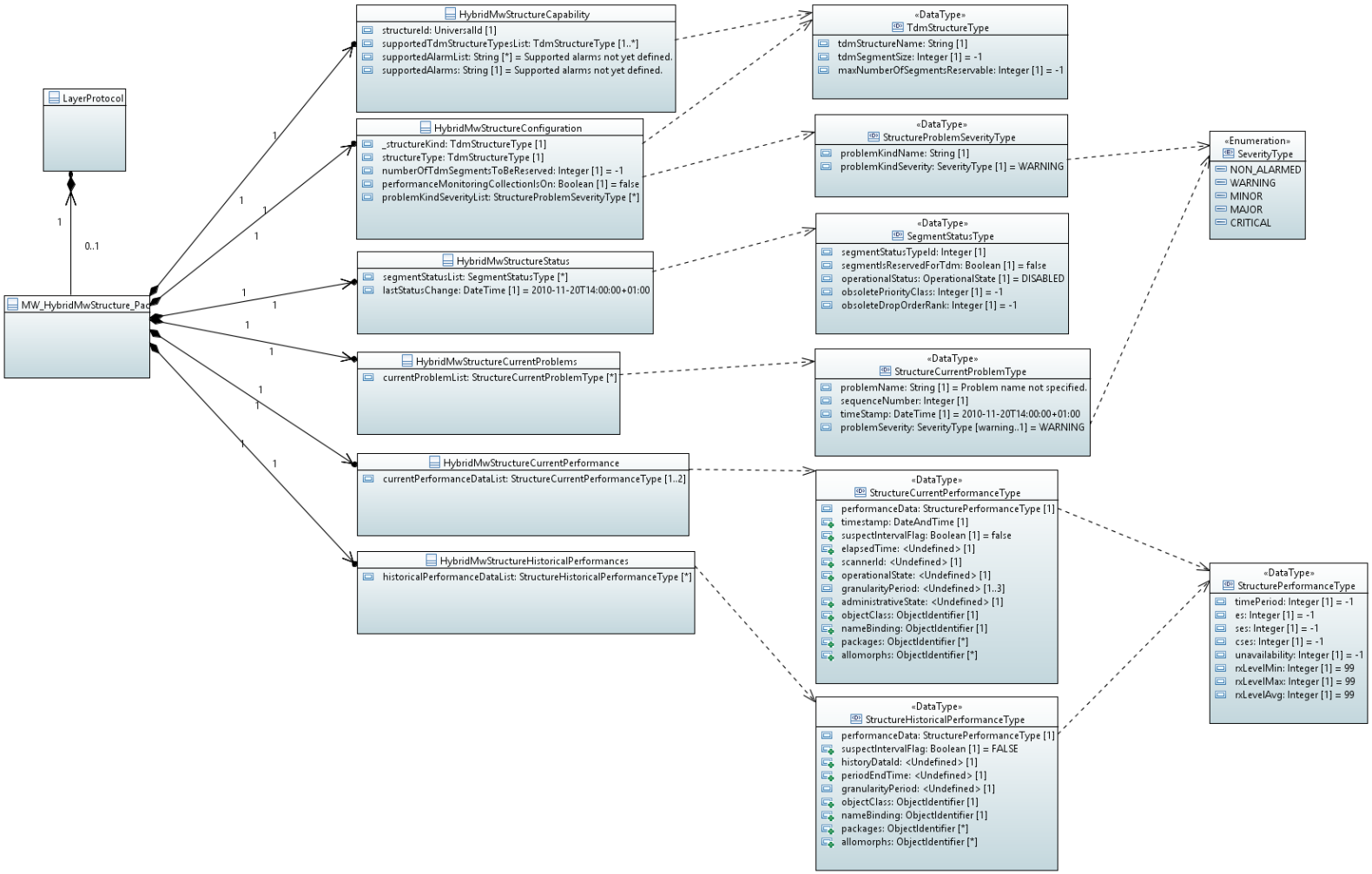
## 15.2.2 HybridMwStructure_Pac




### 15.2.2.1 MW_HybridMwStructure_Pac

Qualified Name: MicrowaveModel::ObjectClasses::HybridMwStructure::MW_HybridMwStructure_Pac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The HybridMwStructure_Pac and its attached classes MUST be provided on management interfaces of microwave devices, which are transporting TDM and Ethernet traffic.

Applied stereotypes:

- OpenModelClass
  - objectCreationNotification: YES
  - objectDeletionNotification: YES
  - support: CONDITIONAL_MANDATORY
  - condition: hybrid-microwave In case the microwave device allows Ethernet and native TDM transport in parallel, it has to support this feature on its management interface.

**Table 17: Attributes for MW_HybridMwStructure_Pac**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| _layerProtocol | LayerProtocol<br>./. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 1<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | CoreModel-CoreNetworkModule-ObjectClasses:NetworkElement/_ltpRefList/_lpList/uuid |
| _hybridMwStructureCapability | HybridMwStructureCapability<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |
| _hybridMwStructureConfiguration | HybridMwStructureConfiguration<br>./. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| _hybridMwStructureStatus | HybridMwStructureStatus<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |
| _hybridMwStructureCurrentProblems | HybridMwStructureCurrentProblems<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |
| _hybridMwStructureCurrentPerformance | HybridMwStructureCurrentPerformance<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |
| _hybridMwStructureHistoricalPerformances | HybridMwStructureHistoricalPerformances<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |

### 15.2.2.2 HybridMwStructureCapability

Qualified Name: MicrowaveModel::ObjectClasses::HybridMwStructure::HybridMwStructureCapability

Describes the logical structuring of the physical capacity provided by a hybrid microwave device (TDM + Ethernet). Segmentation is available. TDM transport is available.

Applied stereotypes:

- OpenModelClass


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

**Table 18: Attributes for HybridMwStructureCapability**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| structureId | UniversalId<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 1<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Identifies the Structure for bundling and container. |
| supportedTdmStructureTypesList | TdmStructureType<br>./. | 1..* | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Lists the TDM frame types that are supported. |
| supportedAlarmList | String<br>Supported alarms not yet defined. | 0..* | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | Available alarms to be listed. Mandatory:non. Names are to be separated by commas. Further alarms might be added by the vendor. |
| supportedAlarms | String<br>Supported alarms not yet defined. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY<br>Deprecated | Available alarms to be listed. Mandatory:non. Names are to be separated by commas. Further alarms might be added by the device. |


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### 15.2.2.3 HybridMwStructureConfiguration

Qualified Name: MicrowaveModel::ObjectClasses::HybridMwStructure::HybridMwStructureConfiguration

Applied stereotypes:

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

**Table 19: Attributes for HybridMwStructureConfiguration**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| _structureKind | TdmStructureType<br>./. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | TDM frame to be applied. |
| structureType | TdmStructureType<br>./. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY<br>Deprecated | TDM frame to be applied. |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| numberOfTdmSegmentsToBeReserved | Integer<br>-1 | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: LENGTH_16_BIT<br>• unit: no unit defined<br>• support: MANDATORY | Allows to configure the number of segments reserved for TDM frames of the type specified in HybridMwStructure::HybridMwStructure Configuration::structureType |
| performanceMonitoringCollectionIsOn | Boolean<br>false | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0 | Enables measurement, collection, storage and access to performance data. |
| problemKindSeverityList | StructureProblemSeverityType<br>./. | 0..* | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Severity of the type of problem to be configured. |

### 15.2.2.4 HybridMwStructureStatus

Qualified Name: MicrowaveModel::ObjectClasses::HybridMwStructure::HybridMwStructureStatus

Applied stereotypes:

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

**Table 20: Attributes for HybridMwStructureStatus**


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| segmentStatusList | SegmentStatusType<br>./. | 0..* | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Status of each segment (all TDM and one Ethernet). Multiplicity = HybridMwStructure::StructureConfiguration::tdmReservedNumberOfSegments + 1 |
| lastStatusChange | DateTime<br>2010-11-20T14:00:00+01:00 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Time and date of the last update of the status information. _format:yyyyMMddhhmmss.s[Z\|{+\|-}HHMm]; 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. |

### 15.2.2.5 HybridMwStructureCurrentProblems

Qualified Name: MicrowaveModel::ObjectClasses::HybridMwStructure::HybridMwStructureCurrentProblems

Applied stereotypes:

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

**Table 21: Attributes for HybridMwStructureCurrentProblems**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| currentProblemList | StructureCurrentProblemType<br>./. | 0..* | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | |

### 15.2.2.6 HybridMwStructureCurrentPerformance

Qualified Name: MicrowaveModel::ObjectClasses::HybridMwStructure::HybridMwStructureCurrentPerformance

Aggregated performance information of the structure of a hybrid microwave at a particular moment.

Applied stereotypes:

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

**Table 22: Attributes for HybridMwStructureCurrentPerformance**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| currentPerformanceDataList | StructureCurrentPerformanceType<br>./. | 1..2 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• 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. |

### 15.2.2.7 HybridMwStructureHistoricalPerformances

Qualified Name: MicrowaveModel::ObjectClasses::HybridMwStructure::HybridMwStructureHistoricalPerformances

Aggregated performance information of the structure of a hybrid microwave for a pre-defined measurement interval.

Applied stereotypes:


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

**Table 23: Attributes for HybridMwStructureHistoricalPerformances**

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


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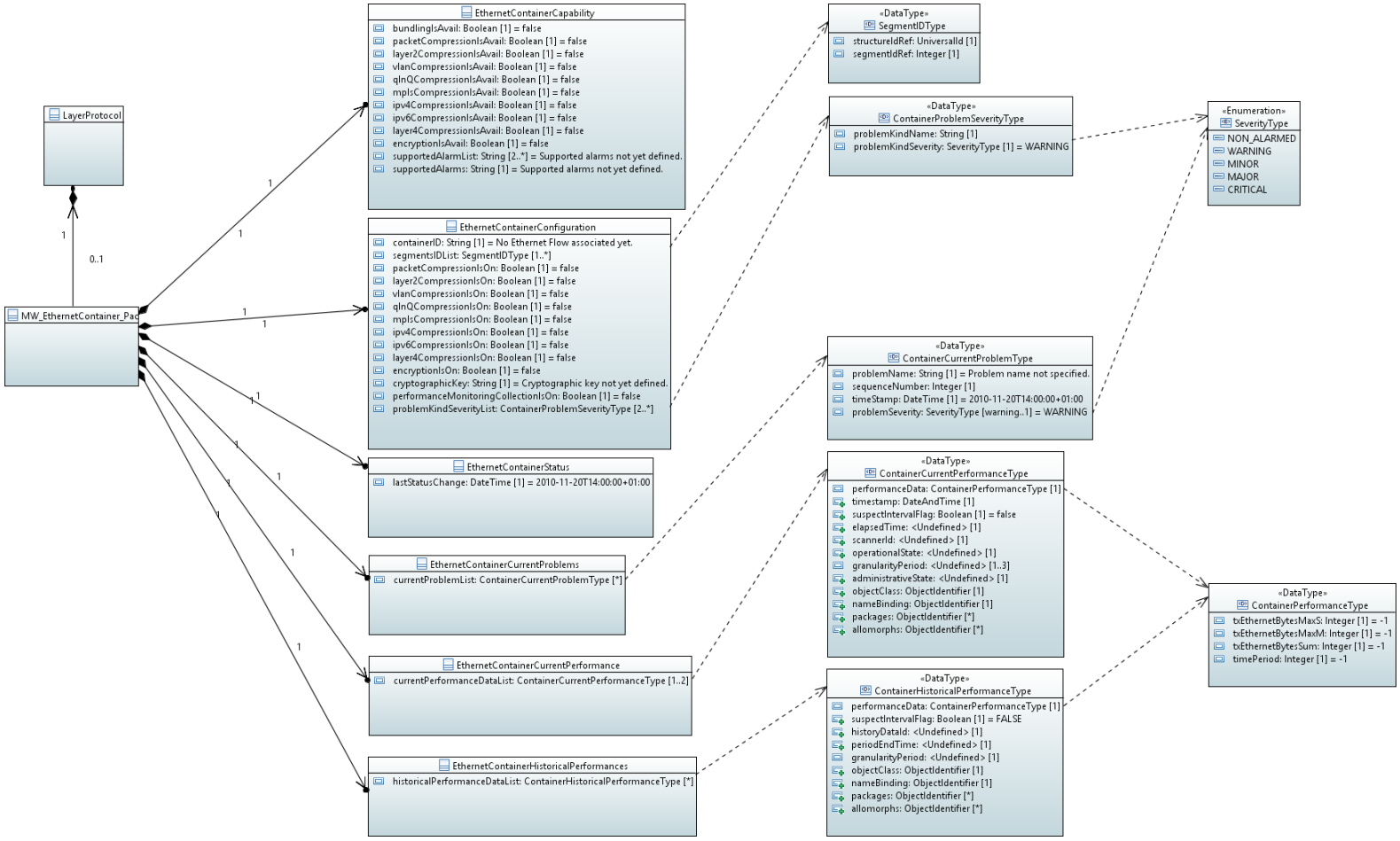
# 15.3 Container_Pacs

## 15.3.1 EthernetContainer_Pac




### 15.3.1.1 MW_EthernetContainer_Pac

Qualified Name: MicrowaveModel::ObjectClasses::EthernetContainer::MW_EthernetContainer_Pac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Applied stereotypes:

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

**Table 24: Attributes for MW_EthernetContainer_Pac**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| _layerProtocol | LayerProtocol<br>./. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 1<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | CoreModel-CoreNetworkModule-ObjectClasses:NetworkElement/_ltpRefList/_lpList/uuid |
| _ethernetContainerCapability | EthernetContainerCapability<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |
| _ethernetContainerConfiguration | EthernetContainerConfiguration<br>./. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |
| _ethernetContainerStatus | EthernetContainerStatus<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| _ethernetContainerCurrentProblems | EthernetContainerCurrentProblems<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |
| _ethernetContainerCurrentPerformance | EthernetContainerCurrentPerformance<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |
| _ethernetContainerHistoricalPerformances | EthernetContainerHistoricalPerformances<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |

### 15.3.1.2 EthernetContainerCapability

Qualified Name: MicrowaveModel::ObjectClasses::EthernetContainer::EthernetContainerCapability

Applied stereotypes:

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

**Table 25: Attributes for EthernetContainerCapability**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| bundlingIsAvail | Boolean<br>false | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | This attribute has to be set on 'true', if the device allows combining resources from several air interfaces for transporting this Ethernet container. |
| packetCompressionIsAvail | Boolean<br>false | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | In case packet compression can be activated, but not configured to a certain type, packetCompressionAvail shall be set on 'true', but none of the compression level specific booleans. |
| layer2CompressionIsAvail | Boolean<br>false | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Packet compression on layer 2 available at the device. |
| vlanCompressionIsAvail | Boolean<br>false | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Packet compression on VLAN layer available at the device. |
| qInQCompressionIsAvail | Boolean<br>false | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Packet compression on layer of a second VLAN available at the device. |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| mplsCompressionIsAvail | Boolean<br>false | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Packet compression on mpls layer available at the device. |
| ipv4CompressionIsAvail | Boolean<br>false | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Packet compression on layer 3 for IPv4 available at the device. |
| ipv6CompressionIsAvail | Boolean<br>false | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Packet compression on layer 3 for IPv6 available at the device. |
| layer4CompressionIsAvail | Boolean<br>false | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Packet compression on layer 4 (TCP and UDP header) available at the device. |
| encryptionIsAvail | Boolean<br>false | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Shall be marked 'true', if Ethernet payload encryption is available. |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| supportedAlarmList | String<br><br>Supported alarms not yet defined. | 2..* | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0 | Available alarms to be listed. Mandatory:'framingIsFaulty' and 'containerIsDown'. Further alarms might be added by the vendor. |
| supportedAlarms | String<br><br>Supported alarms not yet defined. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY<br>Deprecated | Available alarms to be listed. Mandatory:'framingIsFaulty' and 'containerIsDown'. Further alarms might be added by the device. |

### 15.3.1.3 EthernetContainerConfiguration

Qualified Name: MicrowaveModel::ObjectClasses::EthernetContainer::EthernetContainerConfiguration

Applied stereotypes:

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

**Table 26: Attributes for EthernetContainerConfiguration**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| containerID | String<br>No Ethernet Flow associated yet. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | ContainterID in Netconf must be the same as EthernetPortID in OpenFlow so a connection can be made between the two items, which separately exist in the controller. |
| segmentsIDList | SegmentIDType<br>./. | 1..* | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Lists the segments used for transporting this Ethernet container. In case EthernetContainer::ContainerCapability::bundlingIsAvail==0, all TypeDefinitions::segmentIdType::structureId must be identical in the list. |
| packetCompressionIsOn | Boolean<br>false | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | In case packet compression is activated, but no type is activated, it is assumed that the device chooses the optimum. |
| layer2CompressionIsOn | Boolean<br>false | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Packet compression on layer 2 configured at the device. |
| vlanCompressionIsOn | Boolean<br>false | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Packet compression on VLAN layer configured at the device. |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| qInQCompressionIsOn | Boolean<br>false | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Packet compression on layer of a second VLAN configured at the device. |
| mplsCompressionIsOn | Boolean<br>false | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Packet compression on MPLS layer configured at the device. |
| ipv4CompressionIsOn | Boolean<br>false | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Packet compression on layer 3 for IPv4 configured at the device. |
| ipv6CompressionIsOn | Boolean<br>false | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Packet compression on layer 3 for IPv6 configured at the device. |
| layer4CompressionIsOn | Boolean<br>false | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Packet compression on layer 4 (TCP and UDP header) configured at the device. |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| encryptionIsOn | Boolean<br>false | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Activates encryption of the Ethernet payload. |
| cryptographicKey | String<br>Cryptographic key not yet defined. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Key for transforming plaintext into cipher text data. |
| performanceMonitoringCollectionIsOn | Boolean<br>false | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | Enables measurement, collection, storage and access to performance data. |
| problemKindSeverityList | ContainerProblemSeverityType<br>./. | 2..* | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Severity of the problem to be configured. |

### 15.3.1.4 EthernetContainerStatus

Qualified Name: MicrowaveModel::ObjectClasses::EthernetContainer::EthernetContainerStatus


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Applied stereotypes:

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

**Table 27: Attributes for EthernetContainerStatus**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| lastStatusChange | DateTime<br><br>2010-11-20T14:00:00+01:00 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Time the Container entered its current operational status. _format:yyyyMMddhhmmss.s[Z\|{+\|-}HHMm]; 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. |

### 15.3.1.5 EthernetContainerCurrentProblems

Qualified Name: MicrowaveModel::ObjectClasses::EthernetContainer::EthernetContainerCurrentProblems

Applied stereotypes:

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

**Table 28: Attributes for EthernetContainerCurrentProblems**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| currentProblemList | ContainerCurrentProblemType<br>./. | 0..* | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | |

### 15.3.1.6 EthernetContainerCurrentPerformance

Qualified Name: MicrowaveModel::ObjectClasses::EthernetContainer::EthernetContainerCurrentPerformance

Aggregated performance information of the Ethernet container at a particular moment.

Applied stereotypes:

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

**Table 29: Attributes for EthernetContainerCurrentPerformance**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| currentPerformanceDataList | ContainerCurrentPerformanceType<br>./. | 1..2 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | |

### 15.3.1.7 EthernetContainerHistoricalPerformances

Qualified Name: MicrowaveModel::ObjectClasses::EthernetContainer::EthernetContainerHistoricalPerformances

Aggregated performance information of the Ethernet container for a pre-defined measurement interval.

Applied stereotypes:


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

**Table 30: Attributes for EthernetContainerHistoricalPerformances**

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


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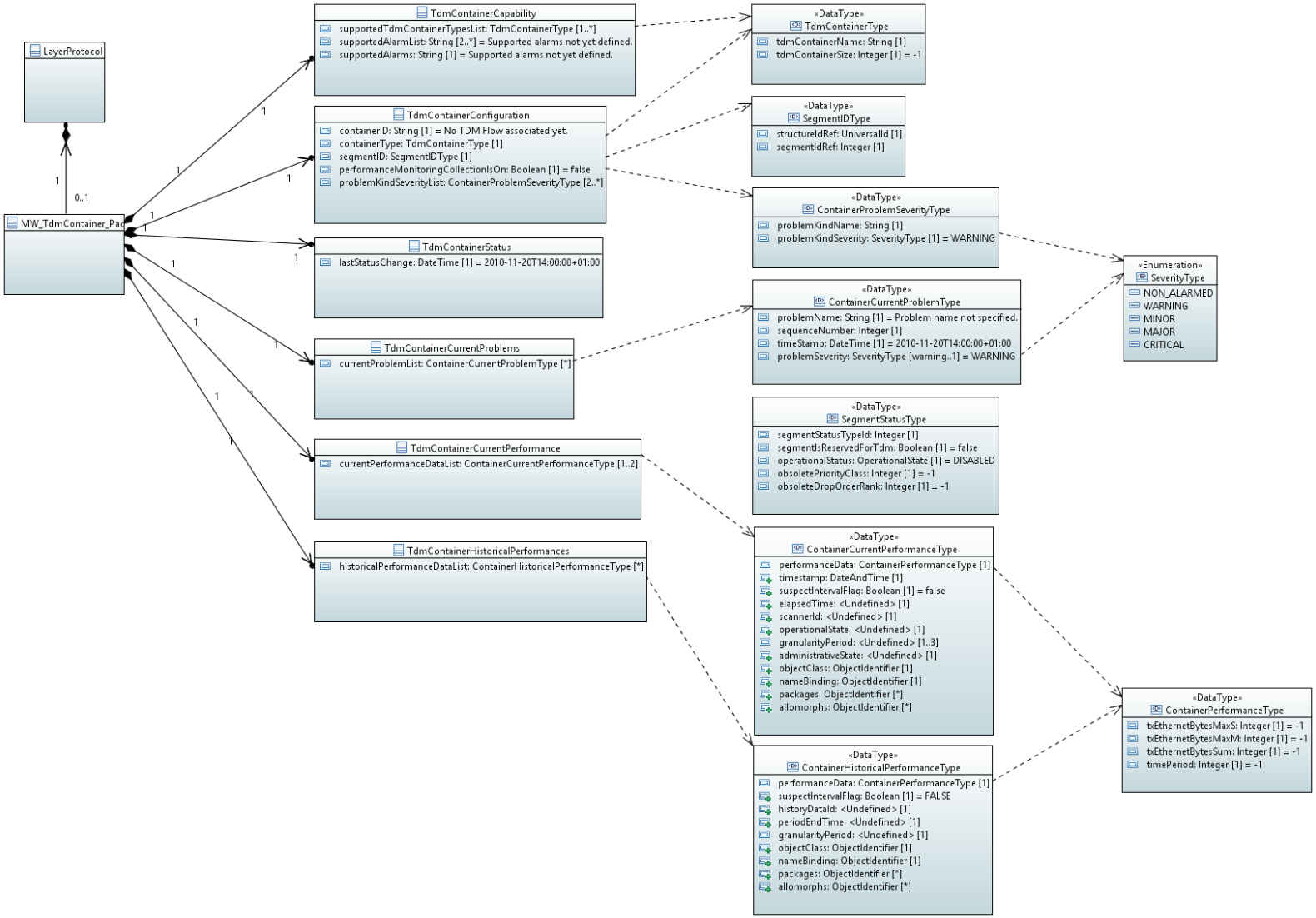
## 15.3.2 TdmContainer_Pac




### 15.3.2.1 MW_TdmContainer_Pac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Qualified Name: MicrowaveModel::ObjectClasses::TdmContainer::MW_TdmContainer_Pac

The TdmContainer_Pac and its attached classes MUST be provided on management interfaces of microwave devices, which are transporting TDM traffic.

Applied stereotypes:

- OpenModelClass
  - objectCreationNotification: YES
  - objectDeletionNotification: YES
  - support: CONDITIONAL_MANDATORY
  - condition: hybrid-microwave In case the microwave device allows Ethernet and native TDM transport in parallel, it has to support this feature on its management interface.

**Table 31: Attributes for MW_TdmContainer_Pac**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| _layerProtocol | LayerProtocol<br>./. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 1<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | CoreModel-CoreNetworkModule-ObjectClasses:NetworkElement/_ltpRefList/_lpList/uuid |
| _tdmContainerCapability | TdmContainerCapability<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |
| _tdmContainerConfiguration | TdmContainerConfiguration<br>./. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| _tdmContainerStatus | TdmContainerStatus<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |
| _tdmContainerCurrentProblems | TdmContainerCurrentProblems<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |
| _tdmContainerCurrentPerformance | TdmContainerCurrentPerformance<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |
| _tdmContainerHistoricalPerformances | TdmContainerHistoricalPerformances<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |

### 15.3.2.2 TdmContainerCapability

Qualified Name: MicrowaveModel::ObjectClasses::TdmContainer::TdmContainerCapability

Bundling is not available.

Applied stereotypes:

- OpenModelClass
  - objectCreationNotification: NO


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- objectDeletionNotification: NO
- support: MANDATORY

**Table 32: Attributes for TdmContainerCapability**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| supportedTdmContainerTypesList | TdmContainerType<br>./. | 1..* | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Lists the TDM containers that are supported. |
| supportedAlarmList | String<br>Supported alarms not yet defined. | 2..* | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this feature for allowing clients with v1.1 managing servers with v1.0. | Available alarms to be listed. Mandatory:'framingIsFaulty' and 'containerIsDown'. Further alarms might be added by the vendor. |
| supportedAlarms | String<br>Supported alarms not yet defined. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY<br>Deprecated | Available alarms to be listed. Mandatory:'framingIsFaulty' and 'containerIsDown'. Further alarms might be added by the device. |

### 15.3.2.3 TdmContainerConfiguration

Qualified Name: MicrowaveModel::ObjectClasses::TdmContainer::TdmContainerConfiguration

Applied stereotypes:

- OpenModelClass


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

**Table 33: Attributes for TdmContainerConfiguration**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| containerID | String<br>No TDM Flow associated yet. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | ContainterID in Netconf must be the same as TDM Flow ID so a connection can be made between the two items, which separately exist in the controller. |
| containerType | TdmContainerType<br>./. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Type of TDM container. |
| segmentID | SegmentIDType<br>./. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Multiplicity = 1; One segment per TDM container; Type of segment must match type of container; |
| performanceMonitoringCollectionIsOn | Boolean<br>false | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | Enables measurement, collection, storage and access to performance data. |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| problemKindSeverityList | ContainerProblemSeverityType<br>./. | 2..* | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Severity of the problem to be configured. |

### 15.3.2.4 TdmContainerStatus

Qualified Name: MicrowaveModel::ObjectClasses::TdmContainer::TdmContainerStatus

Applied stereotypes:

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

**Table 34: Attributes for TdmContainerStatus**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| lastStatusChange | DateTime<br>2010-11-20T14:00:00+01:00 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Time the Container entered its current operational status. _format:yyyyMMddhhmmss.s[Z\|{+\|-}HHMm]; 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. |

### 15.3.2.5 TdmContainerCurrentProblems

Qualified Name: MicrowaveModel::ObjectClasses::TdmContainer::TdmContainerCurrentProblems


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Applied stereotypes:

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

**Table 35: Attributes for TdmContainerCurrentProblems**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| currentProblemList | ContainerCurrentProblemType<br>./. | 0..* | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | |

### 15.3.2.6 TdmContainerCurrentPerformance

Qualified Name: MicrowaveModel::ObjectClasses::TdmContainer::TdmContainerCurrentPerformance

Aggregated performance information of the TDM container at a particular moment.

Applied stereotypes:

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

**Table 36: Attributes for TdmContainerCurrentPerformance**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| currentPerformanceDataList | ContainerCurrentPerformanceType<br>./. | 1..2 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• 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. |


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### 15.3.2.7 TdmContainerHistoricalPerformances

Qualified Name: MicrowaveModel::ObjectClasses::TdmContainer::TdmContainerHistoricalPerformances

Aggregated performance information of the TDM container for a pre-defined measurement interval.

Applied stereotypes:

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

**Table 37: Attributes for TdmContainerHistoricalPerformances**

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


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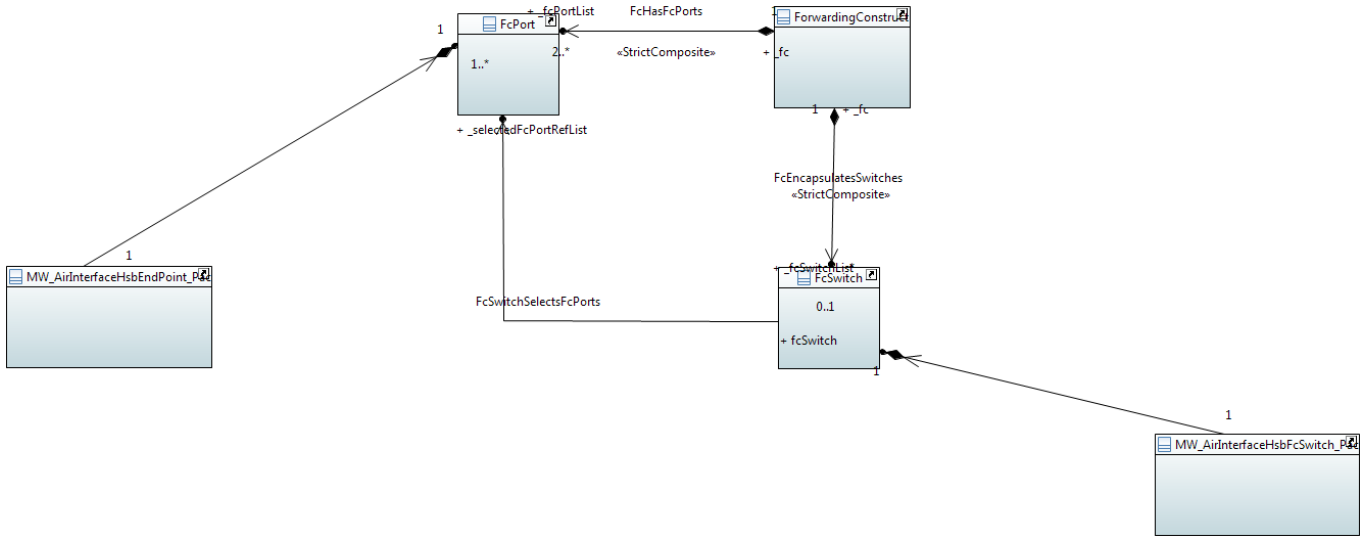
## 15.4 AirInterfaceHsb




### 15.4.1 MW_AirInterfaceHsbFcSwitch_Pac

Qualified Name: MicrowaveModel::ObjectClasses::AirInterfaceHsb::MW_AirInterfaceHsbFcSwitch_Pac

Represents and defines a protection switch structure encapsulated in the forwarding construct. Essentially performs the function of Protection Group. Associates to 2 or more Endpoints each playing the role of a Protection Unit. One or more protection EndPoints (standby/backup) provide protection for one or more working (i.e. regular/main/preferred) Endpoints where either protection or working can feed one or more protected Endpoint. May be used in revertive or non-revertive (symmetric) mode. When in revertive mode may define waitToRestore time. May be used in one of several modes including source switch, destination switched, source and destination switched etc (covering cases such as 1+1 ane 1:1). May be lockout (prevented from switching), force switched or manual switched. Will indicate switch state and change of state.

Applied stereotypes:

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

**Table 38: Attributes for MW_AirInterfaceHsbFcSwitch_Pac**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| protType | ProtectionType<br>HSB | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Indicates the protection scheme that is used for the ProtectionGroup. |
| airInterfaceHsbConfigurationIsFaultySeverity | SeverityType<br>WARNING | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | The level of severity of an airInterfaceHsbConfigurationIsFaulty alarm shall be chosen from an enumeration. |
| airInterfaceHsbIsPartlyDownSeverity | SeverityType<br>WARNING | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | The level of severity for one link out of the HSB configuration being down shall be chosen from an enumeration. |
| airInterfaceHsbIsDownSeverity | SeverityType<br>WARNING | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | The level of severity of the total HSB configuration being down shall be chosen from an enumeration. |
| _fcswitch | FcSwitch<br>./. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 1<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |


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### 15.4.2 MW_AirInterfaceHsbEndPoint_Pac

Qualified Name: MicrowaveModel::ObjectClasses::AirInterfaceHsb::MW_AirInterfaceHsbEndPoint_Pac

The EndPoint (EP) object class models the access to the FC function. Each EndPoint instance has a role (e.g., working, protection, protected, hub, spoke, leaf, root, etc.) with respect to the FC function. The association of the FC to LTPs is made via EndPoints (essentially the ports of the FC) where each EndPoint (EP) of the FC has a role in the context of the FC. The traffic forwarding between the associated End PointsEPs of the FC depends upon the type of FC and may be associated with FCSwitch object instances. In cases where there is protection conveys the protecting role of the access to the FC. The EP replaces the Protection Unit of a traditional protection model. It represents a protected (resilient/reliable) point or a protecting (unreliable working or protection) point.

Applied stereotypes:

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

**Table 39: Attributes for MW_AirInterfaceHsbEndPoint_Pac**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| role | RoleType<br>WORKING | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | |
| _endpoint | FcPort<br>./. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 1<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |


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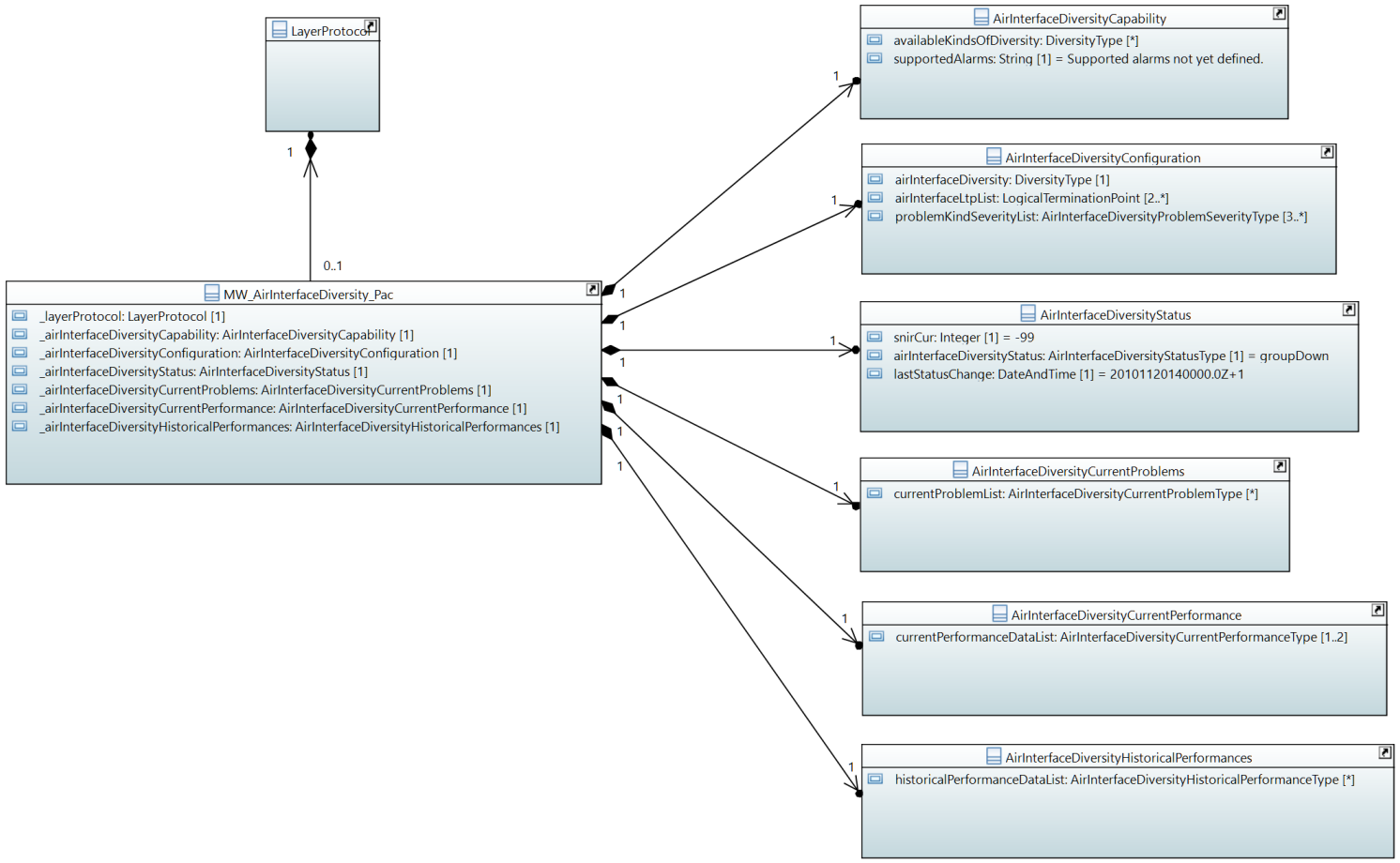
## 15.5 AirInterfaceDiversity_Pac




### 15.5.1 MW_AirInterfaceDiversity_Pac

Qualified Name: MicrowaveModel::ObjectClasses::AirInterfaceDiversity::MW_AirInterfaceDiversity_Pac

Applied stereotypes:

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

**Table 40: Attributes for MW_AirInterfaceDiversity_Pac**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| _layerProtocol | LayerProtocol<br>./. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 1<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | CoreModel-CoreNetworkModule-ObjectClasses:NetworkElement/_ltpRefList/_lpList/uuid |
| _airInterfaceDiversityCapability | AirInterfaceDiversityCapability<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |
| _airInterfaceDiversityConfiguration | AirInterfaceDiversityConfiguration<br>./. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |
| _airInterfaceDiversityStatus | AirInterfaceDiversityStatus<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| _airInterfaceDiversityCurrentProblems | AirInterfaceDiversityCurrentProblems<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |
| _airInterfaceDiversityCurrentPerformance | AirInterfaceDiversityCurrentPerformance<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |
| _airInterfaceDiversityHistoricalPerformances | AirInterfaceDiversityHistoricalPerformances<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | See referenced class |

## 15.5.2 AirInterfaceDiversityCapability

Qualified Name: MicrowaveModel::ObjectClasses::AirInterfaceDiversity::AirInterfaceDiversityCapability

Describes the capabilities in implementing different types of air interface diversity.

Applied stereotypes:

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

**Table 41: Attributes for AirInterfaceDiversityCapability**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| availableKindsOfDiversity | DiversityType<br>./. | 0..* | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Available types of diversity to be listed. |
| supportedAlarmList | String<br>Supported alarms not yet defined. | 2..* | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | Available alarms to be listed. Mandatory:'airInterfaceDiversityConfigurationIsPartlyDown' (at least one air interface is down, but not all of them) and 'airInterfaceDiversityConfigurationIsDown' (all air interfaces are down). Further alarms might be added by the vendor. |
| supportedAlarms | String<br>Supported alarms not yet defined. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY<br>Deprecated | Available alarms to be listed. Mandatory:'airInterfaceDiversityConfigurationIsPartlyDown' (at least one air interface is down, but not all of them) and 'airInterfaceDiversityConfigurationIsDown' (all air interfaces are down). Further alarms might be added by the device. Names are to be separated by commas. |

### 15.5.3 AirInterfaceDiversityConfiguration

Qualified Name: MicrowaveModel::ObjectClasses::AirInterfaceDiversity::AirInterfaceDiversityConfiguration

Applied stereotypes:

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


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**Table 42: Attributes for AirInterfaceDiversityConfiguration**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| airInterfaceDiversity | DiversityType<br>./. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Type of air interface diversity configured at the link. |
| _airInterfaceLtpList | LogicalTerminationPoint<br>./. | 2..* | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | _multiplicity:2-ThisAirInterfaceDiversity::AirInterfaceDiversityConfiguration::airInterfaceDiversity::diversityType::numberOfAirInterfacesMax |
| performanceMonitoringCollectionIsOn | Boolean<br>false | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | Enables measurement, collection, storage and access to performance data. |
| thresholdCrossAlarmList | ThresholdCrossAlarmType<br>./. | 0..6 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | List of threshold cross alarms to be configured. |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| problemKindSeverityList | AirInterfaceDiversityProblemSeverityType<br>./. | 3..* | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Severity of the problem to be configured. |

## 15.5.4 AirInterfaceDiversityStatus

Qualified Name: MicrowaveModel::ObjectClasses::AirInterfaceDiversity::AirInterfaceDiversityStatus

Applied stereotypes:

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

**Table 43: Attributes for AirInterfaceDiversityStatus**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| snirCur | Integer<br>-99 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: dB<br>• support: MANDATORY | Currently measured signal to (noise+interference) ratio of the combined signals. |
| airInterfaceDiversityStatus | AirInterfaceDiversityStatusType<br>GROUP_DOWN | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Status of the air interface bundle. |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| lastStatusChange | DateTime<br><br>2010-11-20T14:00:00+01:00 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Time the Diversity Group entered its current operational status. _format:yyyyMMddhhmmss.s[Z\|{+\|-}HHMm]; 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. |

## 15.5.5 AirInterfaceDiversityCurrentProblems

Qualified Name: MicrowaveModel::ObjectClasses::AirInterfaceDiversity::AirInterfaceDiversityCurrentProblems

Applied stereotypes:

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

**Table 44: Attributes for AirInterfaceDiversityCurrentProblems**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| currentProblemList | AirInterfaceDiversityCurrentProblemType<br><br>./. | 0..* | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | |

## 15.5.6 AirInterfaceDiversityCurrentPerformance

Qualified Name: MicrowaveModel::ObjectClasses::AirInterfaceDiversity::AirInterfaceDiversityCurrentPerformance


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

Applied stereotypes:

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

**Table 45: Attributes for AirInterfaceDiversityCurrentPerformance**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| currentPerformanceDataList | AirInterfaceDiversityCurrentPerformanceType<br><br>./. | 1..2 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• 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. |

## 15.5.7 AirInterfaceDiversityHistoricalPerformances

Qualified Name: MicrowaveModel::ObjectClasses::AirInterfaceDiversity::AirInterfaceDiversityHistoricalPerformances

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

Applied stereotypes:

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

**Table 46: Attributes for AirInterfaceDiversityHistoricalPerformances**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|


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

# 15.6 Data Types

## 15.6.1 ChannelPlanType

Qualified Name: MicrowaveModel::TypeDefinitions::ChannelPlanType

**Table 47: Attributes for ChannelPlanType**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| supportedChannelPlan | String<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 1<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Unique name (e.g. ECC/REC/(01)04_Annex 5) of a document, which describes a frequency grid that can be adjusted at the air interface. Corresponding channel plans to be delivered by the hardware vendor and to be stored by the operator in an controller/application attached database. |
| transmissionModeList | TransmissionModeType<br>./. | 1..* | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| duplexDistanceIsVariable | Boolean<br>false | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | To be set on 'true', if the distance between transmitted and received frequency is variable. |
| duplexDistanceList | Integer<br>-1 | 1..* | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: kHz<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | Distance between transmitted and received frequency. To be filled with single value, in case duplex distance is not variable. To be filled with all configurable values, in case duplex distance is variable. |
| duplexDistance | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: kHz<br>• support: MANDATORY<br>Deprecated | Distance between transmitted and received frequency. |
| autoFreqSelectIsAvail | Boolean<br>false | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | In case the microwave radio is capable of automatically selecting the transmit frequency in unlicensed bands, this field shall contain a 'true'. |

## 15.6.2 TransmissionModeType

Qualified Name: MicrowaveModel::TypeDefinitions::TransmissionModeType


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## Table 48: Attributes for TransmissionModeType

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| transmissionModeId | UniversalId<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 1<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Indentifies the transmissionMode for internal reference. |
| transmissionModeName | String<br>Name of the transmission mode not yet defined. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | Name of the transmission mode. BBBB-m*-i*/t*-r*. B=four digits of channel bandwidth in MHz. m*=required number of digits for modulation name. (i*/t*=code rate.) i*=required number of digits for number of information bits. t*=required number of digits for total bits. r*=required number of digits for rate reduction factor. Example: 028-4QAM-188/204-1 |
| channelBandwidth | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: kHz<br>• support: MANDATORY | Bandwidth of the transmit channel. The value shall be expressed explicitly (means in kHz) not as a reference to an international agreement. The values shall be chosen from the following _list: 3.500, 7.000, 14.000, 27.500, 28.000, 29.000, 29.650, 30.000, 40.000, 50.000, 55.000, 56.000, 59.300, 60.000, 80.000, 100.000, 112.000, 120.000, 150.000, 200.000, 250.000, 500.000, 750.000, 1.000.000, 1.250.000, 1.500.000, 1.750.000, 2.000.000; |
| modulationScheme | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_16_BIT<br>• unit: symbols<br>• support: MANDATORY | Modulation scheme, which is base to the other characteristics described in the same transmissionModeType data type. The modulation scheme shall be described by the number of states in the phase diagram (e.g. BPSK->'2' or 256QAM->'256'). |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| codeRate | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: %<br>• support: MANDATORY | Code rate of the coding scheme in %<br>(Net bit rate ≤ Gross bit rate · code rate). |
| symbolRateReductionFactor | Integer<br>1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: no unit defined<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | Reduction factor for the symbol rate.<br>Example: value would be 4 for 1/4BPSK. |
| txPowerMin | Integer<br>99 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: dBm<br>• support: MANDATORY | Value of the minimum transmit power the modem can operate in dBm. |
| txPowerMax | Integer<br>99 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: dBm<br>• support: MANDATORY | Value of the maximum transmit power the modem can operate in dBm. |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| rxThreshold | Integer<br>99 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_16_BIT<br>• unit: dBm<br>• support: MANDATORY | Value of the receive level required to decode the received signal with a Bit Error Rate of 1e-6 or less. |
| amUpshiftLevel | Integer<br>99 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: dBm<br>• support: MANDATORY | Value of the receive level that has to be exceeded to shift into a higher modulation scheme. |
| amDownshiftLevel | Integer<br>99 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: dBm<br>• support: MANDATORY | Value of the receive level that has to be exceeded for not shifting into a lower modulation scheme. |
| xpicIsAvail | Boolean<br>false | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | In case this air interface type is capable of XPIC, this field shall contain a 'true'. This information shall purely relate to capabilities of the equipment type, but not to the operational capability of a specific hardware composition on site. Means for example that this attribute might contain a 'true' statement, even if an additional cable would have been required to actually operate XPIC in a specific case. |

## 15.6.3 AirInterfaceProblemSeverityType

Qualified Name: MicrowaveModel::TypeDefinitions::AirInterfaceProblemSeverityType

**Table 49: Attributes for AirInterfaceProblemSeverityType**


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| problemKindName | String<br>./. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 1<br>• AVC: NA<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Name of the alarm according to AirInterface::AirInterfaceCapability::supportedAlarms |
| problemKindSeverity | SeverityType<br>WARNING | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Severity of this type of alarm. |

## 15.6.4 AirInterfaceCurrentProblemType

Qualified Name: MicrowaveModel::TypeDefinitions::AirInterfaceCurrentProblemType

**Table 50: Attributes for AirInterfaceCurrentProblemType**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| problemName | String<br>Problem name not specified. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Name of the alarm according to AirInterface::AirInterfaceCapability::supportedAlarms |

## 15.6.5 AirInterfacePerformanceType

Qualified Name: MicrowaveModel::TypeDefinitions::AirInterfacePerformanceType

Consolidated performance information of the air interface.


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**Table 51: Attributes for AirInterfacePerformanceType**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| es | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: MANDATORY | Number of errored seconds. |
| ses | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: MANDATORY | Number of severely errored seconds. |
| cses | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: MANDATORY | Number of consecutive severely errored seconds. |
| unavailability | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: MANDATORY | Total time of unavailability in seconds. |
| txLevelMin | Integer<br>99 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: dBm<br>• support: MANDATORY | Minimum transmit power. Signed integers are required. |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| txLevelMax | Integer<br>99 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: dBm<br>• support: MANDATORY | Maximum transmit power. Signed integers are required. |
| txLevelAvg | Integer<br>99 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: dBm<br>• support: MANDATORY | Averaged transmit power. Signed integers are required. |
| rxLevelMin | Integer<br>99 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: dBm<br>• support: MANDATORY | Minimum receive level. Signed integers are required. |
| rxLevelMax | Integer<br>99 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: dBm<br>• support: MANDATORY | Maximum receive level. Signed integers are required. |
| rxLevelAvg | Integer<br>99 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: dBm<br>• support: MANDATORY | Averaged receive level. Signed integers are required. |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| timeXStatesList | TimeXStatesType<br>./. | 1..* | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | Time period the transmitter operated in the respective transmission mode. |
| time2States | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: MANDATORY<br>Deprecated | Sum of all seconds the transmitter operated in e.g. BPSK. |
| time4StatesS | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: MANDATORY<br>Deprecated | |
| time4States | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: MANDATORY<br>Deprecated | |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| time8States | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: MANDATORY<br>Deprecated | |
| time16StatesS | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: MANDATORY<br>Deprecated | |
| time16States | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: MANDATORY<br>Deprecated | |
| time32States | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: MANDATORY<br>Deprecated | |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| time64States | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: MANDATORY<br>Deprecated | |
| time128States | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: MANDATORY<br>Deprecated | |
| time256States | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: MANDATORY<br>Deprecated | |
| time512States | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: MANDATORY<br>Deprecated | |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| time512StatesL | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: MANDATORY<br>Deprecated | |
| time1024States | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: MANDATORY<br>Deprecated | |
| time1024StatesL | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: MANDATORY<br>Deprecated | |
| time2048States | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: MANDATORY<br>Deprecated | |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| time2048StatesL | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: MANDATORY<br>Deprecated | |
| time4096States | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: MANDATORY<br>Deprecated | |
| time4096StatesL | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: MANDATORY<br>Deprecated | |
| time8192States | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: MANDATORY<br>Deprecated | |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| time8192StatesL | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: MANDATORY<br>Deprecated | |
| snirMin | Integer<br>-99 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: dB<br>• support: MANDATORY | Minimum signal to (noise+interference) ratio. |
| snirMax | Integer<br>-99 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: dB<br>• support: MANDATORY | Maximum signal to (noise+interference) ratio. |
| snirAvg | Integer<br>-99 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: dB<br>• support: MANDATORY | Averaged signal to (noise+interference) ratio. |
| xpdMin | Integer<br>-99 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: dB<br>• support: MANDATORY | Minimum cross polarization discrimination. |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| xpdMax | Integer<br>-99 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: dB<br>• support: MANDATORY | Maximum cross polarization discrimination. |
| xpdAvg | Integer<br>-99 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: dB<br>• support: MANDATORY | Averaged cross polarization discrimination. |
| rfTempMin | Integer<br>-99 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: C<br>• support: MANDATORY | Lowest temperature (in degree Celsius) of the radio module inside the outdoor unit. |
| rfTempMax | Integer<br>-99 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: C<br>• support: MANDATORY | Highest temperature (in degree Celsius) of the radio module inside the outdoor unit. |
| rfTempAvg | Integer<br>-99 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: C<br>• support: MANDATORY | Averaged temperature (in degree Celsius) of the radio module inside the outdoor unit. |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| defectBlocksSum | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_16_BIT<br>• unit: blocks<br>• support: MANDATORY | Total number of blocks that were defect after receiving and could not be corrected by the FEC. |
| timePeriod | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: MANDATORY | Total length of the measurement period. |

## 15.6.6 AirInterfaceCurrentPerformanceType

Qualified Name: MicrowaveModel::TypeDefinitions::AirInterfaceCurrentPerformanceType

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

**Table 52: Attributes for AirInterfaceCurrentPerformanceType**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| performanceData | AirInterfacePerformanceType<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | |

## 15.6.7 AirInterfaceHistoricalPerformanceType

Qualified Name: MicrowaveModel::TypeDefinitions::AirInterfaceHistoricalPerformanceType

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


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**Table 53: Attributes for AirInterfaceHistoricalPerformanceType**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| performanceData | AirInterfacePerformanceType<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | |

## 15.6.8 DiversityType

Qualified Name: MicrowaveModel::TypeDefinitions::DiversityType

**Table 54: Attributes for DiversityType**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| diversityName | String<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 1<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Names to be chosen from the following list: 'spaceDiversity', 'frequencyDiversity' |
| numberOfAirInterfacesMax | Integer<br>1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: air interfaces<br>• support: MANDATORY | Maximum number of air interfaces that could be part of this kind of diversity. |

## 15.6.9 AirInterfaceDiversityProblemSeverityType

Qualified Name: MicrowaveModel::TypeDefinitions::AirInterfaceDiversityProblemSeverityType


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**Table 55: Attributes for AirInterfaceDiversityProblemSeverityType**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| problemKindName | String<br>./. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 1<br>• AVC: NA<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Name of the alarm according to AirInterfaceDiversity::AirInterfaceDiversityCapability::supportedAlarms |
| problemKindSeverity | SeverityType<br>WARNING | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Severity of this type of alarm. |

## 15.6.10 AirInterfaceDiversityCurrentProblemType

Qualified Name: MicrowaveModel::TypeDefinitions::AirInterfaceDiversityCurrentProblemType

**Table 56: Attributes for AirInterfaceDiversityCurrentProblemType**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| problemName | String<br>Problem name not specified. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Name of the alarm according to AirInterfaceDiversity::AirInterfaceDiversityCapability::supportedAlarms |

## 15.6.11 AirInterfaceDiversityPerformanceType

Qualified Name: MicrowaveModel::TypeDefinitions::AirInterfaceDiversityPerformanceType


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Consolidated performance information of the air interface diversity group.

**Table 57: Attributes for AirInterfaceDiversityPerformanceType**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| snirMin | Integer<br>-99 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: dB<br>• support: MANDATORY | Minimum signal to (noise+interference) ratio of the combined signals. |
| snirMax | Integer<br>-99 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: dB<br>• support: MANDATORY | Maximum signal to (noise+interference) ratio of the combined signals. |
| snirAvg | Integer<br>-99 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: dB<br>• support: MANDATORY | Average signal to (noise+interference) ratio of the combined signals. |

## 15.6.12 AirInterfaceDiversityCurrentPerformanceType

Qualified Name: MicrowaveModel::TypeDefinitions::AirInterfaceDiversityCurrentPerformanceType

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

**Table 58: Attributes for AirInterfaceDiversityCurrentPerformanceType**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| performanceData | AirInterfaceDiversityPerformanceType<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | |

## 15.6.13 AirInterfaceDiversityHistoricalPerformanceType

Qualified Name: MicrowaveModel::TypeDefinitions::AirInterfaceDiversityHistoricalPerformanceType

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

**Table 59: Attributes for AirInterfaceDiversityHistoricalPerformanceType**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| performanceData | AirInterfaceDiversityPerformanceType<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | |

## 15.6.14 TdmStructureType

Qualified Name: MicrowaveModel::TypeDefinitions::TdmStructureType

**Table 60: Attributes for TdmStructureType**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| tdmStructureName | String<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 1<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Names to be chosen from the following list:<br>'e1','t1','j1','e3','ds3','stm1','cpri1','cpri2','cpri3','cpri4','cpri5','cpri6' or 'cpri7' |
| tdmSegmentSize | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: kbit/s<br>• support: MANDATORY | Size of the TDM segment in kbit/s.<br>Values to be chosen from the following list: '2048','1544','34000','44736','155520','614400','1228800','2457600','3072000','4915200','6144000' or '9830400; |
| maxNumberOfSegmentsReservable | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: segments<br>• support: MANDATORY | Device specific maximum number of segments (not depending on current air interface configuration) that can be reserved for this type of segment on a single air interface. |

## 15.6.15 StructureProblemSeverityType

Qualified Name: MicrowaveModel::TypeDefinitions::StructureProblemSeverityType

**Table 61: Attributes for StructureProblemSeverityType**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| problemKindName | String<br>./. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 1<br>• AVC: NA<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Name of the alarm according to Structure::StructureCapability::supported Alarms |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| problemKindSeverity | SeverityType<br>WARNING | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Severity of this type of alarm. |

## 15.6.16 StructureCurrentProblemType

Qualified Name: MicrowaveModel::TypeDefinitions::StructureCurrentProblemType

**Table 62: Attributes for StructureCurrentProblemType**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| problemName | String<br>Problem name not specified. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Name of the alarm according to Structure::StructureCapability::supported Alarms |

## 15.6.17 StructurePerformanceType

Qualified Name: MicrowaveModel::TypeDefinitions::StructurePerformanceType

Consolidated performance information of the Structure.

**Table 63: Attributes for StructurePerformanceType**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| timePeriod | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: MANDATORY<br>• condition: | Total length of the measurement period in seconds. |
| es | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | Number of errored seconds. 1+0: Same value as for single air interface. 1+1 and Diversity: Value representing the combined signals. |
| ses | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | Number of severely errored seconds. 1+0: Same value as for single air interface. 1+1 and Diversity: Value representing the combined signals. |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| cses | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | Number of consecutive severely errored seconds. 1+0: Same value as for single air interface. 1+1 and Diversity: Value representing the combined signals. |
| unavailability | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | Total time of unavailability in seconds. 1+0: Same value as for single air interface. 1+1 and Diversity: Value representing the combined signals. |
| rxLevelMin | Integer<br>99 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: dBm<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | Minimum receive level. 1+0: Same value as for single air interface. 1+1: Value representing the combined signals. Diversity: To be left on default value. |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| rxLevelMax | Integer<br>99 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: dBm<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | Maximum receive level. 1+0: Same value as for single air interface. 1+1: Value representing the combined signals. Diversity: To be left on default value. |
| rxLevelAvg | Integer<br>99 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_8_BIT<br>• unit: dBm<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | Averaged receive level. 1+0: Same value as for single air interface. 1+1: Value representing the combined signals. Diversity: To be left on default value. |

### 15.6.18 StructureCurrentPerformanceType

Qualified Name: MicrowaveModel::TypeDefinitions::StructureCurrentPerformanceType

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

**Table 64: Attributes for StructureCurrentPerformanceType**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| performanceData | StructurePerformanceType<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | |

## 15.6.19 StructureHistoricalPerformanceType

Qualified Name: MicrowaveModel::TypeDefinitions::StructureHistoricalPerformanceType

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

**Table 65: Attributes for StructureHistoricalPerformanceType**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| performanceData | StructurePerformanceType<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | |

## 15.6.20 TdmContainerType

Qualified Name: MicrowaveModel::TypeDefinitions::TdmContainerType

**Table 66: Attributes for TdmContainerType**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| tdmContainerName | String<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 1<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Names to be chosen from the following list:<br>'e1','t1','j1','e3','t3','stm1','cpri1','cpri2','cpri3','cpri4','cpri5','cpri6' or 'cpri7' |
| tdmContainerSize | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: kbit/s<br>• support: MANDATORY | Capacity required for transporting this type of container (in kbit/s). Values to be chosen from the following list:<br>'2048','1544','34000','44736','155520','614400','1228800','2457600','3072000','4915200','6144000' or '9830400; |

## 15.6.21 SegmentIDType

Qualified Name: MicrowaveModel::TypeDefinitions::SegmentIDType

Identifies the segments, which are used to transport the container.

**Table 67: Attributes for SegmentIDType**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| structureIdRef | UniversalId<br>./. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 1<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| segmentIdRef | Integer<br>./. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 2<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: LENGTH_16_BIT<br>• unit: no unit defined<br>• support: MANDATORY | Combinations of structureId and segmentId must be unique inside the device to assure that every resource is used just once. |

## 15.6.22 SegmentStatusType

Qualified Name: MicrowaveModel::TypeDefinitions::SegmentStatusType

**Table 68: Attributes for SegmentStatusType**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| segmentStatusTypeId | Integer<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 1<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_16_BIT<br>• unit: no unit defined<br>• support: MANDATORY | |
| segmentIsReservedForTdm | Boolean<br>false | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | The number of segments, which is configured by Structure::StructureConfiguration::tdmReservedNumberOfSegements, has to be reserved for TDM. Starting from the lowest index value, these segments have to be marked with a 'true' in segmentIsReservedForTdm. |
| operationalStatus | OperationalState<br>DISABLED | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Current operational status of each segment. |


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### 15.6.23 ContainerProblemSeverityType

Qualified Name: MicrowaveModel::TypeDefinitions::ContainerProblemSeverityType

**Table 69: Attributes for ContainerProblemSeverityType**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| problemKindName | String<br>./. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 1<br>• AVC: NA<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Name of the alarm according to Container::ContainerCapability::supportedAlarms |
| problemKindSeverity | SeverityType<br>WARNING | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Severity of this type of alarm. |

### 15.6.24 ContainerCurrentProblemType

Qualified Name: MicrowaveModel::TypeDefinitions::ContainerCurrentProblemType

**Table 70: Attributes for ContainerCurrentProblemType**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| problemName | String<br>Problem name not specified. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Name of the alarm according to Container::ContainerCapability::supportedAlarms |

## 15.6.25 ContainerPerformanceType

Qualified Name: MicrowaveModel::TypeDefinitions::ContainerPerformanceType

Consolidated performance information of the Container.

**Table 71: Attributes for ContainerPerformanceType**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| txEthernetBytesMaxS | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: Bytes/s<br>• support: MANDATORY | Counts the number of Bytes of Ethernet traffic (before header compression) transmitted within a second and keeps the highest value within the measurement period. Field to be left blank for all types of TDM containers. |
| txEthernetBytesMaxM | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_64_BIT<br>• unit: Bytes/min<br>• support: MANDATORY | Counts the number of Bytes of Ethernet traffic (before header compression) transmitted within a minute and keeps the highest value with in the measurement period. Field to be left blank for all types of TDM containers. |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| txEthernetBytesSum | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_64_BIT<br>• unit: Bytes<br>• support: MANDATORY | Total number of Bytes of Ethernet traffic (before header compression) transmitted (in direction out of the device) during the measurement period. Field to be left blank for all types of TDM containers. |
| timePeriod | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: MANDATORY | Total length of the measurement period in seconds. |

## 15.6.26 ContainerCurrentPerformanceType

Qualified Name: MicrowaveModel::TypeDefinitions::ContainerCurrentPerformanceType

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

**Table 72: Attributes for ContainerCurrentPerformanceType**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| performanceData | ContainerPerformanceType<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | |

## 15.6.27 ContainerHistoricalPerformanceType

Qualified Name: MicrowaveModel::TypeDefinitions::ContainerHistoricalPerformanceType

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


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**Table 73: Attributes for ContainerHistoricalPerformanceType**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| performanceData | ContainerPerformanceType<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | |

## 15.6.28 ThresholdCrossAlarmType

Qualified Name: MicrowaveModel::TypeDefinitions::ThresholdCrossAlarmType

Allows defining a threshold cross alarm.

**Table 74: Attributes for ThresholdCrossAlarmType**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| g826ValueKind | G826Type<br>./. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 1<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | Kind of performance value that shall be equipped with a threshold alarm. |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| granularityPeriod | GranularityPeriodType<br>./. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 2<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | Period of the performance data collection. |
| alarmRaisingThreshold | Integer<br>-1 | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | Number of events required for raising the threshold cross alarm. |
| alarmClearingThreshold | Integer<br>-1 | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: YES<br>• isInvariant: false<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | Number of events required for clearing the threshold cross alarm. |

### 15.6.29 TimeXStatesType

Qualified Name: MicrowaveModel::TypeDefinitions::TimeXStatesType


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**Table 75: Attributes for TimeXStatesType**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| _transmissionMode | TransmissionModeType<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | Operated transmission mode. |
| time | Integer<br>-1 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: s<br>• support: CONDITIONAL_MANDATORY<br>• condition:revision1_1 All artifacts, which have been added in release TR-532 v1.1, have to be marked with this if-feature statement for allowing clients with v1.1 managing servers with v1.0. | Sum of all seconds the transmitter operated the transmission mode. |

# 15.7 Enumeration Types

## 15.7.1 LoopBackType

Qualified Name: MicrowaveModel::TypeDefinitions::LoopBackType

Contains Enumeration Literals:

- RF_TO_REMOTE:
  - Returning the header information of the remote site back to the remote site on the radio interface between both outdoor units.
- RF_TO_LOCAL:


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    - Returning the header information of the local site back to the local site on the radio interface between both outdoor units.
- IF_TO_REMOTE:
    - Returning the header information of the remote site back to the remote site on the intermediate frequency interface between local indoor unit and outdoor unit.
- IF_TO_LOCAL:
    - Returning the header information of the local site back to the local site on the intermediate frequency interface between local indoor unit and outdoor unit.
- NONE:
- IF:
    - Intermediate Frequency on the interface between indoor and outdoor unit.
        - Deprecated
- RF:
    - Radio Frequency on the interface between outdoor unit and outdoor unit at the remote site.
        - Deprecated
- NON:
        - Deprecated

### 15.7.2 SeverityType

Qualified Name: MicrowaveModel::TypeDefinitions::SeverityType

According to ITU-T M.3160

Contains Enumeration Literals:

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

### 15.7.3 PolarizationType

Qualified Name: MicrowaveModel::TypeDefinitions::PolarizationType

Contains Enumeration Literals:

- NOT_SPECIFIED:
- HORIZONTAL:


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- VERTICAL:

### 15.7.4 ProtectionType

Qualified Name: MicrowaveModel::TypeDefinitions::ProtectionType

Contains Enumeration Literals:

- HSB:

### 15.7.5 RoleType

Qualified Name: MicrowaveModel::TypeDefinitions::RoleType

Contains Enumeration Literals:

- WORKING:
- PROTECTION:
- PROTECTED:

### 15.7.6 AirInterfaceDiversityStatusType

Qualified Name: MicrowaveModel::TypeDefinitions::AirInterfaceDiversityStatusType

Contains Enumeration Literals:

- GROUP_DOWN:
  - All air interfaces that are members of the diversity configuration are down.
- NOT_ALL_AI_ACTIVE:
  - At least one, but not all of the air interfaces that are part of the diversity configuration is not working.
- ALL_AI_ACTIVE:
  - All air interfaces that are part of the diversity configuration are working.

### 15.7.7 GranularityPeriodType

Qualified Name: MicrowaveModel::TypeDefinitions::GranularityPeriodType

The enumeration with the options for granularity period of the performance data.


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Contains Enumeration Literals:

- UNKNOWN:
- PERIOD-15-MIN:
- PERIOD-24-HOURS:

### 15.7.8 G826Type

Qualified Name: MicrowaveModel::TypeDefinitions::G826Type

Contains Enumeration Literals:

- ES:
  - Errored Seconds. Threshold cross alarm will relate to TypeDefinitions::AirInterfacePerformanceType::es .
- SES:
  - Severely Errored Seconds. Threshold cross alarm will relate to TypeDefinitions::AirInterfacePerformanceType::ses .
- CSES:
  - Consecutive Severely Errored Seconds. Threshold cross alarm will relate to TypeDefinitions::AirInterfacePerformanceType::cses .
- NOT_SPECIFIED:

## 15.8 Super Classes

### 15.8.1 MwCurrentProblem

Qualified Name: MicrowaveModel::ObjectClasses::SuperClasses::MwCurrentProblem

Applied stereotypes:

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

**Table 76: Attributes for MwCurrentProblem**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| sequenceNumber | Integer<br>./. | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 1<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: no unit defined<br>• support: MANDATORY | Unique sequence number of the current problem object. |
| timeStamp | DateTime<br>2010-11-20T14:00:00+01:00 | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Time and date of the problem. _format:yyyyMMddhhmmss.s[Z\|{+\|-}HHMm]; 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. |
| problemSeverity | SeverityType<br>WARNING | 1 | R | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Severity of the alarm. |


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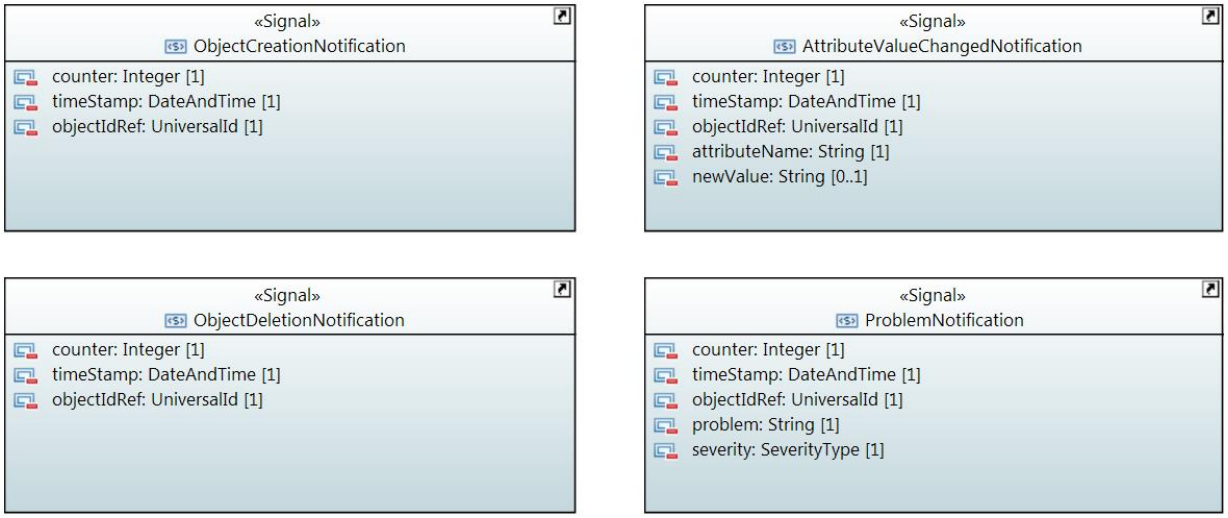
## 15.9 Notifications




### 15.9.1 AttributeValueChangedNotification

Qualified Name: MicrowaveModel::Notifications::AttributeValueChangedNotification

To be sent when an attribute has changed and one or more controllers have to update their data.

Applied stereotypes:

- OpenModelNotification
  - triggerConditionList: invalid
  - support: MANDATORY

**Table 77: Attributes for AttributeValueChangedNotification**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| counter | Integer<br><br>-1 | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: no unit defined<br>• support: MANDATORY | Counts attribute value changed notifications. |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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| timeStamp | DateTime<br>2010-11-20T14:00:00+01:00 | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | |
| objectIdRef | UniversalId<br>./. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | ID of the affected MW_AirInterface_Pac, MW_AirInterfaceDiversity_Pac, MW_Structure_Pac, MW_PureEthernetStructure_Pac, MW_HybridMwStructure_Pac, MW_Container_Pac, MW_EthernetContainer_Pac or MW_TdmContainer_Pac. |
| attributeName | String<br>Attribute name not specified. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Name of the attribute that has been changed. |
| newValue | String<br>New value not specified. | 0..1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Attribute value converted to a string (xml, json, ...) |

## 15.9.2 ObjectCreationNotification

Qualified Name: MicrowaveModel::Notifications::ObjectCreationNotification

To be sent when a new MW_AirInterface_Pac, MW_AirInterfaceDiversity_Pac, MW_Structure_Pac, MW_PureEthernetStructure_Pac, MW_HybridMwStructure_Pac, MW_Container_Pac, MW_EthernetContainer_Pac or MW_TdmContainer_Pac has to be instancieted in the controller.

Applied stereotypes:


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- OpenModelNotification
  - triggerConditionList: invalid
  - support: MANDATORY

**Table 78: Attributes for ObjectCreationNotification**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| counter | Integer<br><br>-1 | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: no unit defined<br>• support: MANDATORY | Counts object creation notifications. |
| timeStamp | DateTime<br><br>2010-11-20T14:00:00+01:00 | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | |
| objectIdRef | UniversalId<br><br>./. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | ID of the affected MW_AirInterface_Pac, MW_AirInterfaceDiversity_Pac, MW_Structure_Pac, MW_PureEthernetStructure_Pac, MW_HybridMwStructure_Pac, MW_Container_Pac, MW_EthernetContainer_Pac or MW_TdmContainer_Pac. |
| objectType | String<br><br>Type of created object not specified. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Type of Object to be chosen from the following list of values: 'MW_AirInterface_Pac', 'MW_AirInterfaceDiversity_Pac', 'MW_Structure_Pac', 'MW_PureEthernetStructure_Pac', 'MW_HybridMwStructure_Pac', 'MW_Container_Pac', 'MW_EthernetContainer_Pac' or 'MW_TdmContainer_Pac'. |


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### 15.9.3 ObjectDeletionNotification

Qualified Name: MicrowaveModel::Notifications::ObjectDeletionNotification

To be sent when a new MW_AirInterface_Pac, MW_AirInterfaceDiversity_Pac, MW_Structure_Pac, MW_PureEthernetStructure_Pac, MW_HybridMwStructure_Pac, MW_Container_Pac, MW_EthernetContainer_Pac or MW_TdmContainer_Pac instance has to be deleted in the controller.

Applied stereotypes:

- OpenModelNotification
  - triggerConditionList: invalid
  - support: MANDATORY

**Table 79: Attributes for ObjectDeletionNotification**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| counter | Integer<br>-1 | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: no unit defined<br>• support: MANDATORY | Counts object deletion notifications. |
| timeStamp | DateTime<br>2010-11-20T14:00:00+01:00 | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | |
| objectIdRef | UniversalId<br>./. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | ID of the affected MW_AirInterface_Pac, MW_AirInterfaceDiversity_Pac, MW_Structure_Pac, MW_PureEthernetStructure_Pac, MW_HybridMwStructure_Pac, MW_Container_Pac, MW_EthernetContainer_Pac or MW_TdmContainer_Pac. |


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### 15.9.4 ProblemNotification

Qualified Name: MicrowaveModel::Notifications::ProblemNotification

To be sent when a problem occurs at a MW_AirInterface_Pac, MW_AirInterfaceDiversity_Pac, MW_Structure_Pac, MW_PureEthernetStructure_Pac, MW_HybridMwStructure_Pac, MW_Container_Pac, MW_EthernetContainer_Pac or MW_TdmContainer_Pac.

Applied stereotypes:

- OpenModelNotification
  - triggerConditionList: invalid
  - support: MANDATORY

**Table 80: Attributes for ProblemNotification**

| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| counter | Integer<br>-1 | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: LENGTH_32_BIT<br>• unit: no unit defined<br>• support: MANDATORY | Counts problem notifications |
| timeStamp | DateTime<br>2010-11-20T14:00:00+01:00 | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | |
| objectIdRef | UniversalId<br>./. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | ID of the affected MW_AirInterface_Pac, MW_AirInterfaceDiversity_Pac, MW_Structure_Pac, MW_PureEthernetStructure_Pac, MW_HybridMwStructure_Pac, MW_Container_Pac, MW_EthernetContainer_Pac or MW_TdmContainer_Pac. |


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| Attribute Name | Type<br>DefaultValue | Multiplicity | Access | Stereotypes | Description |
|---|---|---|---|---|---|
| problem | String<br><br>Problem name not specified. | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Name of the problem according to AirInterface::AirInterfaceCapability::supportedAlarms or AirInterfaceDiversity::AirInterfaceDiversityCapability::supportedAlarms or Structure::StructureCapability::supportedAlarms or PureEthernetStructure::PureEthernetStructureCapability::supportedAlarms or HybridMwStructure::HybridMwStructureCapability::supportedAlarms or Container::ContainerCapability::supportedAlarms or EthernetContainer::EthernetContainerCapability::supportedAlarms or TdmContainer::TdmContainerCapability::supportedAlarms. |
| severity | SeverityType<br><br>WARNING | 1 | RW | OpenModelAttribute<br>• partOfObjectKey: 0<br>• AVC: NO<br>• isInvariant: true<br>• valueRange: no range constraint<br>• bitLength: NA<br>• unit: no unit defined<br>• support: MANDATORY | Severity of the problem according to AirInterface::AirInterfaceConfiguration::problemSeverityList, AirInterfaceDiversity::AirInterfaceDiversityConfiguration::problemSeverityList, Structure::StructureConfiguration::problemSeverityList, PureEthernetStructure::PureEthernetStructureConfiguration::problemSeverityList, HybridMwStructure::HybridMwStructureConfiguration::problemSeverityList, Container::ContainerConfiguration::problemSeverityList, EthernetContainer::EthernetContainerConfiguration::problemSeverityList or TdmContainer::TdmContainerConfiguration::problemSeverityList |


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# 16 Translation Table Functional Model

| Functional Model | Information Model |
|---|---|
| MW-Client | Container |
| MWS | Structures |
| MWS-X | Group of Structures |
| MWPS | AirInterface |

# 17 References

| Reference | Comment |
|---|---|
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| [ONF SDN Arch WL] | SDN Architecture for Wireless Transport Networks 1.0, July 2016 (https://www.opennetworking.org/images/stories/downloads/sdnresources/technical-reports/TR_SDN_ARCH_WL_1.0.pdf) |
| [ONF UMLG] | 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) |
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# 18 Back matter

## 18.1 Editors

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## 18.2 Contributors

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