High-level overview of differences between TAPI v2.1.3 and TAPI v2.4.0

Contents

Introduction

This document provides an overview of the main changes between TAPI v2.1.3 and TAPI v2.4.0. The document focusses on changes to the YANG models. These changes correspond to changes in the UML models (which is used to generate the YANG).

Note that the document may not capture all changes. The Reference Implementation Agreements, TR-547 and TR-548, provide more details.

General comments

TAPI v2.4.0 is not backward compatible with TAPI v2.1.3.

Considering the overall set of models, the main changes are as follows:

- Major enhancements to the modeling of photonic impairment
- Extensive oam enhancements including OAM supports simplified NCM (referencing CEPs)
- tapi-fm has been added to consolidate alarm and pm reporting structures
- tapi-streaming and tqpi-notification have been aligned in approach to notification of creation as well as approach to Alarms and PMs reporting
    - The TAPI v2.1.3 approaches are maintained (as deprecated)
- tapi-streaming has been enhanced in preparation for efficient PM streaming.
- tapi-treaming has been positioned in the same way TAPI Notification is positioned.
    - Each technology agnostic module specifies augments to Streaming and Notification.
    - All technology agnostic modules will import both TapiNotification and TapiStreaming.
    - Object Creation model is now aligned for both Notification and Streaming.
- tapi-odu has changed to tapi-digital-otn
- Layering has been enhanced such that:
    - The PHOTONIC_LAYER_QUALIFIER_{ SMC, OMSA, OTSA, OTS_OMS } layer qualifiers are **deprecated**.
    - The PHOTONIC_LAYER_QUALIFIER_{ OCH, NMC, OTSi } layer qualifiers **are not used** *(candidates for future deprecation)*. The RIA mandates the use of OTSiMC which integrates the ITU-T OTSi and MC concepts (as well as the OCH).
    - The PHOTONIC_LAYER_QUALIFIER_{MCA, OTSiMCA} when applied to *ROADM-to-ROADM* scenarios are **left for further study**.
    - The PHOTONIC_LAYER_QUALIFIER_{OTSiA, OTSiMCA} when applied to *Transceiver-to-Transceiver* scenarios are **left for further study.**
        - The RIA only considers the provisioning of assemblies indirectly via the provisioning of client services (ODU/OTU). The direct provisioning of OTSiA, OTSiMCA services may apply in support of other clients not covered by this RIA.

    - New DIGITAL_OTN TAPI layer protocol name that models the OTU/ODU G.872 layers. The use of ODU TAPI layer protocol name is deprecated.
    - OTU_TYPE identity has been added (extending the LAYER_PROTOCOL_QUALIFIER) as well as OTU_TYPE_OTU1, OTU2, OTU3, OTU4 and OTU_CN identities.
    - OTS_MEDIA has been added to replace and clarify the use of OTS and UNSPECIFIED protocol layer qualifiers while avoiding an excessive number of NEP/CEPs (i.e., avoid duplication of OTS and PHYSICAL MEDIA)
    - The PHOTONIC_LAYER_QUALIFIER_OTSiMC protocol layer qualifier potentially includes information on the OTSi signal at the termination point (with electrical/optical conversion).
        - Note that OTSiMC is now extended to the transponder.
- server-connection has been added to allow direct client to server navigation.
- physical-route has been added to enable the reporting of the route of a connection through a complex photonic device.
- A profile entity has been added.
- Several enums have been converted to identities to allow extension.
- Some RPCs have been removed and some deprecated.
    - All RPCs will be removed in a later release.
- The NEP/SIP capability model has been enhanced (potential payload) including supported-layer-protocol-qualifier
- resiliency-route-constraint has been added to allow for enhanced protection route requests.
- tapi-notification usage has been clarified further
- Connectivity service constraints have been improved to include constraints on resilience routes
- All frequencies are in Hz
- strand-joint has been added to allow detailed modeling of impairments at joints and junctions
- Access port supports SIP
- Internal points have been added to connectivity service
- General improvements to structures
- yang-version “1.1” used throughout.
- Comments improved throughout.
- Conditional constraints added to some yang descriptions (aim to add more in future releases).
- RPCs removed from some yang modules (aim to remove all RPCs in next release).
- Many parameters made optional in UML. Note that:
    - The UML multiplicity of [1] is converted to YANG as if [0..1]
    - TR-547 clarifies the conditions for each parameter

The following sections provide a view of the main changes per model.

tapi-common.yang

Augment of transmission-capability-profile added.

RPCs deprecated and will be removed in future release.

Removed the "presence" statement of context container.

Object classes

Changed:

- tapi-context

    - RPC linkage removed
    - profile (list) added
    - sip-inventory added
- service-interface-point
    - moved inheritance from resource-spec to global-class
    - supported-cep-layer-protocol-qualifier-instances (mandatory list) added
    - available-cep-layer-protocol-qualifier-instances (list) added
    - direction type changed to direction (was port-direction) and changed to config false
    - profiles added (sink-profile, source-profile and profile)

Added:

- profile
- sip-inventory

Removed:

- resource-spec
    - The classes now directly uses global-class or uses local-class
- service-spec
    - The classes now directly uses global-class or uses local-class
- termination-pac

Type definitions

Changed:

- layer-protocol-name
    - ODU has been deprecated
    - DIGITAL_OTN has been added (replacing ODU)
- termination-state
    - enumeration literal names corrected
        - CAN_NEVER_TERMINATE replaces LP_CAN_NEVER_TERMINATE
        - NOT_TERMINATED replaces LT_NOT_TERMINATED
        - PERMANENTLY_TERMINATED replaces LT_PERMENANTLY_TERMINATED
- capacity
    - bandwidth-profile added
- capacity-value
    - value changed to real (was integer)
- capacity-unit
    - list of units extended
    - is an identity (was previously an enum)

Added:

- direction (replaces termination-direction)
- mac-address
- binary-type
- timeticks
- object-type
    - This was defined in notification. It is now used by both notification and streaming.

- pm-parameter-value
- pm-parameter
- any-type
- payload-structure
- support-layer-protocol-qualifier
- sip-inventory-uuid
- eth-parameter-name
- eth-alarm-condition-name
- alr
- dc
- pm

Removed

- termination-direction
- port-direction
- bandwidth-profile
- bandwidth-profile-type

Deprecated

- alarm-name
- pm-param-name
- detected

tapi-connectivity.yang

Descriptions improved in many places.

RPCs removed.

Streaming augments moved from streaming to connectivity.

Notification augments added.

grouping connection-ref is required-instance false

Object classes

Changed:

- connection
    - layer-protocol-qualifier added
    - server-connection added
        - Provides navigation down the layer stack and removes need for connectivity-service to reference supporting top level connections at all layers.
    - bounding-node added
    - moved inheritance from resource-spec to global-class
- connection-end-point
    - protection-role added
    - direction of type direction replaces connection-port-direction of type port-direction
    - moved from resource-spec to global-class

    - termination-state moved out of termination-pac
    - termination-pac removed
    - profiles added (sink-profile, source-profile and profile)
- connectivity-constraint
    - service-layer removed
    - connectivity-direction removed
- connectivity-service
    - moved inheritance from resource-spec to global-class
    - layer-protocol-name added
    - layer-protocol-qualifier added
    - direction added
    - topology-constraint now a list
    - connectivity-service reference (list) added
        - association to other connectivity-service instances for complex connectivity provisioning,
    - internal-point (list) added
- connectivity-service-end-point
    - layer-protocol-name becomes optional
    - layer-protocol-qualifier becomes optional
    - direction type changed to direction (was port-direction)
    - csep-role added
    - assembled-connectivity-service-end-point added
    - layer-protocol-constraint added
    - profiles added (sink-profile, source-profile and profile)
- connectivity-context
    - rpcs removed
- switch
    - selection-control removed
    - switch-direction type changed to direction (was port-direction)
- switch-control
    - moved inheritance from resource-spec to global-class
- resilience-constraint
    - fault-condition-determination added
    - set-up-priority added
    - wait-to-revert-time type changed to time-period (was integer)
    - selection-control added
    - resiliency-route-constraint added

Added:

- resilience-route-constraint
- connectivity-service-internal-point
- layer-protocol-constraint

Type definitions

Added:

- fault-condition-determination (identity)

- connectivity-object-type (identity)
- csep-role
- connectivity-service-spec-reference

tapi-equipment.yang

Descriptions improved in many places.

Streaming augments moved from streaming to equipment.

Many parameters/structures made conditional.

is-expected-actual-mismatch has been clarified with the description “This is false where there is no expectation.”

All properties changed from experimental to essentially mature.

An access-port can be referenced from both the NEP and the corresponding SIP

supporting-physical-span augmentation of link has been fixed.

Grouping connector-pin-address, list pin-and-role, specified key 'location-in-connector'.

Grouping equipment, set as config false

- list expected-equipment
- container actual-equipment

Object classes

Changed:

- abstract-strand
  - to-strand-joint added
  - strand-joint added
- physical-context
  - no longer a global-class

Added:

- access-port-supports-nep
  - This replaces supporting-access-port
- physical-route
  - Describes the route of a connection through the equipments of a device
- physical-route-list
- strand-joint
  - To support detailed statements of joint impairments and reflection
- access-port-supports-sip
- physical-route-element
- geolocation

Removed:

- supporting-access-port

Type definitions

Changed:

- connector-pin-address
  - equipment-uuid property removed
  - equipment reference added
- actual-non-field-replaceable-module
  - is now a local-class
- expected-non-field-replaceable-module
  - is now a local-class
- equipment-object-type
  - has been moved back from deprecated to mature
  - has been extended with new object types from tapi-equipment
- expected-equipment
  - equipment-not-expected added
- pin-and-role
  - connector-pin-orientation added

Added:

- physical-route-state
- flow-direction

tapi-fm.yang

This is a new module that consolidates alarm and performance monitoring reporting for both tapi notification and tapi streaming (see TR-547 and TR-548 for more details).

tapi-notification.yang

Augmentation for notification of entities from common added.

Descriptions improved in many places.

Now supports detected-condition, pm-metric-info, detector-info and simple-detector augmented from tapi-fm.

Object classes and Notifications

Changed:

- notification-subscription-service
  - moved inheritance from service-spec to global-class
  - event-notification added
  - subscription-filter multiplicity changed from 1 to list (0..*)
  - supported-notification-types removed
  - supported-object-types removed
- notification-context
  - event-notification added

- notification is deprecated

Added:

- attribute-value-change
- event-notification (replaces the deprecated notification)

Removed:

- alarm-info (covered by tapi-fm)
- tca-info (covered by tapi-fm)

Type definitions

Changed:

- name-and-value-change
  - value-name is now mandatory
  - old-value is now optional
- notification-type
  - ALARM_EVENT removed
  - THRESHOLD_CROSSING_ALERT removed

Added:

- notification-object-type

Removed:

- object-type
  - Now defined in tapi-common
- perceived-severity-type
- threshold-crossing-type
- service-affecting
- perceived-tca-severity

tapi-oam.yang

Import of notification and streaming to allow for the new aligned approach.

Augment with streaming and notification.

Descriptions improved in many places.

Object classes

Changed:

- mep
  - all properties are optional
  - layer-protocol-qualifier added
  - termination-direction removed
  - mep-identifier removed
  - peer-mep-identifier removed

- oam-job
    - oam-job-state added
    - oam-service-end-point changed to oam-service-point and now optional
    - connection-end-point added
    - connectivity-service-end-point added
    - result-string added
    - profile used instead of oam-profile
    - pm-data added
    - current-data used instead of pm-current-data
- meg
    - moved inheritance from resource-spec to global-class
    - layer-protocol-name removed
    - forwarding-direction removed
    - meg-level removed
    - meg-identifier removed
- mip
    - layer-protocol-qualifier added
    - operational-state-pac added
- oam-service
    - oam-service-point used instead of end-point
    - oam-constraint removed
    - oam-profile removed
- oam-context
    - oam-profile removed
- oam-service-point (was called oam-service-end-point)
    - service-interface-point is now optional
    - connection-endpoint added
    - layer-protocol-qualifier added
    - is-mip added
    - direction removed
    - mep-identifier removed
    - peer-mep-identifier removed
- current-data (was pm-current-data)
    - granularity-period removed
    - timestamp removed
    - period-start-time added
    - elapse-time is now optional
    - pm-data-pac added
    - mep added
    - mip added
    - connection-end-point added
    - history-data was called pm-history-data
- history-data (was pm-history-data)
    - time-period removed
    - period-end-time removed
    - suspect-interval-flag removed
    - period-start-time added

    - period-end-time added
    - pm-data-pac added
- oam-profile
    - pm-threshold-data removed
    - pm-bin-data removed
    - pm-data added

Added

- pm-data
- pm-data-pac
- connectivity-oam-job
- connectivity-oam-service
- connectivity-oam-service-point

Removed

- oam-constraint
- pm-threshold-data
- pm-bin-data

Type definitions:

Changed:

- oam-job-type (two identities, LOOPBACK_TERMINAL and LOOPBACK_FACILITY, defined)

Added

- pm-parameter
- threshold-crossing-qualifier
- oam-object-type
- threshold-config
- threshold-type
- oam-job-state

tapi-path-computation.yang

Object classes

Changed:

- path-service-end-point
    - direction is now type direction (was port-direction)
- path-computation-service
    - forwarding-direction added
    - layer-protocol-name added
- routing-constraint
    - route-direction removed
    - tolerable-impact added
- topology-constraint
    - In now a local-class

    - explicit-route added
    - constraint-weight added
    - include-topology type is now topology (was uuid)
    - exclude-topology (was avoid-topology) type is now topology (was uuid_
    - include-path type is now path (was uuid)
    - exclude-path type is now path (was uuid)
    - include-link type is now link (was uuid)
    - exclude-link type is now link (was uuid)
    - include-node type is now node (was uuid)
    - exclude-node type is now node (was uuid)
    - include-node-edge-point added
    - exclude-node-edge-point added

Type definitions

Added:

- grade-of-impact
- path-computation-object-type

tapi-streaming.yang

Augments moved to other modules to align with good practice and notification. Note that common remains as a result of overall hierarchy.

Descriptions improved and conditions added to optional attributes.

Now supports detected-condition, pm-metric-info, detector-info and simple-detector augmented from tapi-fm.

Most attribute are now conditional.

RPCs have been removed.

Object classes

Changed:

- compacted-log-details
    - max-allowed-segment-roll-delay added
    - max-compaction-lag added
- alarm-condition-detector-detail deprecated (in favor of tapi-fm structures)
- condtition-detector
    - measured-entity-class type now object-type (was object-class-identifier)
- stream-monitor
    - dynamic-stream-data added
    - id-of-last-record-read-from-log removed (in dynamic-stream-data)
    - id-of-last-record-written-to-log removed (in dynamic-stream-data)
    - last-updated removed (in dynamic-stream-data)
- connection-protocol-details
    - allowed-connection-protocol type now connection-protocol (was string)
    - encoding-format added

- available-stream
    - connection-protocol type now connection-protocol (was string)
- supported-stream-type
    - stream-type-content type now object-type (was object-class-identifier)
    - record-trigger added
- log-record-body
    - record-content type now object-type (was object-class-identifier)

Added:

- information-record-strategy
- dynamic-stream-data

Type definitions

Changed:

- log-record-strategy
    - WHOLE_ENTITY_ON_CHANGE deprecated (in favor of ..WHOLE_ENTITY and ..ON_CHANGE)
    - WHOLE_ENTITY_PERIODIC deprecated (in favor of ..WHOLE_ENTITY and ..PERIODIC)
    - WHOLE_ENTITY added
- record-type
    - CHANGE added
    - UPDATE added
    - CREATE added
- condition-detector
    - PM_THRESHOLD_DETECTOR added

Added:

- record-suppression
- stream-object-type
- value-expectation
- value-expectation-dither
- record-trigger
- connection-protocol
- encoding-format

Removed:

- object-class-identifier

tapi-topology.yang

Augments moved to other modules to align with good practice and notification. Note that common remains as a result of overall hierarchy.

Comments improved and conditions added to optional attributes.

Most attribute are now conditional.

RPCs removed.

Object classes

Changed:

- link
  - moved inheritance from resource-spec to global-class
- node
  - moved inheritance from resource-spec to global-class
  - nep-inventory added
  - profile added
  - risk-parameter-pac added
- topology
  - moved inheritance from resource-spec to global-class
  - boundary-node-edge-point added
- node-edge-point
  - moved inheritance from resource-spec to global-class
  - supported-cep-layer-protocol-qualifier is now supported-cep-layer-protocol-qualifier-instance with type supported-layer-protocol-qualifier (type was layer-protocol-qualifier)
  - available-cep-layer-protocol-qualifier added
  - supported-payload-structure added
  - available-payload-structure added
  - termination added
  - interdomain-plug-id-pac added
  - node-rule-group added
  - profiles added (sink-profile, source-profile and profile)
  - direction (of type direction) replaces link-port-direction (of type port-direction)
- node-rule-group
  - moved inheritance from resource-spec to global-class
  - node-edge-point is now optional/conditional
  - inter-rule-group removed
  - profiles added (sink-profile, source-profile and profile)

Added:

- interdomain-plug-id
- nep-inventory

Type definitions

Changed:

- rule-type
  - IMPAIRMENT added
- protection-type
  - NO_PROTECTION replaces NO_PROTECTON
  - ONE_FOR_N_PROTECTION added
  - M_FOR_N_PROTECTION added
  - ONE_FOR_ONE_BY_N added

Added:

- topology-object-type (identity)
- nep-inventory-uuid

tapi-virtual-network.yang

Object classes

Changed:

- virtual-network-service
    - moved inheritance from resource-spec to global-class

Type definitions

Added:

- virtual-network-object-type

digital-otn.yang

Was previously called odu.yang

Descriptions improved in many places

Many parameters made optional

Major rearrangement of class structure and major enhancements.

Object classes

Changed:

- OduTerminationAndClientAdaptationPac
    - fec-parameters moved to otu
    - number-of-odu-c added
- OduCtpPac
    - Odu-mip reference added
- Odu-mep-spec changed name to otn-mep-spec
    - odu-ncm removed
    - otu-mep added
    - odu-tcm-mep-pac now called odu-tcm-mep
    - odu-defect-pac removed
    - odu-pm-pac removed
- odu-tcm-mep-pac renamed otu-tcm-mep
    - tcm-level added
    - position-sequence added
    - txti
    - otn-oam-common added

    - odu-tcm-mep-status added
    - ac-status-source and sink removed
- odu-mip-spec renamed otn-mip-spec
    - odu-ncm removed
    - odu-tcm-mip-pac renamed odu-tcm-mip
    - odu-pm-pac removed
    - odu-defect-pac removed
- odu-mip-pac renamed odu-mip
    - codirectional added
    - refactored into otn-oam-common and odu-mip-status
        - adding tcm-fields-in-use and odu-current-number-of-tributary-slots
- odu-tcm-mip-pac renamed odu-tcm-mip
    - codirectional added
    - tcm-level added
    - position-sequence added
    - refactored into otn-oam-common and odu-tcm-mip-status
        - adding tcm-fields-in-use and odu-current-number-of-tributary-slots
- odu-mep-pac renamed odu-mep
    - dm-source removed
    - dm-value removed
    - refactored into otn-oam-common and odu-mep-status
- odu-common-pac
    - otu-type removed
- odu-connectivity-service-end-point-spec
    - odu-cn-csep-ttp-pac added
- odu-csep-common-pac
    - odu-type removed
    - number-of-odu-c removed

Added:

- otn-error-performance-data
- otn-oam-mep-service-point
- otn-oam-mip-service-point
- odu-delay-performance
- otu-fec-performance-data
- otn-oam-service
- otn-oam-common
- odu-tcm-mep-status
- odu-tcm-mip-status
- otu-mep
- otu-mep-status
- odu-mip-status
- otu-csep-ttp-pac
- odu-cn-csep-ttp-pac
- otu-connection-end-point-spec
- otu-ttp-pac
- otu-connectivity-service-end-point-spec

- otsia-mep
- otn-cn-error-performance-data
- otn-meg-spec
- odu-tcm-oam-service
- odu-tcm-meg

Removed:

- odu-pool-pac
- odu-node-edge-point-spec
- odu-ncm-pac removed
- odu-pm-pac
- odu-defect-pac

Type definitions

Added:

- otn-fault-condition-determination
- odu-oam-job-type
- otn-counters
- otu-type
- fec-type
- standard-fec-typ
- otn-alarm-condition-name (but this is deprecated)

Removed

- fec-properties

Tapi-photonic-media.yang

- Major rearrangement of class structure and major enhancements.
    - A detailed comparison is not provided
- Descriptions improved in many places
- Many parameters made optional in UML.