TAPI UML Model

COMMON

Version 2.5.0

ONF Document Type: Technical Recommendation

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Document History

Version	Date	Description of Change
2.3	May 27, 2021	Model Dump *Gendoc generates documentation from Eclipse Modeling Framework (EMF) models using document templates in formats such as OpenOffice Writer (.odt), Microsoft Word (.docx), Microsoft Excel (.xlsx) and Microsoft Powerpoint (.pptx).*
2.4.0	December 2022	See high level diff document in Github
2.4.1	March 2023	See high level diff document in Github
2.5.0	October 2023	See high level diff document in Github

1 Common Model

TapiCommon: This module contains TAPI Common Model definitions. Source: TapiCommon.uml
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1.1 Diagrams

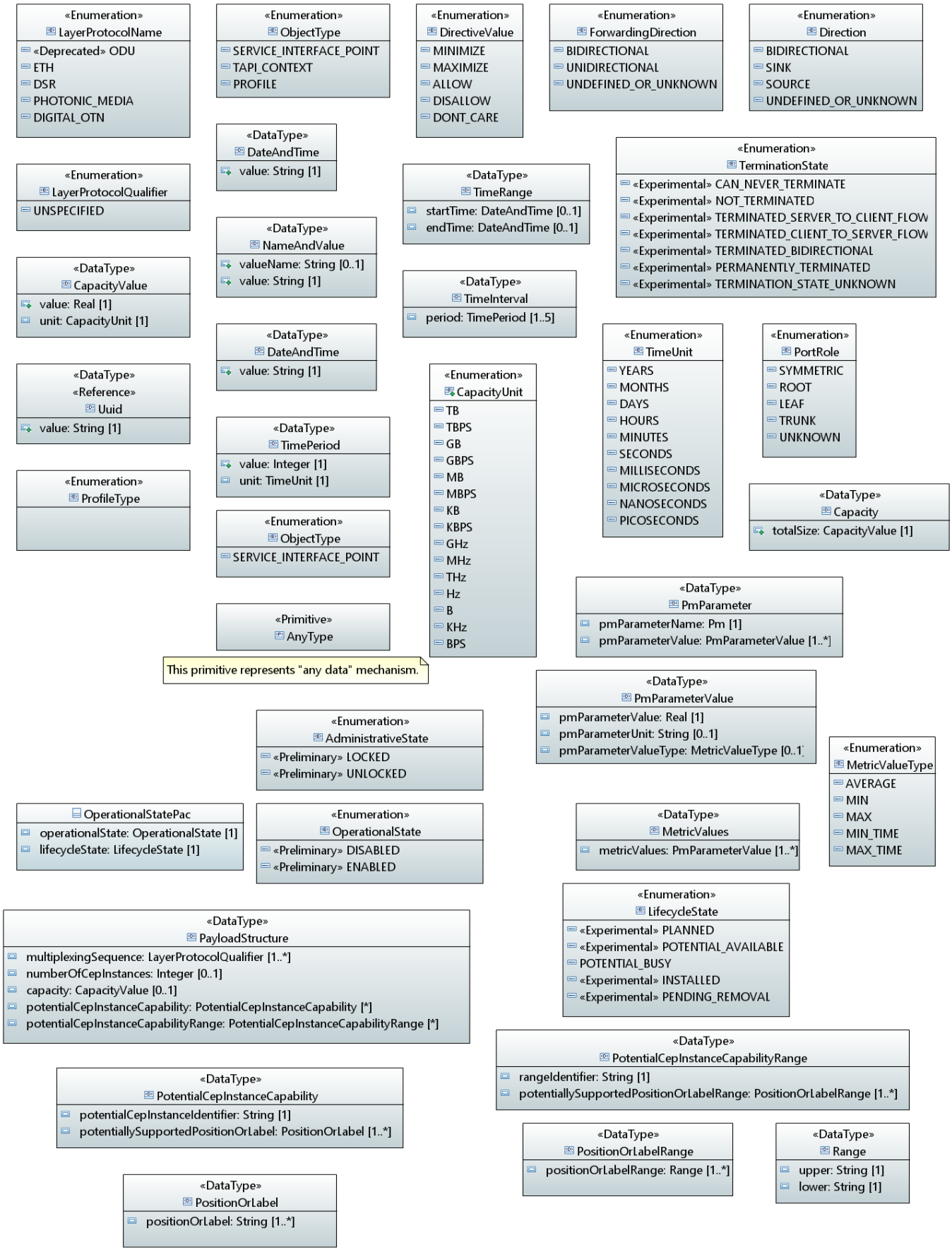

Figure 1 – Diagram *CommonDataTypes*

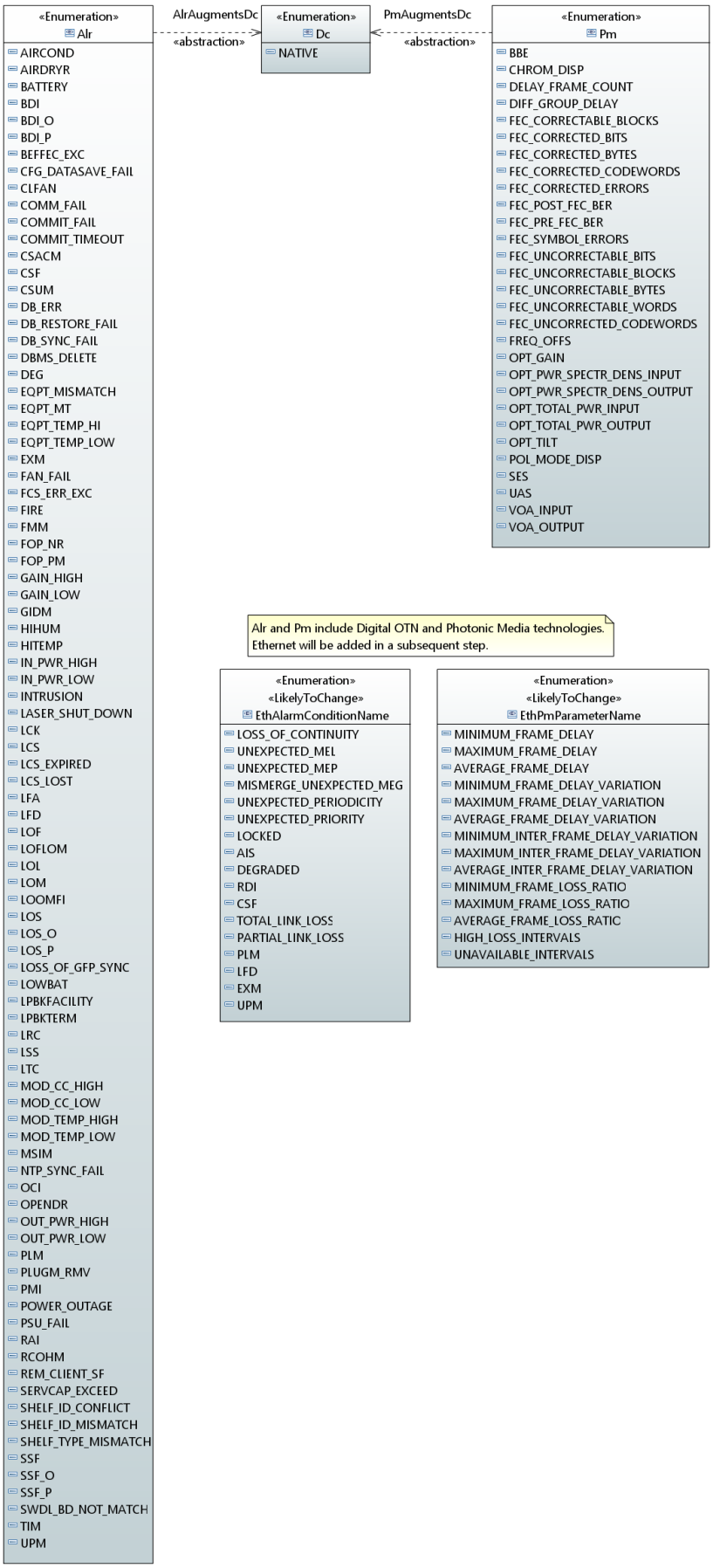

Figure 2 – Diagram *CommonOamFmTypes*

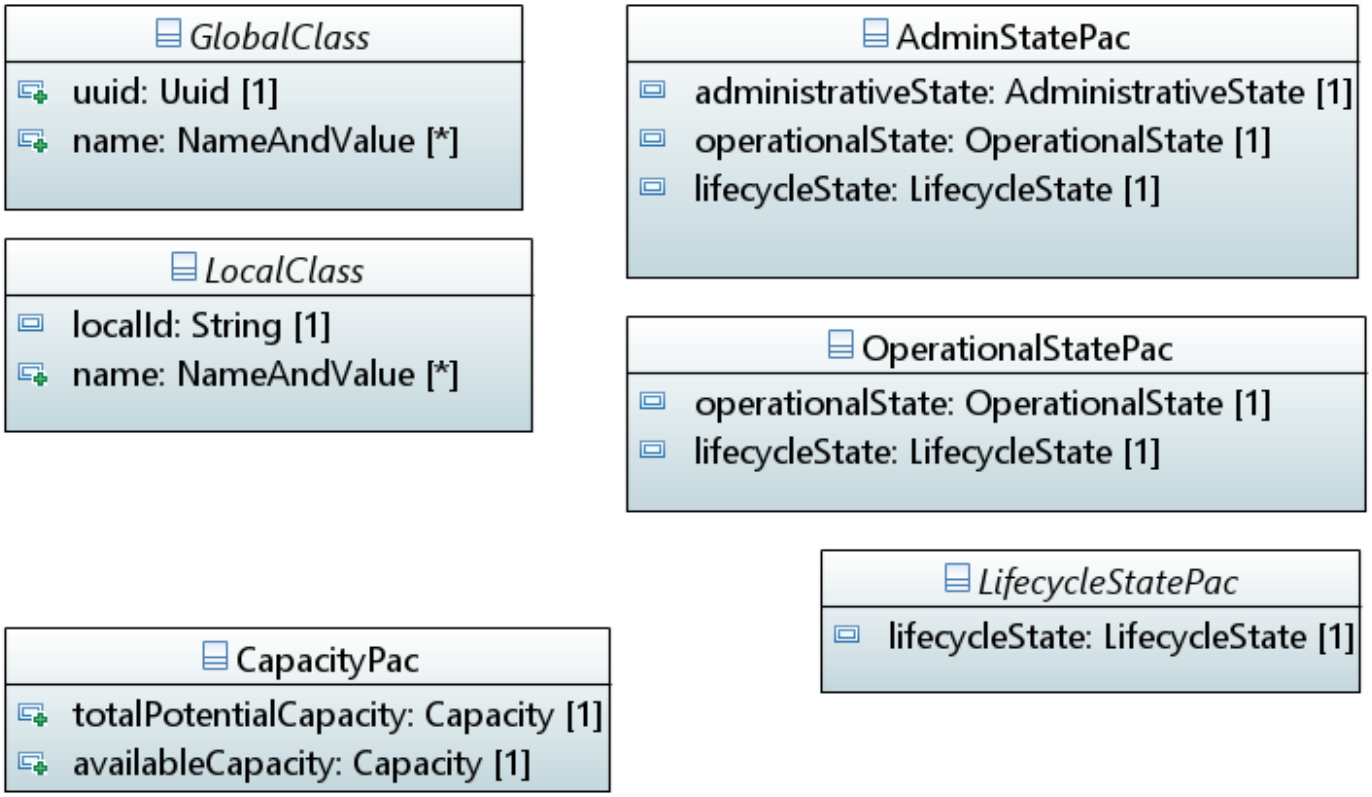

Figure 3 – Diagram *CommonPacs*

Figure 4 – Diagram *Context*

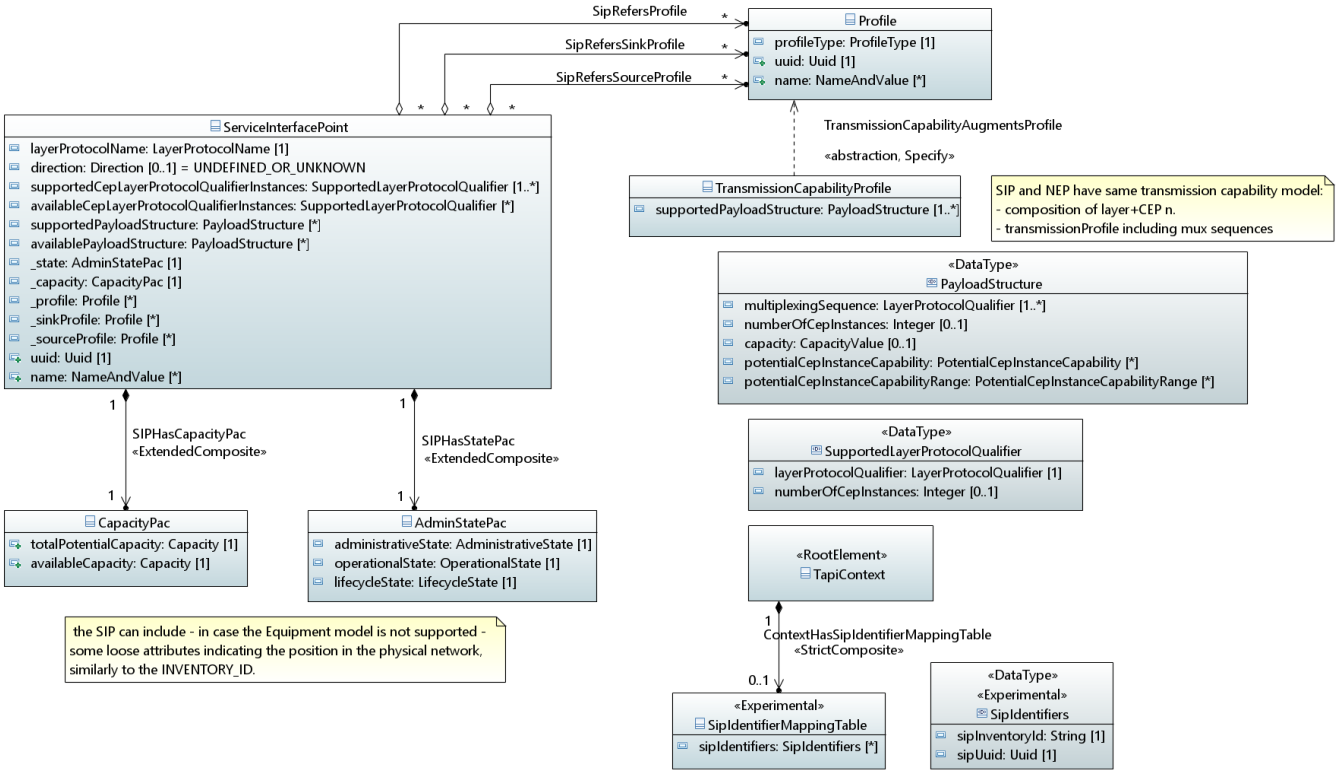

Figure 5 – Diagram *ServicePointDetails*

1.2 Classes

1.2.1 AdminStatePac

Description:

- Provides state attributes that are applicable to an entity that can be administered. Such an entity also has operational and lifecycle aspects.

Applied stereotypes:

- OpenInterfaceModelClass
  - objectCreationNotification: NA
  - objectDeletionNotification: NA
- OpenModelClass
  - support: MANDATORY

Attribute Name	Type	Mult.	Access	Stereotypes
administrativeState	AdministrativeState	1	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: No • isInvariant: false • valueRange: no range constraint • support: MANDATORY

Attribute Name	Type	Mult.	Access	Stereotypes
	Description: The administration of managed objects operates independently of the operability and usage of managed objects and is described by the administrative state attribute. The administrative state is used by the operator to make a resource available for service, or to remove a resource from service.			
operationalState	OperationalState	1	R	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: The operational state gives the information about the real capability of a resource to provide or not provide service.			
lifecycleState	LifecycleState	1	R	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: Used to track the planned deployment, allocation to clients and withdrawal of resources.			

Table 1 – Attributes for class *AdminStatePac*

1.2.2 CapacityPac

Description:

- Provides capacity related attributes.

Applied stereotypes:

- OpenInterfaceModelClass
  - objectCreationNotification: NA
  - objectDeletionNotification: NA
- OpenModelClass
  - support: MANDATORY

Attribute Name	Type	Mult.	Access	Stereotypes
totalPotentialCapacity	Capacity	1	R	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: An optimistic view of the capacity of the entity assuming that any shared capacity is available to be taken.			

Attribute Name	Type	Mult.	Access	Stereotypes
availableCapacity	Capacity	1	R	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: Capacity available to be assigned.			

Table 2 – Attributes for class *CapacityPac*

1.2.3 GlobalClass

Description:

- This class serves as the super class for all TAPI entities that can be directly retrieved by their ID. As such, these are first class entities and their ID is expected to be globally unique.

Applied stereotypes:

- OpenInterfaceModelClass
  - objectCreationNotification: NA
  - objectDeletionNotification: NA
- OpenModelClass
  - support: MANDATORY

Attribute Name	Type	Mult.	Access	Stereotypes
uuid	Uuid	1	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: yes – part: 1 • isInvariant: true • valueRange: no range constraint • support: MANDATORY
	Description: UUID: An identifier that is universally unique within an identifier space, where the identifier space is itself globally unique, and immutable. An UUID carries no semantics with respect to the purpose or state of the entity. UUID here uses string representation as defined in RFC 4122. The canonical representation uses lowercase characters. Pattern: [0-9a-fA-F]{8}-[0-9a-fA-F]{4}-[0-9a-fA-F]{4}-' + '[0-9a-fA-F]{4}-[0-9a-fA-F]{12} Example of a UUID in string representation: f81d4fae-7dec-11d0-a765-00a0c91e6bf6			
name	NameAndValue	0..*	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: List of names. This value is unique in some namespace but may change during the life of the entity. A name carries no semantics with respect to the purpose of the entity.			

Table 3 – Attributes for class *GlobalClass*

1.2.4 LifecycleStatePac

Description:

- Provides state attributes for an entity that has lifecycle aspects only.

Applied stereotypes:

- OpenInterfaceModelClass
  - objectCreationNotification: NA
  - objectDeletionNotification: NA
- OpenModelClass
  - support: MANDATORY

Attribute Name	Type	Mult.	Access	Stereotypes
lifecycleState	LifecycleState	1	R	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: Used to track the planned deployment, allocation to clients and withdrawal of resources.			

Table 4 – Attributes for class *LifecycleStatePac*

1.2.5 LocalClass

Description:

- This class serves as the super class for all TAPI entities that are ancillary of first class entities, i.e. their ID is not expected to be globally unique.

Applied stereotypes:

- OpenInterfaceModelClass
  - objectCreationNotification: NA
  - objectDeletionNotification: NA
- OpenModelClass
  - support: MANDATORY

Attribute Name	Type	Mult.	Access	Stereotypes
localId	PrimitiveTypes::String	1	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: yes – part: 1 • isInvariant: true • valueRange: no range constraint • support: MANDATORY
	Description: An identifier that is unique in the context of the GlobalClass from which it is inseparable.			

Attribute Name	Type	Mult.	Access	Stereotypes
name	NameAndValue	0..*	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: List of names. This value is unique in some namespace but may change during the life of the entity. A name carries no semantics with respect to the purpose of the entity.			

Table 5 – Attributes for class *LocalClass*

1.2.6 OperationalStatePac

Description:

- Provides state attributes that are applicable to an entity that reflects operational aspects. Such an entity is expected to also have lifecycle aspects.

Applied stereotypes:

- OpenInterfaceModelClass
  - objectCreationNotification: NA
  - objectDeletionNotification: NA
- OpenModelClass
  - support: MANDATORY

Attribute Name	Type	Mult.	Access	Stereotypes
operationalState	OperationalState	1	R	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: The operational state gives the information about the real capability of a resource to provide or not provide service.			
lifecycleState	LifecycleState	1	R	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: Used to track the planned deployment, allocation to clients and withdrawal of resources.			

Table 6 – Attributes for class *OperationalStatePac*

1.2.7 Profile

Applied stereotypes:

- OpenInterfaceModelClass
  - objectCreationNotification: NA
  - objectDeletionNotification: NA
- OpenModelClass
  - support: MANDATORY

Attribute Name	Type	Mult.	Access	Stereotypes
profileType	ProfileType	1	R	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description:			
uuid Inherited: *TapiCommon::ObjectClasses::GlobalClass::uuid*	Uuid	1	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: yes – part: 1 • isInvariant: true • valueRange: no range constraint • support: MANDATORY
	Description: UUID: An identifier that is universally unique within an identifier space, where the identifier space is itself globally unique, and immutable. An UUID carries no semantics with respect to the purpose or state of the entity. UUID here uses string representation as defined in RFC 4122. The canonical representation uses lowercase characters. Pattern: [0-9a-fA-F]{8}-[0-9a-fA-F]{4}-[0-9a-fA-F]{4}-' + '[0-9a-fA-F]{4}-[0-9a-fA-F]{12} Example of a UUID in string representation: f81d4fae-7dec-11d0-a765-00a0c91e6bf6			
name Inherited: *TapiCommon::ObjectClasses::GlobalClass::name*	NameAndValue	0..*	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: List of names. This value is unique in some namespace but may change during the life of the entity. A name carries no semantics with respect to the purpose of the entity.			

Table 7 – Attributes for class *Profile*

1.2.8 ServiceInterfacePoint

Description:

- A Service Interface Point represents the network-interface-facing aspects of the edge-port functions that access the forwarding capabilities provided by the Node. Hence it provides a limited, simplified view of interest to external clients (e.g. shared addressing, capacity, resource availability, etc.), that enable the clients to request connectivity without the need to understand the provider network internals.

Applied stereotypes:

- OpenInterfaceModelClass
  - objectCreationNotification: NA
  - objectDeletionNotification: NA
- OpenModelClass
  - support: MANDATORY

Attribute Name	Type	Mult.	Access	Stereotypes
layerProtocolName	LayerProtocolName	1	R	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: The layer protocol of the ServiceInterfacePoint (SIP). Usage of layerProtocolName [>1] in the ServiceInterfacePoint should be considered experimental.			
direction	Direction Default value: *UNDEFINED_OR_UNKNOWN*	0..1	R	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: The SIP direction. It is intended the "internal viewpoint", i.e. the source SIP is sending to the network, the sink SIP is sending from the network. If direction attribute is missing the ServiceInterfacePoint (SIP) instance is to be intended as "BIDIRECTIONAL".			
supportedCepLayerProtocolQualifierInstances	SupportedLayerProtocolQualifier	1..*	R	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: The supported sub-layer(s) or rate(s) of Layer Protocol.			
availableCepLayerProtocolQualifierInstances	SupportedLayerProtocolQualifier	0..*	R	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description:			

Attribute Name	Type	Mult.	Access	Stereotypes
supportedPayloadStructure	PayloadStructure	0..*	R	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description:			
availablePayloadStructure	PayloadStructure	0..*	R	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description:			
_state *Navigable association end of:* *SIPHasStatePac*	AdminStatePac	1	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: The ServiceInterfacePoint (SIP) status information.			
_capacity *Navigable association end of:* *SIPHasCapacityPac*	CapacityPac	1	R	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: The ServiceInterfacePoint (SIP) capacity information.			
_profile *Navigable association end of:* *SipRefersProfile*	Profile	0..*	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description:			

Attribute Name	Type	Mult.	Access	Stereotypes
_sinkProfile *Navigable association end of:* *SipRefersSinkProfile*	Profile	0..*	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description:			
_sourceProfile *Navigable association end of:* *SipRefersSourceProfile*	Profile	0..*	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description:			
uuid Inherited: *TapiCommon::ObjectClasses::GlobalClass ::uuid*	Uuid	1	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: yes – part: 1 • isInvariant: true • valueRange: no range constraint • support: MANDATORY
	Description: UUID: An identifier that is universally unique within an identifier space, where the identifier space is itself globally unique, and immutable. An UUID carries no semantics with respect to the purpose or state of the entity. UUID here uses string representation as defined in RFC 4122. The canonical representation uses lowercase characters. Pattern: [0-9a-fA-F]{8}-[0-9a-fA-F]{4}-[0-9a-fA-F]{4}-' + '[0-9a-fA-F]{4}-[0-9a-fA-F]{12} Example of a UUID in string representation: f81d4fae-7dec-11d0-a765-00a0c91e6bf6			
name Inherited: *TapiCommon::ObjectClasses::GlobalClass ::name*	NameAndValue	0..*	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: List of names. This value is unique in some namespace but may change during the life of the entity. A name carries no semantics with respect to the purpose of the entity.			

Table 8 – Attributes for class *ServiceInterfacePoint*

1.2.9 SipIdentifierMappingTable

Description:

- Table for the mapping between UUID and Inventory Id of SIPs.

Applied stereotypes:

- OpenInterfaceModelClass

- objectCreationNotification: NA
- objectDeletionNotification: NA

- OpenModelClass
  - support: MANDATORY
- Experimental

Attribute Name	Type	Mult.	Access	Stereotypes
sipIdentifiers	SipIdentifiers	0..*	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: Table for the mapping between UUID and Inventory Id of SIPs.			

Table 9 – Attributes for class *SipIdentifierMappingTable*

1.2.10 TapiContext

Description:

- This object class represents the scope of control that a particular SDN controller has with respect to a particular network, (i.e., encompassing a designated set of interconnected (virtual) network elements). This class includes the list of Service Interface Points. This class can be augmented by specific contexts, e.g. topology context.

Applied stereotypes:

- RootElement
  - name: invalid
  - multiplicity: invalid
  - description: invalid
- OpenInterfaceModelClass
  - objectCreationNotification: NA
  - objectDeletionNotification: NA
- OpenModelClass
  - support: MANDATORY

Attribute Name	Type	Mult.	Access	Stereotypes
_serviceInterfacePoint *Navigable association end of:* *ContextHasSIPs*	ServiceInterfacePoint	0..*	R	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: The ServiceInterfacePoint (SIP) instances belonging to this context.			

Attribute Name	Type	Mult.	Access	Stereotypes
_profile *Navigable association end of:* *ContextHasProfiles*	Profile	0..*	R	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description:			
_sipIdentifierMappingTable *Navigable association end of:* *ContextHasSipIdentifierMappingTable*	SipIdentifierMappingTable	0..1	R	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: Table for the mapping between UUID and Inventory Id of SIPs.			
uuid Inherited: *TapiCommon::ObjectClasses::GlobalClass ::uuid*	Uuid	1	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: yes – part: 1 • isInvariant: true • valueRange: no range constraint • support: MANDATORY
	Description: UUID: An identifier that is universally unique within an identifier space, where the identifier space is itself globally unique, and immutable. An UUID carries no semantics with respect to the purpose or state of the entity. UUID here uses string representation as defined in RFC 4122. The canonical representation uses lowercase characters. Pattern: [0-9a-fA-F]{8}-[0-9a-fA-F]{4}-[0-9a-fA-F]{4}-' + '[0-9a-fA-F]{4}-[0-9a-fA-F]{12} Example of a UUID in string representation: f81d4fae-7dec-11d0-a765-00a0c91e6bf6			
name Inherited: *TapiCommon::ObjectClasses::GlobalClass ::name*	NameAndValue	0..*	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: List of names. This value is unique in some namespace but may change during the life of the entity. A name carries no semantics with respect to the purpose of the entity.			

Table 10 – Attributes for class *TapiContext*

1.2.11 TransmissionCapabilityProfile

Applied stereotypes:

- OpenInterfaceModelClass
  - objectCreationNotification: NA
  - objectDeletionNotification: NA

- OpenModelClass
  - support: MANDATORY

Attribute Name	Type	Mult.	Access	Stereotypes
supportedPayloadStructure	PayloadStructure	1..*	R	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: Description of (potential) capability.			

Table 11 – Attributes for class *TransmissionCapabilityProfile*

1.3 Signals

1.4 Associations

1.4.1 ContextHasProfiles

Applied stereotype:

- StrictComposite

Association end role name	Aggreg. type	Navigable	Target Class	Mult.
_profile	composite	Yes	Profile	0..*
tapicontext	none	No	TapiContext	1

Table 12 – Member ends for association *ContextHasProfiles*

1.4.2 ContextHasSIPs

Applied stereotype:

- StrictComposite

Association end role name	Aggreg. type	Navigable	Target Class	Mult.
_serviceInterfacePoint	composite	Yes	ServiceInterfacePoint	0..*
context	none	No	TapiContext	1

Table 13 – Member ends for association *ContextHasSIPs*

1.4.3 ContextHasSipIdentifierMappingTable

Applied stereotype:

- StrictComposite

Association end role name	Aggreg. type	Navigable	Target Class	Mult.
_sipIdentifierMappingTable	composite	Yes	SipIdentifierMappingTable	0..1
tapicontext	none	No	TapiContext	1

Table 14 – Member ends for association *ContextHasSipIdentifierMappingTable*

1.4.4 SIPHasCapacityPac

Applied stereotype:

- ExtendedComposite

Association end role name	Aggreg. type	Navigable	Target Class	Mult.
_capacity	composite	Yes	CapacityPac	1
serviceinterfacepoint	none	No	ServiceInterfacePoint	1

Table 15 – Member ends for association *SIPHasCapacityPac*

1.4.5 SIPHasStatePac

Applied stereotype:

- ExtendedComposite

Association end role name	Aggreg. type	Navigable	Target Class	Mult.
_state	composite	Yes	AdminStatePac	1
_serviceEndPoint	none	No	ServiceInterfacePoint	1

Table 16 – Member ends for association *SIPHasStatePac*

1.4.6 SipRefersProfile

Association end role name	Aggreg. type	Navigable	Target Class	Mult.
_profile	shared	Yes	Profile	0..*
serviceinterfacepoint	none	No	ServiceInterfacePoint	0..*

Table 17 – Member ends for association *SipRefersProfile*

1.4.7 SipRefersSinkProfile

Association end role name	Aggreg. type	Navigable	Target Class	Mult.
_sinkProfile	shared	Yes	Profile	0..*
serviceinterfacepoint	none	No	ServiceInterfacePoint	0..*

Table 18 – Member ends for association *SipRefersSinkProfile*

1.4.8 SipRefersSourceProfile

Association end role name	Aggreg. type	Navigable	Target Class	Mult.
_sourceProfile	shared	Yes	Profile	0..*
serviceinterfacepoint	none	No	ServiceInterfacePoint	0..*

Table 19 – Member ends for association *SipRefersSourceProfile*

1.5 Abstractions

1.5.1 AlrAugmentsDc

Augmenting Enumeration	Augmented Enumeration

Alr	Dc
- AIRCOND - AIRDRYR - BATTERY - BDI - BDI_O - BDI_P - BEFFEC_EXC - CFG_DATASAVE_FAIL - CLFAN - COMMIT_FAIL - COMMIT_TIMEOUT - COMM_FAIL - CSACM - CSF - CSUM - DBMS_DELETE - DB_ERR - DB_RESTORE_FAIL - DB_SYNC_FAIL - DEG - EQPT_MISMATCH - EQPT_MT - EQPT_TEMP_HI - EQPT_TEMP_LOW - EXM - FAN_FAIL - FCS_ERR_EXC - FIRE - FMM - FOP_NR - FOP_PM - GAIN_HIGH - GAIN_LOW - GIDM - HIHUM - HITEMP - INTRUSION - IN_PWR_HIGH - IN_PWR_LOW - LASER_SHUT_DOWN - LCK - LCS - LCS_EXPIRED - LCS_LOST - LFA - LFD - LOF - LOFLOM - LOL - LOM - LOOMFI - LOS - LOSS_OF_GFP_SYNC - LOS_O - LOS_P - LOWBAT - LPBKFACILITY - LPBKTERM - LRC - LSS - LTC - MOD_CC_HIGH - MOD_CC_LOW - MOD_TEMP_HIGH - MOD_TEMP_LOW - MSIM	- NATIVE

- NTP_SYNC_FAIL - OCI - OPENDR - OUT_PWR_HIGH - OUT_PWR_LOW - PLM - PLUGM_RMV - PMI - POWER_OUTAGE - PSU_FAIL - RAI - RCOHM - REM_CLIENT_SF - SERVCAP_EXCEED - SHELF_ID_CONFLICT - SHELF_ID_MISMATCH - SHELF_TYPE_MISMATCH - SSF - SSF_O - SSF_P - SWDL_BD_NOT_MATCH - TIM - UPM	
Comment Enumeration Augment.	

Table 20 – Member ends for enum abstraction *AlrAugmentsDc*

1.5.2 PmAugmentsDc

Augmenting Enumeration	Augmented Enumeration
Pm - BBE - CHROM_DISP - DELAY_FRAME_COUNT - DIFF_GROUP_DELAY - FEC_CORRECTABLE_BLOCKS - FEC_CORRECTED_BITS - FEC_CORRECTED_BYTES - FEC_CORRECTED_CODEWORDS - FEC_CORRECTED_ERRORS - FEC_POST_FEC_BER - FEC_PRE_FEC_BER - FEC_SYMBOL_ERRORS - FEC_UNCORRECTABLE_BITS - FEC_UNCORRECTABLE_BLOCKS - FEC_UNCORRECTABLE_BYTES - FEC_UNCORRECTABLE_WORDS - FEC_UNCORRECTED_CODEWORDS - FREQ_OFFS - OPT_GAIN - OPT_PWR_SPECTR_DENS_INPUT - OPT_PWR_SPECTR_DENS_OUTPUT - OPT_TILT - OPT_TOTAL_PWR_INPUT - OPT_TOTAL_PWR_OUTPUT - POL_MODE_DISP - SES - UAS - VOA_INPUT - VOA_OUTPUT	Dc - NATIVE
Comment Enumeration Augment.	

Table 21 – Member ends for enum abstraction *PmAugmentsDc*

1.5.3 TransmissionCapabilityAugmentsProfile

Augmenting Class	Augmented Class	Comment
TransmissionCapabilityProfile	TapiCommon::ObjectClasses::Profile	
target: "/TapiCommon:Context: context/TapiCommon:Context: profile"		

Table 22 – Member ends for class abstraction *TransmissionCapabilityAugmentsProfile*

1.6 Data Types

1.6.1 Capacity

Description:

- Information on capacity of a particular entity.

Attribute Name	Type	Mult.	Access	Stereotypes
totalSize	CapacityValue	1	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: yes – part: 1 • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: Total capacity of the entity. In case of bandwidthProfile, this is expected to be the same as the committedInformationRate.			

Table 23 – Attributes for data type *Capacity*

1.6.2 CapacityValue

Description:

- The Capacity (Bandwidth) values that are applicable for digital layers.

Attribute Name	Type	Mult.	Access	Stereotypes
value	PrimitiveTypes::Real	1	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey:No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: The specific value of the capacity.			
unit	CapacityUnit	1	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey:No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: The specific unit of measurement of the capacity.			

Table 24 – Attributes for data type *CapacityValue*

1.6.3 DateAndTime

Description:

- This primitive type defines the date and time according to ISO 8601 with the following structure: yyyyMMddhhmmss.s[Z|{+|-}HHMm] where: yyyy 0000..9999 year MM 01..12 month dd 01..31 day hh 00..23 hour mm 00..59 minute ss 00..60 second (60 for leap seconds) s .0...9 tenth of second (set to .0 if EMS or NE cannot support this granularity) Z Z indicates UTC (rather than local time) {+|-} + or - delta from UTC HH 00..23 time zone difference in hours Mm 00..59 time zone difference in minutes.

Attribute Name	Type	Mult.	Access	Stereotypes
value	PrimitiveTypes::String	1	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey:No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: The specific value of the date and time.			

Table 25 – Attributes for data type *DateAndTime*

1.6.4 MetricValues

Attribute Name	Type	Mult.	Access	Stereotypes
metricValues	PmParameterValue	1..*	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey:No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description:			

Table 26 – Attributes for data type *MetricValues*

1.6.5 NameAndValue

Description:

- A scoped name-value pair.

Attribute Name	Type	Mult.	Access	Stereotypes
valueName	PrimitiveTypes::String	0..1	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: yes – part: 1 • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: The name of the value. Optional, the value need not to have a name.			
value	PrimitiveTypes::String	1	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey:No • isInvariant: false • valueRange: no range constraint • support: MANDATORY

Attribute Name	Type	Mult.	Access	Stereotypes
	Description: The specific value.			

Table 27 – Attributes for data type *NameAndValue*

1.6.6 PayloadStructure

Description:

- The supported multiplexing sequences, e.g. - ODU0; ODU1; ODU2; ODU4 : 80 - ODU0; ODU1; ODU2; ODU3; ODU4 : 64 - ODUflex; ODU2; ODU3; ODU4 : 64 [64/ts] : 10G - ODUflex; ODU2; ODU4: 80 [80/ts] : 10G - ODU1; ODU2; ODU3; ODUCn : 40 [mult. for n] - ODU2; ODU4; ODUCn: 10 [mult. for n] - ODU2; ODU3: ODU4; ODUCn: 8 [mult. for n] - ODU3; ODU4; ODUCn: 2 [mult. for n] - OTSiMC; MC; OMS; OTS : 80 : 50G - ODUCn; OTSiMC : 2 : 200G - ODUCn; OTSiMC : 1 : 400G In each sequence, the first entry indicates the upper most client (non-terminated) CEP, the rest of entries indicate the server terminated CEPs (forming the mux path).

Attribute Name	Type	Mult.	Access	Stereotypes
multiplexingSequence	LayerProtocolQualifier	1..*	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey:No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: List of layer protocol qualifiers composing the multiplexing sequence.			
numberOfCepInstances	PrimitiveTypes::Integer	0..1	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey:No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: The maximum number of uppermost client CEPs (non-terminated). This relates to the first entry of the mux sequence.			
capacity	CapacityValue	0..1	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey:No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: The maximum capacity of the multiplexing sequence. E.g. in case of ODUFlex.			

Attribute Name	Type	Mult.	Access	Stereotypes
potentialCepInstanceCapability	PotentialCepInstanceCapability	0..*	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey:No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: Capability of supportable potential CEP instances.			
potentialCepInstanceCapabilityRange	PotentialCepInstanceCapabilityRange	0..*	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey:No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description:			

Table 28 – Attributes for data type *PayloadStructure*

1.6.7 PmParameter

Description:

- PM metric name and value.

Attribute Name	Type	Mult.	Access	Stereotypes
pmParameterName	Pm	1	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey:No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: The name of the PM metric. Technology specific modules may define specific PM metrics.			
pmParameterValue	PmParameterValue	1..*	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey:No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: The value of the PM metric.			

Table 29 – Attributes for data type *PmParameter*

1.6.8 PmParameterValue

Description:

- PM metric value.

Attribute Name	Type	Mult.	Access	Stereotypes
pmParameterValue	PrimitiveTypes::Real	1	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey:No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: The PM Parameter value. The type Real allows the representation of e.g. either gauges or counters.			
pmParameterUnit	PrimitiveTypes::String	0..1	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey:No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: The PM Parameter unit.			
pmParameterValueType	MetricValueType	0..1	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: yes – part: 1 • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description:			

Table 30 – Attributes for data type *PmParameterValue*

1.6.9 PositionOrLabel

Attribute Name	Type	Mult.	Access	Stereotypes
positionOrLabel	PrimitiveTypes::String	1..*	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey:No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: The set of information composing a position or label of a CEP (potential) instance.			

Table 31 – Attributes for data type *PositionOrLabel*

1.6.10 PositionOrLabelRange

Attribute Name	Type	Mult.	Access	Stereotypes
positionOrLabelRange	Range	1..*	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey:No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description:			

Table 32 – Attributes for data type *PositionOrLabelRange*

1.6.11 PotentialCepInstanceCapability

Attribute Name	Type	Mult.	Access	Stereotypes
potentialCepInstanceIdentifier	PrimitiveTypes::String	1	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: yes – part: 1 • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: Identifier of the potential CEP instance.			
potentiallySupportedPositionOrLabel	PositionOrLabel	1..*	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey:No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: Information related to the signal property in terms of position in the bandwidth. Technology specific example are time-slot, frequency/slot, packet label.			

Table 33 – Attributes for data type *PotentialCepInstanceCapability*

1.6.12 PotentialCepInstanceCapabilityRange

Attribute Name	Type	Mult.	Access	Stereotypes
rangeIdentifier	PrimitiveTypes::String	1	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: yes – part: 1 • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description:			

Attribute Name	Type	Mult.	Access	Stereotypes
potentiallySupportedPositionOrLabelRange	PositionOrLabelRange	1..*	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey:No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description:			

Table 34 – Attributes for data type *PotentialCepInstanceCapabilityRange*

1.6.13 Range

Attribute Name	Type	Mult.	Access	Stereotypes
upper	PrimitiveTypes::String	1	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey:No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description:			
lower	PrimitiveTypes::String	1	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey:No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description:			

Table 35 – Attributes for data type *Range*

1.6.14 SipIdentifiers

Description:

- Each entry provides the mapping between the UUID and the Inventory Id of a SIP instance.

Applied stereotype:

- Experimental

Attribute Name	Type	Mult.	Access	Stereotypes
sipInventoryId	PrimitiveTypes::String	1	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: yes – part: 1 • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: Inventory ID of the SIP.			
sipUuid	Uuid	1	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey:No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: UUID of the SIP.			

Table 36 – Attributes for data type *SipIdentifiers*

1.6.15 SupportedLayerProtocolQualifier

Attribute Name	Type	Mult.	Access	Stereotypes
layerProtocolQualifier	LayerProtocolQualifier	1	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey:No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description:			
numberOfCepInstances	PrimitiveTypes::Integer	0..1	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey:No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: Number of CEP instances at the layer protocol qualifier.			

Table 37 – Attributes for data type *SupportedLayerProtocolQualifier*

1.6.16 TimeInterval

Description:

- Interval of time, duration. Q.821: The Interval attribute type indicates the time between occurrences of a given activity described by an instance of the Management Operations Schedule object class. The interval can be specified in seconds, minutes, hours, or days.

Attribute Name	Type	Mult.	Access	Stereotypes
period	TimePeriod	1..5	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey:No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: The specific interval of time. Each TimePeriod occurrence specifies a duration in years, months, days, hours, minutes etc. The 1..5 occurrences complies with Q.821. ITU-T Q.821 (02/2000): TimeInterval ::= SEQUENCE { day [0] INTEGER (0..31) DEFAULT 0, hour [1] INTEGER (0..23) DEFAULT 0, minute [2] INTEGER (0..59) DEFAULT 0, second [3] INTEGER (0..59) DEFAULT 0, msec [4] INTEGER (0..999) DEFAULT 0 } Examples: A duration of 1 hour, 15 minutes and 30 seconds should be coded as 3 occurrences of TimePeriod: - HOURS; 1 - MINUTES; 15 - SECONDS; 30 A duration of 1550 milliseconds as two occurrences of TimePeriod: - SECONDS; 1 - MILLISECONDS: 550			

Table 38 – Attributes for data type *TimeInterval*

1.6.17 TimePeriod

Description:

- Period of time.

Attribute Name	Type	Mult.	Access	Stereotypes
value	PrimitiveTypes::Integer	1	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey:No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: The specific value of the time period.			
unit	TimeUnit	1	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey: yes – part: 1 • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: The unit of measurement of the time period.			

Table 39 – Attributes for data type *TimePeriod*

1.6.18 TimeRange

Description:

- Range of time.

Attribute Name	Type	Mult.	Access	Stereotypes
startTime	DateAndTime	0..1	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey:No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: Date and time of the range start.			
endTime	DateAndTime	0..1	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey:No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: Date and time of the range end.			

Table 40 – Attributes for data type *TimeRange*

1.6.19 Uuid

Description:

- The univeral ID value where the mechanism for generation is defined by some authority not directly referenced in the structure. UUID here uses string representation as defined in RFC 4122. The canonical representation uses lowercase characters. Pattern: [0-9a-fA-F]{8}-[0-9a-fA-F]{4}-[0-9a-fA-F]{4}-' + '[0-9a-fA-F]{4}-[0-9a-fA-F]{12} Example of a UUID in string representation: f81d4fae-7dec-11d0-a765-00a0c91e6bf6

Applied stereotype:

- Reference
  - reference: {"source":"rfc6991", "yang-import":"ietf-yang-types/uuid"}

Attribute Name	Type	Mult.	Access	Stereotypes
value	PrimitiveTypes::String	1	RW	OpenInterfaceModelAttribute • AVC: NA OpenModelAttribute • isKey:No • isInvariant: false • valueRange: no range constraint • support: MANDATORY
	Description: The specific value of the universal id.			

Table 41 – Attributes for data type *Uuid*

1.7 Enumerations

1.7.1 AdministrativeState

Description:

- The possible values of the administrativeState.

Contains Enumeration Literals:

- LOCKED
  - Users are administratively prohibited from making use of the resource.
  - Applied stereotype:
    - Preliminary
- UNLOCKED
  - Users are allowed to use the resource.
  - Applied stereotype:
    - Preliminary

1.7.2 Alr

Contains Enumeration Literals:

- AIRCOND
- AIRDRYR
- BATTERY
- BDI
  - G.798: Backward defect indication.
- BDI_O
  - G.798: Backward defect indication overhead.
- BDI_P
  - G.798: Backward defect indication payload.
- BEFFEC_EXC
- CFG_DATASAVE_FAIL
- CLFAN
- COMM_FAIL
- COMMIT_FAIL
- COMMIT_TIMEOUT
- CSACM
  - G.798: Calendar Slot Availability Count Mismatch.
- CSF
  - G.798: Client signal fail.
- CSUM
- DB_ERR
- DB_RESTORE_FAIL
- DB_SYNC_FAIL
- DBMS_DELETE
- DEG
  - G.798, G.806: Signal degrade.
- EQPT_MISMATCH

- EQPT_MT
- EQPT_TEMP_HI
- EQPT_TEMP_LOW
- EXM
  - GFP extension header mismatch. G.806 - Common GFP sink processes: GFP extension header mismatch (dEXM) is raised when the accepted EXI (AcEXI) is different from the expected EXI. dEXM is cleared when AcEXI matches the expected EXI or GFP_SF is active.
- FAN_FAIL
- FCS_ERR_EXC
- FIRE
- FMM
  - G.798: FlexO/FlexE Map Mismatch.
- FOP_NR
  - G.798: ODU linear protection failure of protocol no response.
- FOP_PM
  - G.798: ODU linear protection failure of protocol provisioning mismatch.
- GAIN_HIGH
- GAIN_LOW
- GIDM
  - G.798: Group ID Mismatch.
- HIHUM
- HITEMP
- IN_PWR_HIGH
- IN_PWR_LOW
- INTRUSION
- LASER_SHUT_DOWN
- LCK
  - G.798: Locked.
- LCS
  - G.798, IEEE 802.3, G.709: Loss of character synchronization.
- LCS_EXPIRED
- LCS_LOST
- LFA
  - G.798: Loss of FEC word alignment.
- LFD
  - GFP loss of frame delineation. G.806 - Server layer-specific GFP sink processes: GFP loss of frame delineation (dLFD) is raised when the frame delineation process (clause 6.3.1 of [ITU-T G.7041]) is not in the "SYNC" state. dLFD is cleared when the frame delineation process is in the "SYNC" state.
- LOF
  - G.798, G.783: Loss Of Frame.
- LOFLOM
  - G.798: Loss of frame and multiframe - tributary port #p
- LOL
  - G.798: Loss of lane alignment.
- LOM
  - G.798: Loss of multiframe. Loss of the interleaved FlexESG multi-frame.
- LOOMFI
  - G.798: OPU multiframe (OMFI) reception for OPUk with k = 4

- LOS
  - G.783: Loss Of Signal.
- LOS_O
  - G.798: Loss of signal overhead.
- LOS_P
  - G.798: Loss of signal information from the media element. Loss of optical signal.
- LOSS_OF_GFP_SYNC
- LOWBAT
- LPBKFACILITY
- LPBKTERM
- LRC
  - G.798: Loss of Rate Compensation blocks.
- LSS
  - G.798, O.151: Loss of PRBS lock.
- LTC
  - G.798: Loss of tandem connection.
- MOD_CC_HIGH
- MOD_CC_LOW
- MOD_TEMP_HIGH
- MOD_TEMP_LOW
- MSIM
  - G.798: Multiplex structure identifier mismatch supervision - tributary port #p
- NTP_SYNC_FAIL
- OCI
  - G.798: Open connection indication.
- OPENDR
- OUT_PWR_HIGH
- OUT_PWR_LOW
- PLM
  - Payload mismatch supervision. G.806: The payload label mismatch defect (dPLM) shall be detected if the "accepted TSL" code does not match the "expected TSL" code. If the "accepted TSL" is "equipped non-specific", the mismatch is not detected (TSL: Trail Signal Label). Payload type supervision checks that compatible adaptation functions are used at the source and the sink. This is normally done by adding a signal type identifier at the source adaptation function and comparing it with the expected identifier at the sink. If they do not match, a payload mismatch is detected. G.798 - dPLM at the ODUP layer: dPLM shall be declared if the accepted payload type (AcPT) is not equal to the expected payload type(s) as defined by the specific adaptation function.
- PLUGM_RMV
- PMI
- POWER_OUTAGE
- PSU_FAIL
- RAI
- RCOHM
  - G.798: Resize Control Overhead Mismatch.
- REM_CLIENT_SF
- SERVCAP_EXCEED
- SHELF_ID_CONFLICT
- SHELF_ID_MISMATCH

- SHELF_TYPE_MISMATCH
- SSF
  - Server Signal Fail.
- SSF_O
  - Server Signal Fail Overhead.
- SSF_P
  - Server Signal Fail Payload.
- SWDL_BD_NOT_MATCH
- TIM
  - G.798: Connectivity supervision/trail trace identifier mismatch.
- UPM
  - GFP user payload mismatch. G.806 - Client-specific GFP-F (Frame) and GFP-T (Transparent) sink processes: GFP user payload mismatch (dUPM) is raised when the accepted UPI (AcUPI) is different from the expected UPI. dUPM is cleared when AcUPI matches the expected UPI or GFP_SF is active.

1.7.3 CapacityUnit

Description:

- Units of measurement of the capacity.

Contains Enumeration Literals:

- TB
  - Indicates that the integer CapacityValue is in TeraBytes
- TBPS
  - Indicates that the integer CapacityValue is in Terabit-per-second
- GB
  - Indicates that the integer CapacityValue is in GigaBytes
- GBPS
  - Indicates that the integer CapacityValue is in Gigabit-per-second
- MB
  - Indicates that the integer CapacityValue is in MegaBytes
- MBPS
  - Indicates that the integer CapacityValue is in Megabit-per-second
- KB
  - Indicates that the integer CapacityValue is in KiloBytes
- KBPS
  - Indicates that the integer CapacityValue is in Kilobit-per-second
- GHz
  - Indicates that the integer CapacityValue is in gigahertz (spectrum)
- MHz
  - Indicates that the integer CapacityValue is in megahertz (spectrum)
- THz
  - Indicates that the integer CapacityValue is in terahertz (spectrum)
- Hz
  - Indicates that the integer CapacityValue is in Hertz (spectrum)
- B
  - Indicates that the integer CapacityValue is in bits
- KHz

    - Indicates that the integer CapacityValue is in kilohertz (spectrum)
- BPS
    - Indicates that the integer CapacityValue is in bit-per-second

1.7.4 Dc

Contains Enumeration Literals:

- NATIVE
    - This value indicates an Alarm Condition not standardized by this model and specified only in native info attribute.

1.7.5 Direction

Description:

- The directionality of an entity, e.g. CSEP, CEP, NEP.

Contains Enumeration Literals:

- BIDIRECTIONAL
    - A termination entity with both SINK and SOURCE flows.
- SINK
    - The flow is up the layer stack from the server side to the client side.
- SOURCE
    - The flow is down the layer stack from the client side to the server side.
- UNDEFINED_OR_UNKNOWN
    - Not a normal state. The system is unable to determine the correct value.

1.7.6 DirectiveValue

Description:

- Types of directives.

Contains Enumeration Literals:

- MINIMIZE
    - Directive to minimize.
- MAXIMIZE
    - Directive to maximize.
- ALLOW
    - Directive to allow.
- DISALLOW
    - Directive to disallow
- DONT_CARE
    - Directive is do not care.

1.7.7 EthAlarmConditionName

Applied stereotype:

- LikelyToChange

Contains Enumeration Literals:

- LOSS_OF_CONTINUITY
  - G.8021: The loss of continuity defect is calculated at the ETH layer. It monitors the presence of continuity in ETH trails.
- UNEXPECTED_MEL
  - G.8021: Reception of a CCM frame with an invalid MEL value. Monitoring of the connectivity in a maintenance entity group.
- UNEXPECTED_MEP
  - G.8021: Reception of a CCM frame with an invalid MEP value, but with valid MEL and MEG values. Monitoring of the connectivity in a maintenance entity group.
- MISMERGE_UNEXPECTED_MEG
  - G.8021: Reception of a CCM frame with an invalid MEG value, but with a valid MEL value. Monitoring of the connectivity in a maintenance entity group.
- UNEXPECTED_PERIODICITY
  - G.8021: Reception of a CCM frame with an invalid periodicity value, but with valid MEL, MEG and MEP values. It detects the configuration of different periodicities at different MEPs belonging to the same MEG.
- UNEXPECTED_PRIORITY
  - G.8021: Reception of a CCM frame with an invalid priority value, but with valid MEL, MEG, MEP and periodicity values. It detects the configuration of different priorities for CCM at different MEPs belonging to the same MEG.
- LOCKED
  - G.8021: Reception of a LCK frame.
- AIS
  - G.8021: Reception of an AIS frame.
- DEGRADED
  - G.8021: The defect is detected if there are MI_LM_DEGM (lmDegm of EthMepSink) consecutive bad seconds and cleared if there are MI_LM_M (lmM of EthMepSink) consecutive good seconds. In order to declare a bad second the number of transmitted frames must exceed a threshold (MI_LM_TFMIN, lmTfMin of EthMepSink). Furthermore, if the frame loss ratio (lost frames/transmitted frames) is greater than MI_LM_DEGTHR (lmDegThr of EthMepSink), a bad second is declared. This defect is only defined for point-to-point ETH connections. It monitors the connectivity of an ETH trail.
- RDI
  - G.8021: Remote defect indicator defect, reception by an MEP (indexed by "i", this index not included in the "cause" cRDI) of a CCM frame with valid MEL, MEG, MEP and periodicity values and the RDI flag set to x; where x=0 (remote defect clear) and x=1 (remote defect set).
- CSF
  - G.8021 - ETH layer: Reception of a CSF frame that indicates a client loss of signal (dCSF-LOS) or a client forward defect indication (dCSF-FDI) or a client reverse defect indication (dCSF-RDI). The CSF (CSF-LOS, CSF-FDI, and CSF-RDI) defect is calculated at the ETH layer. It monitors the presence of a CSF maintenance signal. G.8021 - GFP: dCSF is Client-specific GFP-F and GFP-T (resp. Frame and Transparent) sink processes. dCSF-RDI: GFP client signal fail-remote defect indication is raised when a GFP client management frame with the RDI UPI (as defined in Table 6-4 of [ITU-T G.7041]) is received. dCSF-RDI is cleared when no such GFP client management frame is received in N x 1000 ms (a value of 3 is suggested for N), a valid GFP client data frame is received, or a GFP client management frame with the DCI UPI is received. dCSF-FDI: GFP client signal fail-forward defect indication is raised when a GFP client management frame with the FDI UPI (as defined in Table 6-4 of [ITU-T G.7041]) is received. dCSF-FDI is cleared when no such GFP client

management frame is received in N x 1000 ms (a value of 3 is suggested for N), a valid GFP client data frame is received, or a GFP client management frame with the DCI UPI is received. dCSF-LOS: GFP client signal fail-loss of signal is raised when a GFP client management frame with the LOS UPI (as defined in Table 6-4 of [ITU-T G.7041]) is received. dCSF-LOS is cleared when no such GFP client management frame is received in N x 1000 ms (a value of 3 is suggested for N), a valid GFP client data frame is received, or a GFP client management frame with the DCI UPI is received.

- TOTAL_LINK_LOSS
  - G.8021: LAG - fault cause will be raised if no ports are active for an aggregator.
- PARTIAL_LINK_LOSS
  - G.8021: LAG - fault cause shall be raised if the number of active ports is less than the provisioned threshold.
- PLM
  - G.806: The payload label mismatch defect (dPLM) shall be detected if the "accepted TSL" code does not match the "expected TSL" code. If the "accepted TSL" is "equipped non-specific", the mismatch is not detected (TSL: Trail Signal Label). Payload type supervision checks that compatible adaptation functions are used at the source and the sink. This is normally done by adding a signal type identifier at the source adaptation function and comparing it with the expected identifier at the sink. If they do not match, a payload mismatch is detected.
- LFD
  - G.806 - Server layer-specific GFP sink processes: GFP loss of frame delineation (dLFD) is raised when the frame delineation process (clause 6.3.1 of [ITU-T G.7041]) is not in the "SYNC" state. dLFD is cleared when the frame delineation process is in the "SYNC" state.
- EXM
  - G.806 - Common GFP sink processes: GFP extension header mismatch (dEXM) is raised when the accepted EXI (AcEXI) is different from the expected EXI. dEXM is cleared when AcEXI matches the expected EXI or GFP_SF is active.
- UPM
  - G.806 - Client-specific GFP-F (Frame) and GFP-T (Transparent) sink processes: GFP user payload mismatch (dUPM) is raised when the accepted UPI (AcUPI) is different from the expected UPI. dUPM is cleared when AcUPI matches the expected UPI or GFP_SF is active.

1.7.8 EthPmParameterName

Applied stereotype:

- LikelyToChange

Contains Enumeration Literals:

- MINIMUM_FRAME_DELAY
- MAXIMUM_FRAME_DELAY
- AVERAGE_FRAME_DELAY
- MINIMUM_FRAME_DELAY_VARIATION
  - This attribute contains the minimum frame delay variation measured in units of ns (nano second, 1x10e-9 seconds). Y.1563: The 2-point frame delay variation (vk) for an Ethernet frame k between SRC and DST is the difference between the absolute Ethernet frame transfer delay (xk) of frame k and a defined reference Ethernet frame transfer delay, d1,2, between those same MPs: vk = xk – d1,2.
- MAXIMUM_FRAME_DELAY_VARIATION

    - This attribute contains the maximum frame delay variation measured in units of ns (nano second, 1x10e-9 seconds). Y.1563: The 2-point frame delay variation (vk) for an Ethernet frame k between SRC and DST is the difference between the absolute Ethernet frame transfer delay (xk) of frame k and a defined reference Ethernet frame transfer delay, d1,2, between those same MPs: vk = xk – d1,2.
- AVERAGE_FRAME_DELAY_VARIATION
    - This attribute contains the average frame delay variation measured in units of ns (nano second, 1x10e-9 seconds). Y.1563: The 2-point frame delay variation (vk) for an Ethernet frame k between SRC and DST is the difference between the absolute Ethernet frame transfer delay (xk) of frame k and a defined reference Ethernet frame transfer delay, d1,2, between those same MPs: vk = xk – d1,2.
- MINIMUM_INTER_FRAME_DELAY_VARIATION
    - This attribute contains the minimum frame delay variation measured in units of ns (nano second, 1x10e-9 seconds). G.8013/Y.1731: Frame delay variation is a measure of the variations in the frame delay between a pair of service frames
- MAXIMUM_INTER_FRAME_DELAY_VARIATION
    - This attribute contains the maximum frame delay variation measured in units of ns (nano second, 1x10e-9 seconds). G.8013/Y.1731: Frame delay variation is a measure of the variations in the frame delay between a pair of service frames
- AVERAGE_INTER_FRAME_DELAY_VARIATION
    - This attribute contains the average frame delay variation measured in units of ns (nano second, 1x10e-9 seconds). G.8013/Y.1731: Frame delay variation is a measure of the variations in the frame delay between a pair of service frames
- MINIMUM_FRAME_LOSS_RATIO
- MAXIMUM_FRAME_LOSS_RATIO
- AVERAGE_FRAME_LOSS_RATIO
- HIGH_LOSS_INTERVALS
- UNAVAILABLE_INTERVALS

1.7.9 ForwardingDirection

Description:

- The directionality of a forwarding entity, e.g. Link, ConnectivityService, Connection, PathComputationService, Path.

Contains Enumeration Literals:

- BIDIRECTIONAL
    - The fowarding entity supports BIDIRECTIONAL flows at all its (conceptual) ports (i.e. all ports have both an INPUT flow and an OUTPUT flow defined).
- UNIDIRECTIONAL
    - The forwarding entity has (conceptual) ports that are either INPUT or OUTPUT. It has no BIDIRECTIONAL (conceptual) ports.
- UNDEFINED_OR_UNKNOWN
    - Not a normal state. The system is unable to determine the correct value.

1.7.10 LayerProtocolName

Description:

- Provides a controlled list of layer protocol names and indicates the naming authority. Note that it is expected that attributes will be added to this structure to convey the naming authority name, the name of the layer protocol using a human readable string and any particular standard reference.

Contains Enumeration Literals:

- ODU
  - Models the ODU layer as per ITU-T G.872

    - Applied stereotype:
      - Deprecated
- ETH
  - Models the ETH layer as per ITU-T G.8010
- DSR
  - Models a Digital Signal of an unspecified rate (Layer 1 coding functions). This value can be used when the intent is to represent a generic digital layer signal without making any statement on its format or overhead (processing) capabilities.
- PHOTONIC_MEDIA
  - Models the optical signal and media channel layer as per ITU-T G.807
- DIGITAL_OTN
  - Models the OTU/ODU OTN digital layers as per ITU-T G.872

1.7.11 LayerProtocolQualifier

Description:

- This enumeration is used to qualify the sub-layers (if applicable) for a specific LayerProtocol. This extensible enumeration can be augmented with layer-specific values in the respective technology-specific modules.

Contains Enumeration Literals:

- UNSPECIFIED
  - No sub-layer is specified.

1.7.12 LifecycleState

Description:

- The possible values of the lifecycleState.

Contains Enumeration Literals:

- PLANNED
  - The resource is planned but is not present in the network.

    - Applied stereotype:
      - Experimental
- POTENTIAL_AVAILABLE
  - The supporting resources are present in the network but are shared with other clients; or require further configuration before they can be used; or both. When a potential resource is configured and allocated to a client it is moved to the INSTALLED state for that client. If the potential resource has been consumed (e.g. allocated to another client) it is moved to the POTENTIAL_BUSY state for all other clients.

- Applied stereotype:
  - Experimental

- POTENTIAL_BUSY
  - The supporting resources are present in the network but have been allocated to other clients.
- INSTALLED
  - The resource is present in the network and is capable of providing the service expected.

- Applied stereotype:
  - Experimental

- PENDING_REMOVAL
  - The resource has been marked for removal.

- Applied stereotype:
  - Experimental

1.7.13 MetricValueType

Contains Enumeration Literals:
- AVERAGE
- MIN
- MAX
- MIN_TIME
- MAX_TIME

1.7.14 ObjectType

Description:
- The list of TAPI Global Object Class types on which Notification signals can be raised. This extensible enumeration can be augmented with specific object types/classes in the other modules.

Contains Enumeration Literals:
- SERVICE_INTERFACE_POINT
  - The ServiceInterfacePoint (SIP) class.
- TAPI_CONTEXT
  - The TapiContext class.
- PROFILE

1.7.15 OperationalState

Description:
- The possible values of the operationalState.

Contains Enumeration Literals:
- DISABLED
  - The resource is unable to meet the SLA of the user of the resource. If no (explicit) SLA is defined the resource is disabled if it is totally inoperable and unable to provide service to the user.

  - Applied stereotype:
    - Preliminary
- ENABLED
  - The resource is partially or fully operable and available for use.

  - Applied stereotype:
    - Preliminary

1.7.16 Pm

Contains Enumeration Literals:

- BBE

  - Applied stereotype:
    - OpenInterfaceEnumerationLiteral
    - protobufEnumeration: 1
- CHROM_DISP
  - Chromatic Dispersion
- DELAY_FRAME_COUNT
- DIFF_GROUP_DELAY
  - Differential Group Delay
- FEC_CORRECTABLE_BLOCKS
  - FEC Correctable Blocks. Reference: OpenROADM.
- FEC_CORRECTED_BITS
  - The number of bits that were corrected by the FEC. Reference: OpenConfig.
- FEC_CORRECTED_BYTES
  - Bytes corrected between those that were received corrupted. Reference: OpenConfig.
- FEC_CORRECTED_CODEWORDS
  - FEC Corrected Codewords Counter. References: - OpenROADM - 100 GE: IEEE802.3-2018 sections 91.6.9 (FEC_corrected_cw_counter), 45.2.1.112 (MDIO) - 400 GE: IEEE802.3-2018 sections 119.3.1 (FEC_corrected_cw_counter), 45.2.3.61 (MDIO)
- FEC_CORRECTED_ERRORS
  - ITU-T G798: The number of bits corrected by the FEC are counted over one second and reported to the MI at the end of the second. For the application of this filter, see the specific atomic functions. During signal fail conditions of the data signal, no corrected bits shall be counted. For details on the signal fail conditions, see the specific atomic functions. Other reference: OpenROADM.
- FEC_POST_FEC_BER
  - Bit error rate after correction by FEC. Reference: OpenConfig.
- FEC_PRE_FEC_BER
  - Bit error rate before correction by FEC. References: - OpenConfig - OpenROADM
- FEC_SYMBOL_ERRORS
  - FEC Symbol Error Counter. references: - OpenROADM - 100 GE: IEEE802.3-2018 sections 91.6.12 (FEC_symbol_error_counter_i), 45.2.1.115/116 (MDIO) - 400 GE: IEEE802.3-2018 sections 119.3.1 (FEC_symbol_error_counter_i), 45.2.3.57/58 (MDIO)
- FEC_UNCORRECTABLE_BITS
  - Bits that could not be corrected by FEC.
- FEC_UNCORRECTABLE_BLOCKS

    - FEC Uncorrectable Blocks. References: - OpenConfig - OpenROADM
- FEC_UNCORRECTABLE_BYTES
    - Bytes that could not be corrected by FEC.
- FEC_UNCORRECTABLE_WORDS
    - The number of words that were uncorrectable by the FEC. Reference: OpenConfig.
- FEC_UNCORRECTED_CODEWORDS
    - FEC Uncorrected Codewords Counter. references: - OpenROADM - 100 GE: IEEE802.3-2018 sections 91.6.10 (FEC_uncorrected_cw_counter), 45.2.1.113 (MDIO) - 400 GE: IEEE802.3-2018 sections 119.3.1 (FEC_uncorrected_cw_counter), 45.2.3.62 (MDIO)
- FREQ_OFFS
    - Frequency Offset
- OPT_GAIN
- OPT_PWR_SPECTR_DENS_INPUT
- OPT_PWR_SPECTR_DENS_OUTPUT
- OPT_TOTAL_PWR_INPUT
- OPT_TOTAL_PWR_OUTPUT
- OPT_TILT
- POL_MODE_DISP
    - Polarization Mode Dispersion
- SES
- UAS
- VOA_INPUT
- VOA_OUTPUT

1.7.17 PortRole

Description:

- The role of a (conceptual) port of a forwarding entity, e.g. Link, ConnectivityService, Connection, PathComputationService, Path, VirtualNetworkService.

Contains Enumeration Literals:

- SYMMETRIC
    - A port that can exchange flows (e.g. distinct packet flows) with any other port(s) in a forwarding entity. The SYMMETRIC role applies to point to point and multipoint to multipoint connection schemes.
- ROOT
    - A port that can exchange flows (e.g. distinct packet flows) with any other port(s) in a forwarding entity. The ROOT role is unique to the Rooted Multipoint connection scheme.
- LEAF
    - A port that can only exchange flows (e.g. distinct packet flows) with any other ROOT or TRUNK port(s) in a forwarding entity. The LEAF role is unique to the Rooted Multipoint connection scheme.
- TRUNK
    - The TRUNK role is unique to the ENNI involved in a Rooted Multipoint connection scheme. It provides a way to extend the concept of ROOT and LEAF bidirectionally across the ENNI without having to create multiple ports (Leaves and Roots) and hairpinning from one to the other.
- UNKNOWN
    - Not a normal state. The system is unable to determine the correct value.

1.7.18 ProfileType

Contains Enumeration Literals:

1.7.19 TerminationState

Description:

- Provides support for the range of behaviours and specific states that the termination function of a termination entity can take with respect to the termination of the signal.

Contains Enumeration Literals:

- CAN_NEVER_TERMINATE
  - A non-flexible case that can never be terminated.
    - Applied stereotype:
      - Experimental
- NOT_TERMINATED
  - A flexible termination that can terminate but is currently not terminated.
    - Applied stereotype:
      - Experimental
- TERMINATED_SERVER_TO_CLIENT_FLOW
  - A flexible termination that is currently terminated for server to client flow only.
    - Applied stereotype:
      - Experimental
- TERMINATED_CLIENT_TO_SERVER_FLOW
  - A flexible termination that is currently terminated for client to server flow only.
    - Applied stereotype:
      - Experimental
- TERMINATED_BIDIRECTIONAL
  - A flexible termination that is currently terminated in both directions of flow.
    - Applied stereotype:
      - Experimental
- PERMANENTLY_TERMINATED
  - A non-flexible termination that is always terminated (in both directions of flow for a bidirectional case and in the one direction of flow for both unidirectional cases).
    - Applied stereotype:
      - Experimental
- TERMINATION_STATE_UNKNOWN
  - Not a normal state. The system is unable to determine the correct value.
    - Applied stereotype:
      - Experimental

1.7.20 TimeUnit

Description:

- Units of measurement of the time.

Contains Enumeration Literals:

- YEARS
- MONTHS
- DAYS
- HOURS
- MINUTES
- SECONDS
- MILLISECONDS
- MICROSECONDS
- NANOSECONDS
- PICOSECONDS

1.8 Primitives

1.8.1 AnyType

Description:

- This primitive represents the "any data" mechanism.

1.8.2 BinaryType

Description:

- Represents any binary data, i.e., a sequence of octets. A binary type can be restricted by a length which defines the number of octets it contains.

1.8.3 MacAddress

Description:

- Pattern: "[0-9a-fA-F]{2}(-[0-9a-fA-F]{2}){5}" Description: "The mac-address type represents a MAC address in the canonical format and hexadecimal format specified by IEEE Std 802. The canonical representation uses lowercase characters. The hexadecimal representation uses uppercase characters."

1.8.4 Timeticks

Description:

- Type uint32. This type represents a non-negative integer that represents the time, modulo 2^32 (4294967296 decimal), in hundredths of a second between two epochs.