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</config>

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Change path substrings above from “{path for output files}\” to your local path for the output files and “{path for CoreModel}\” to your local path for the Core Model. <drop/>

DELETE: Prior to publishing this –gd.docx (including for review), change path substrings above from “C:\Users\ndavis\git\OnfInfoModelOutput\” to “{path for output files}\” and from “C:\Users\ndavis\git\ONFInfoModel\OnfModel\” to “{path for CoreModel}\” <drop/>



Core Information Model (CoreModel)

TR-512.A.x

Appendix – Representing OAM

Version 1.6

September 2022

ONF Document Type: Technical Recommendation

ONF Document Name: Core Information Model version 1.6

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**Important note**

This Technical Recommendations has been approved by the Project TST, but has not been approved by the ONF board.  This Technical Recommendation is an update to a previously released TR specification, but it has been approved under the ONF publishing guidelines for ‘Informational’ publications that allow Project technical steering teams (TSTs) to authorize publication of Informational documents.  The designation of ‘-info’ at the end of the document ID also reflects that the project team (not the ONF board) approved this TR.

Finalizing this document once generated… delete this text prior to publication:

* Replace “{{..}}” with square brackets (which trip up Gendoc)
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  + Click menu item “Update Field” (on this large block of text)
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  + Repeat “update fields” 2 more times (on the same large block of text)
    - if “Update Table…” dialogue appears select “Update entire table”
* Remove reviewer comment

Note that the table of contents and figures need to be updated several times as the table length changes the page numbering and the cross references will need to be re-updated.

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Document History

| **Version** | **Date** | **Description of Change** |
| --- | --- | --- |
| 1.6 | September 2022 | Initial version |

# Introduction to the document suite

This document is an appendix of the addendum to the TR-512 ONF Core Information Model and forms part of the description of the ONF-CIM. For general overview material and references to the other parts refer to [TR-512.1](../TR-512.1_OnfCoreIm-Overview.pdf).

## References

For a full list of references see [TR-512.1](../TR-512.1_OnfCoreIm-Overview.pdf).

## Definitions

For a full list of definition see [TR-512.1](../TR-512.1_OnfCoreIm-Overview.pdf).

## Conventions

See [TR-512.1](../TR-512.1_OnfCoreIm-Overview.pdf) for an explanation of:

* UML conventions
* Lifecycle Stereotypes
* Diagram symbol set

## Viewing UML diagrams

Some of the UML diagrams are very dense. To view them either zoom (sometimes to 400%) or open the associated image file (and zoom appropriately) or open the corresponding UML diagram via Papyrus (for each figure with a UML diagram the UML model diagram name is provided under the figure or within the figure).

## Understanding the figures

Figures showing fragments of the model using standard UML symbols and also figures illustrating application of the model are provided throughout this document. Many of the application-oriented figures also provide UML class diagrams for the corresponding model fragments (see [TR-512.1](../TR-512.1_OnfCoreIm-Overview.pdf) for diagram symbol sets). All UML diagrams depict a subset of the relationships between the classes, such as inheritance (i.e. specialization), association relationships (such as aggregation and composition), and conditional features or capabilities. Some UML diagrams also show further details of the individual classes, such as their attributes and the data types used by the attributes.

## Appendix Overview

This document is part of the Appendix to TR-512. An overview of the Appendix is provided in [TR-512.A.1](TR-512.A.1_OnfCoreIm-AppendixOverview.pdf).

# Introduction to this Appendix document

This document explains how the CIM can be used to model OAM and provides various examples.

The examples in this document are built from descriptions in other documents. The examples are supported by a combination of the FC/LTP (as described in [TR-512.2](TR-512.2_OnfCoreIm-ForwardingAndTermination.pdf)), the physical model (as described in [TR-512.](TR-512.6_OnfCoreIm-Physical.pdf)6) and the specification model (as described in [TR-512.7](TR-512.7_OnfCoreIm-Specification.pdf)).

Each case discussed in this document will be supported by FC specs, LTP specs and scheme specs. Most cases do not explicitly show the scheme spec but have been described using the base classes (FC, LTP etc) from which the scheme spec can be derived.

# OAM principles

The network model required to support OAM is discussed in [TR-512.2](TR-512.2_OnfCoreIm-ForwardingAndTermination.pdf). The symbol set used in this section is explained in the “Key to diagram symbol set” section in [TR-512.1](../TR-512.1_OnfCoreIm-Overview.pdf).

This document provides examples of usage of the network model to represent various OAM functions and structures. For each example detailed stylized layouts of functions that are used to drive FD, FC, LTP and scheme spec are provided along with the resulting simple compact representation.

It is intended that sufficient stylized cases are covered here to allow a modeler to represent their specific function/device. It is not intended that all possible cases are covered.

The spec models provide detail to allow interpretation of the properties compacted into the simplified model and hence allow faults to be diagnosed. The figures in this document are essentially pictorial views of specs.

## OAM in the context of termination

### Termination functions (see [TR-512.2](file:///C:\Users\ndavis\git\CoreInfoModel-202006\OnfModel\CoreGendoc\ModelDescriptions\TR-512.2_OnfCoreIm-ForwardingAndTermination.pdf) and [TR-512.7](file:///C:\Users\ndavis\git\CoreInfoModel-202006\OnfModel\CoreGendoc\ModelDescriptions\TR-512.7_OnfCoreIm-Specification.pdf))

### Measurement in traffic processing

Signal properties

Signal control

Continuous frame structured signals

Packet structured signals

### The key elements of measurement

Termination

Signaling

Measurement span

### Types of measurement

Proxy measurements and shared fate

Measurement span

### Network Connection Monitoring (NCM) as an encapsulation of measurement

### Dismantling the LTP

### Basic parts of OAM

## Various assemblies

### Basic parts laid out

### Various LTP encapsulations

### Relating to Tandem Monitoring and MEG/MEP/MIPs

## The OAM job and results

### The concept of a Job

### Using the Task to represent the job

### …

# Detailed OAM examples

## Overview

This section deals ….

# Mapping to TAPI

## Overview

# For further study

## Media Element

**End of Document**

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* delete text from “Template version…” to end of file <drop/>
* insert a line in “Normal” style<drop/>
* insert text (Insert 🡪 Object 🡪 Text from File… (alt njf)) from: <drop/>
  + TR-512.GT\_OnfCoreIm-CommonGendocTemplate-Fragments.docx <drop/>

Template version 0.0.11 1 June 2018 <drop/>

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<fragment name=’insertClass’ importedBundles=’commons;gmf;papyrus’><drop/>  
<arg name=’cl’ type=’uml::Class’/><drop/>  
<arg name=’className’ type=’String’/><drop/>  
<arg name=’packageName’ type=’String’/><drop/>  
[if (not cl.qualifiedName.contains(packageName))]<drop/>  
[else] <drop/>  
[if(cl.name.contains(className))]<drop/>

Qualified Name: [cl.qualifiedName/]

[if cl.ownedComment->notEmpty()]<drop/>

[for (co:Comment | cl.ownedComment)] <drop/>

<dropEmpty>[cleanAndFormat(co.\_body.clean())/]</dropEmpty>

[/for]<drop/>

[else]To be provided

[/if]<drop/>

[if (cl.isAbstract)]<drop/>

This class is abstract.

[/if]<drop/>

[if (cl.oclAsType(uml::Class).general ->notEmpty())]<drop/>

Inherits properties from:

[for (gen:Class | cl.oclAsType(uml::Class).general)]<drop/>

* [gen.name/]

[/for]<drop/>

[/if]<drop/>

[for (st:Stereotype | cl.getAppliedStereotypes())]<drop/>  
[if(not st.name.contains(‘OpenModelClass’))]<drop/>

This class is [st.name/].

[else] <drop/>  
[/if]<drop/>  
[/for]<drop/>  
[else] <drop/>  
[/if]  
[/if]  
</fragment><drop/>

# Fragment: Insert standard diagram <drop/>

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<arg name=’diagramName’ type=’String’/><drop/>  
<arg name=’diagramTitle’ type=’String’/><drop/>

[for (d:Diagram|p.getPapyrusDiagrams())]<drop/>

[if d.name.contains(diagramName)]

<drop/>

<image object='[d.getDiagram()/]' maxW='true' keepH='false' keepW = ‘false’></image>

CoreModel diagram: [d.name/]

Figure 6-2 [diagramTitle/]

[else]<drop/>

[/if]<drop/>

[/for]<drop/>  
</fragment><drop/>

# Fragment: Insert small diagram <drop/>

<fragment name=’insertSmallDiagram’ importedBundles=’commons;gmf;papyrus’><drop/>  
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<arg name=’diagramName’ type=’String’/><drop/>  
<arg name=’diagramTitle’ type=’String’/><drop/>

[for (d:Diagram|p.getPapyrusDiagrams())]<drop/>

[if d.name.contains(diagramName)]

<drop/>

<image object='[d.getDiagram()/]' maxW='true' keepH='false' keepW = ‘false’></image>

CoreModel diagram: [d.name/]

Figure 6-2 [diagramTitle/]

[else]<drop/>

[/if]<drop/>

[/for]<drop/>  
</fragment><drop/>

# Fragment: Insert attribute row brief not Obsolete<drop/>

<fragment name=’insertAttributeRowBriefNotObsolete’ importedBundles=’commons;gmf;papyrus’><drop/>

Does not work unless we have Mature stereotype… <drop/>  
<arg name=’p’ type=’uml::Property’/><drop/>

[for (st:Stereotype | p.getAppliedStereotypes())]<drop/>

[if(not st.name.contains(‘OpenModelAttribute’))]

[if(not st.name.contains(‘Obsolete’))]

| [p.name/] | [for (st:Stereotype | p.getAppliedStereotypes())]<drop/>  [if(not st.name.contains(‘OpenModelAttribute’))] [st.name/]  [/if]<drop/>  [/for]<drop/>  Do NOT remove the previous line as word throws an error if the cell is empty <drop/> | [if p.ownedComment->notEmpty()]<drop/>  [for (c:Comment | p.ownedComment)] <drop/>  [cleanAndFormat(c.\_body.clean())/]  [/for]  [else] [if (p.name.contains (‘\_’))]See referenced class  [else]To be provided  [/if]<drop/>  [/if]<drop/>  Do NOT remove the previous line as word throws an error if the cell is empty <drop/> |
| --- | --- | --- |

[/if]<drop/>

[/if]<drop/>

[/for]<drop/>  
</fragment><drop/>

# Fragment: Insert attribute row brief <drop/>

<fragment name=’insertAttributeRowBrief’ importedBundles=’commons;gmf;papyrus’><drop/>  
<arg name=’p’ type=’uml::Property’/><drop/>

| [p.name/] | [for (st:Stereotype | p.getAppliedStereotypes())]<drop/>  [if(not st.name.contains(‘OpenModelAttribute’))] [st.name/]  [/if]<drop/>  [/for]<drop/>  Do NOT remove the previous line as word throws an error if the cell is empty <drop/> | [if p.ownedComment->notEmpty()]<drop/>  [for (c:Comment | p.ownedComment)] <drop/>  [cleanAndFormat(c.\_body.clean())/]  [/for]  [else] [if (p.name.contains (‘\_’))]See referenced class  [else]To be provided  [/if]<drop/>  [/if]<drop/>  Do NOT remove the previous line as word throws an error if the cell is empty <drop/> |
| --- | --- | --- |

</fragment><drop/>

# Fragment: Start attribute table brief <drop/>

<fragment name=’insertAttributeTableHeader’ importedBundles=’commons;gmf;papyrus’><drop/>  
<arg name=’cl’ type=’uml::Class’/><drop/>

|  |  |  |
| --- | --- | --- |
| **Attribute Name** | **Lifecycle Stereotype (empty = Mature)** | **Description** |

</fragment><drop/>

# Fragment: Insert Attribute table brief <drop/>

<fragment name=’insertAttributeTableBrief’ importedBundles=’commons;gmf;papyrus’ importedFragments='insertAttributeTableHeader;insertAttributeRowBrief’><drop/>  
<arg name=’cl’ type=’uml::Class’/><drop/>  
[if cl.ownedAttribute->notEmpty()]<drop/>

Table 1: Attributes for [cl.name/]

<table><drop/>

[cl.insertAttributeTableHeader ()/]

[for (p:Property|cl.ownedAttribute)]<drop/>

[if (not p.name.contains(‘\_’))]<drop/>

[p.insertAttributeRowBrief ()/]

[/if]<drop/>

[/for]<drop/>

[for (p:Property|cl.ownedAttribute)]<drop/>

[if (p.name.contains(‘\_’))]<drop/>

[p.insertAttributeRowBrief ()/]

[/if]<drop/>

[/for]<drop/>

</table><drop/>

[/if]<drop/>

</fragment><drop/>

# Fragment: Insert Ten Specified Attribute table brief <drop/>

<fragment name=’insertTenSpecifiedAttributeTableBrief’ importedBundles=’commons;gmf;papyrus’ importedFragments='insertAttributeTableHeader;insertAttributeRowBrief’><drop/>  
<arg name=’cl’ type=’uml::Class’/><drop/>

<arg name=’p1’ type=‘String’/><drop/>

<arg name=’p2’ type=‘String’/><drop/>  
<arg name=’p3’ type=‘String’/><drop/>  
<arg name=’p4’ type=‘String’/><drop/>  
<arg name=’p5’ type=‘String’/><drop/>  
<arg name=’p6’ type=‘String’/><drop/>  
<arg name=’p7’ type=‘String’/><drop/>  
<arg name=’p8’ type=‘String’/><drop/>  
<arg name=’p9’ type=‘String’/><drop/>  
<arg name=’p10’ type=‘String’/><drop/>  
[if cl.ownedAttribute->notEmpty()]<drop/>

Table 1: Attributes for [cl.name/]

<table><drop/>

[cl.insertAttributeTableHeader ()/]

[for (p:Property|cl.ownedAttribute)]<drop/>

[if (p.name.contains(p1) or p.name.contains(p2) or p.name.contains(p3) or p.name.contains(p4) or p.name.contains(p5) or p.name.contains(p6) or p.name.contains(p7) or p.name.contains(p8) or p.name.contains(p9) or p.name.contains(p10))]<drop/>

[if (not p.name.contains(‘\_’))]<drop/>

[p.insertAttributeRowBrief ()/]

[/if]<drop/>

[/if]<drop/>

[if (p.name.contains(p1) or p.name.contains(p2) or p.name.contains(p3) or p.name.contains(p4) or p.name.contains(p5) or p.name.contains(p6) or p.name.contains(p7) or p.name.contains(p8) or p.name.contains(p9) or p.name.contains(p10))]<drop/>

[if (p.name.contains(‘\_’))]<drop/>

[p.insertAttributeRowBrief ()/]

[/if]<drop/>

[/if]<drop/>

[/for]<drop/>

</table><drop/>

[/if]<drop/>

</fragment><drop/>

# Fragment: Insert DataType <drop/>

<fragment name=’insertDataType’ importedBundles=’commons;gmf;papyrus’><drop/>  
<arg name=’dt’ type=’uml::DataType’/><drop/>  
<arg name=’dataTypeName’ type=’String’/><drop/>  
<arg name=’packageName’ type=’String’/><drop/>  
[if (dt.qualifiedName.contains(packageName))]<drop/>  
[if(dt.name.contains(dataTypeName))]<drop/>

Qualified Name: [dt.qualifiedName/]

[for (co:Comment | dt.ownedComment)]<drop/>

<dropEmpty>[cleanAndFormat(co.\_body.clean())/]</dropEmpty>

[/for]<drop/>  
[if (dt.oclAsType(uml::DataType).general ->notEmpty())]<drop/>

Inherits properties from:

[for (tp:DataType | dt.oclAsType(uml::DataType).general)]<drop/>

* [tp.name/]

[/for]<drop/>

[for (gen:Class | dt.oclAsType(uml::DataType).general)]<drop/>

* [gen.name/]

[/for]<drop/>

[/if]<drop/>

[for (st:Stereotype | dt.getAppliedStereotypes())]<drop/>  
This class is [st.name/].

[/for]<drop/>  
[else] <drop/>  
[/if]  
[/if]  
</fragment><drop/>

# Fragment: Start Data Type attribute table brief <drop/>

<fragment name=’insertDataTypeAttributeTableHeader’ importedBundles=’commons;gmf;papyrus’><drop/>  
<arg name=’dt’ type=’uml::DataType’/><drop/>

|  |  |  |
| --- | --- | --- |
| **Attribute Name** | **Lifecycle Stereotype (empty = Mature)** | **Description** |

</fragment><drop/>

# Fragment: Insert Data Type Attribute table brief <drop/>

<fragment name=’insertDataTypeAttributeTableBrief’ importedBundles=’commons;gmf;papyrus’ importedFragments='insertDataTypeAttributeTableHeader;insertAttributeRowBrief’><drop/>  
<arg name=’dt’ type=’uml::DataType’/><drop/>  
[if dt.ownedAttribute->notEmpty()]<drop/>

Table 1: Attributes for [dt.name/]

<table><drop/>

[dt.insertDataTypeAttributeTableHeader ()/]

[for (p:Property|dt.ownedAttribute)]<drop/>

[p.insertAttributeRowBrief ()/]

[/for]<drop/>

</table><drop/>

[/if]<drop/>

</fragment><drop/>

# Fragment: Insert enums <drop/>

<fragment name=’insertEnums’ importedBundles=’commons;gmf;papyrus’><drop/>  
<arg name=’dt’ type=’uml::DataType’/><drop/>

#### [dt.name/]

Qualified Name: [dt.qualifiedName/]

[for (co:Comment | dt.ownedComment)]<drop/>

<dropEmpty>[cleanAndFormat(co.\_body.clean())/]</dropEmpty>

[/for]<drop/>

Applied stereotypes:

[if dt.getAppliedStereotypes()->notEmpty()] <drop/>

[for (st:Stereotype | dt.getAppliedStereotypes())]<drop/>

* [st.name/]

[/for]<drop/>

[else] No stereotypes applied

[/if]<drop/>

[if (dt.oclAsType(uml::DataType).general ->notEmpty())]<drop/>

Inherits literals from:

[for (tp:DataType | dt.oclAsType(uml::DataType).general)]<drop/>

* [tp.name/]

[/for]

[/if]<drop/>

[if (dt.oclAsType(Enumeration).ownedLiteral->notEmpty())]<drop/>

Contains Enumeration Literals:

[for (e:EnumerationLiteral|dt.oclAsType(Enumeration).ownedLiteral)]<drop/>

* [e.name/]:
  + [for (co:Comment | e.ownedComment)]<drop/>
  + <dropEmpty>[cleanAndFormat(co.\_body.clean())/]
  + </dropEmpty>[/for]<drop/>
  + [if dt.getAppliedStereotypes()->notEmpty()] <drop/>
  + Applied stereotypes:
    - [for (st:Stereotype | e.getAppliedStereotypes())]<drop/>
    - [st.name/]
    - [/for]<drop/>
  + [/if]<drop/>

[/for]<drop/>

[/if]<drop/>

</fragment><drop/>