ETSI NFV m-SDO IM/DM Workshop

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ITU-T Information Model Overview

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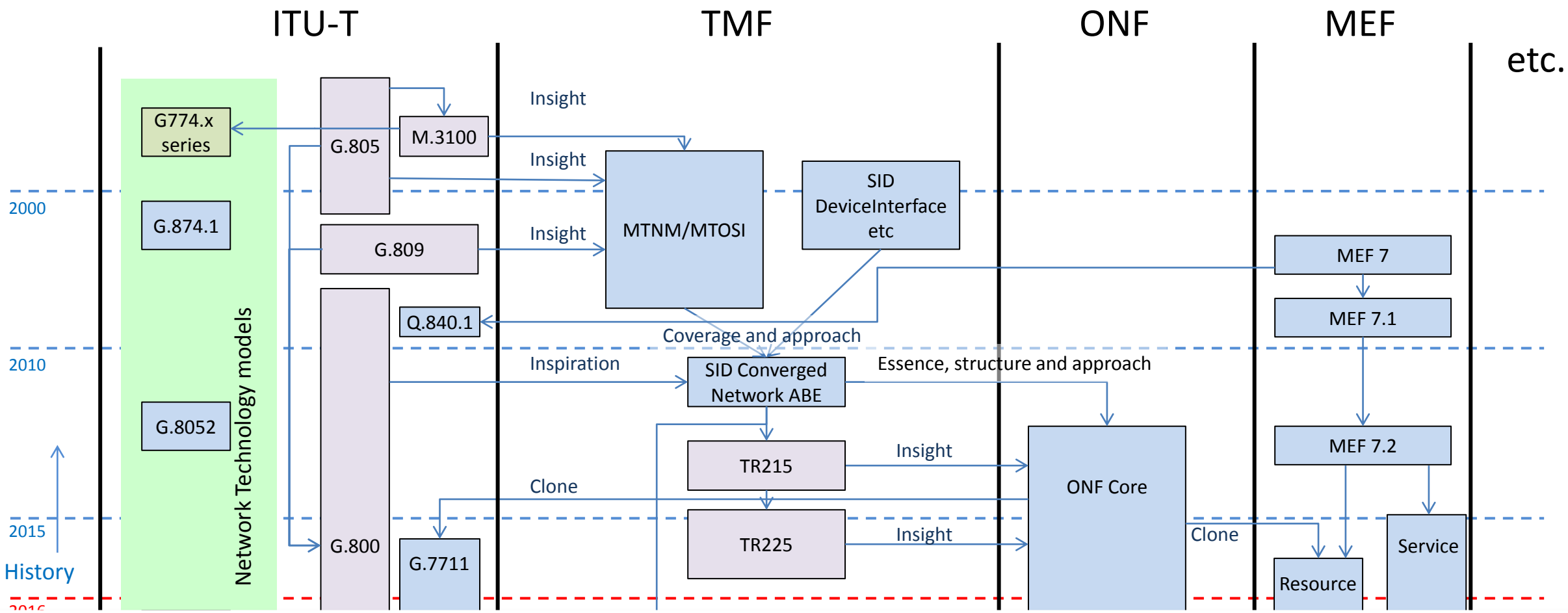
Model Evolution History

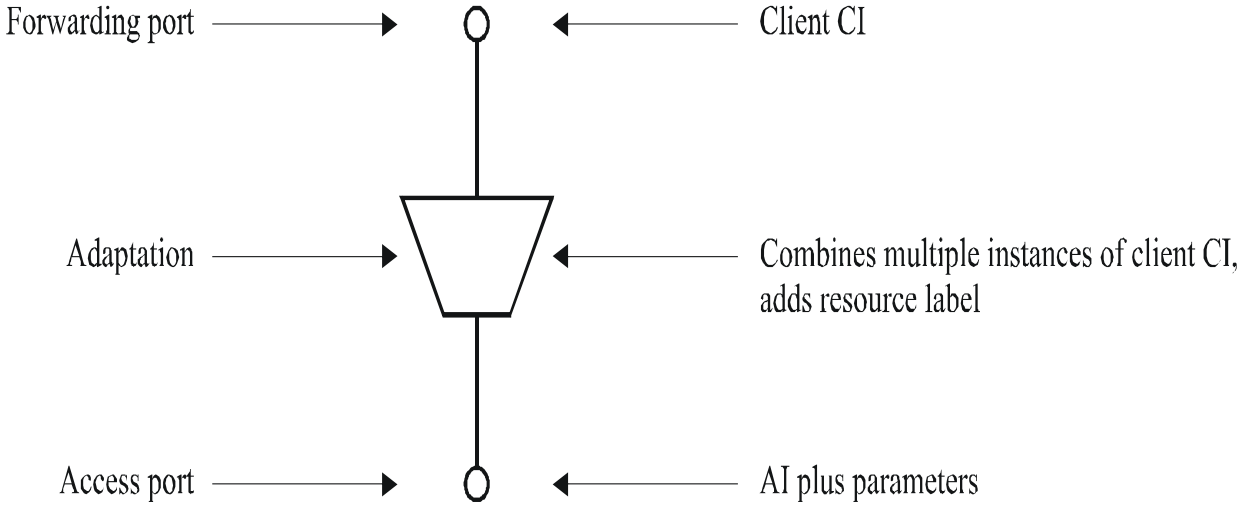


Transport (L0-L2) Standards from ITU-T

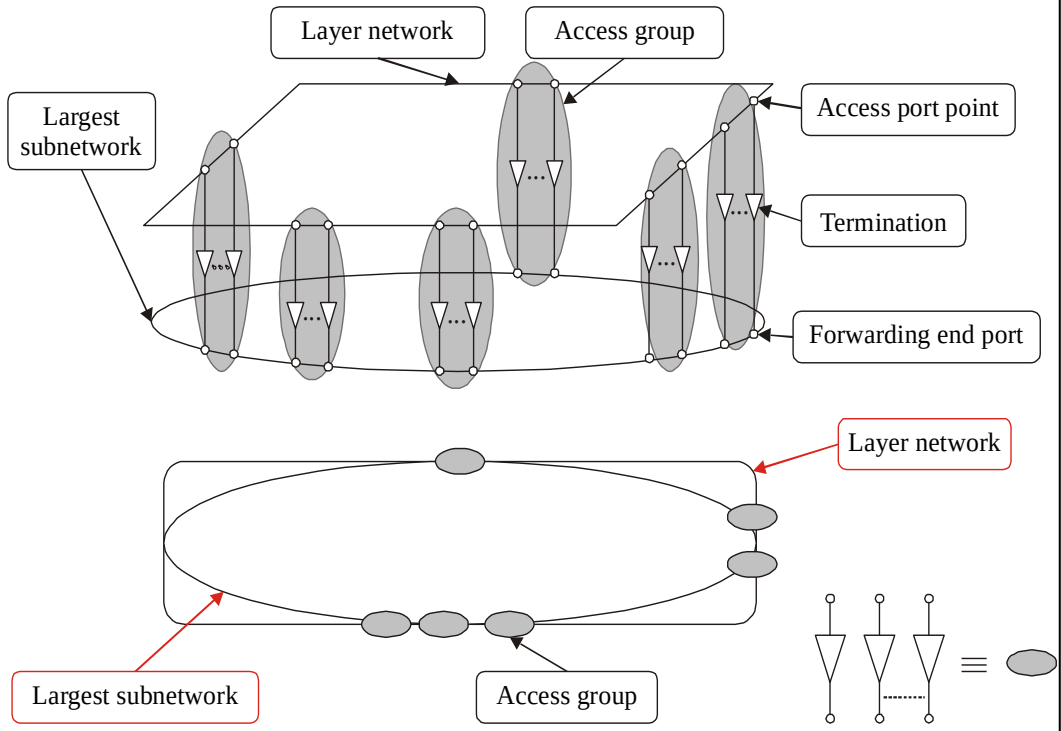
	Generic	OTN	Carrier Ethernet	MPLS-TP	SDH
Transport Architecture	G.800 G.805	G.872	G.8010	G.8110.1	G.803
Equipment Function	G.806	G.798	G.8021	G.8121.x	G.783
Mgmt/Control Requirement	G.7710	G.874	G.8051	G.8151	G.784
Information Model	G.7711	G.874.1	G.8052	G.8152	--
Data Model	*G.7711.x*	*G.874.x*	*G.8052.x*	*G.8152.x*	G.774.x

Functional Architecture of Transport Networks

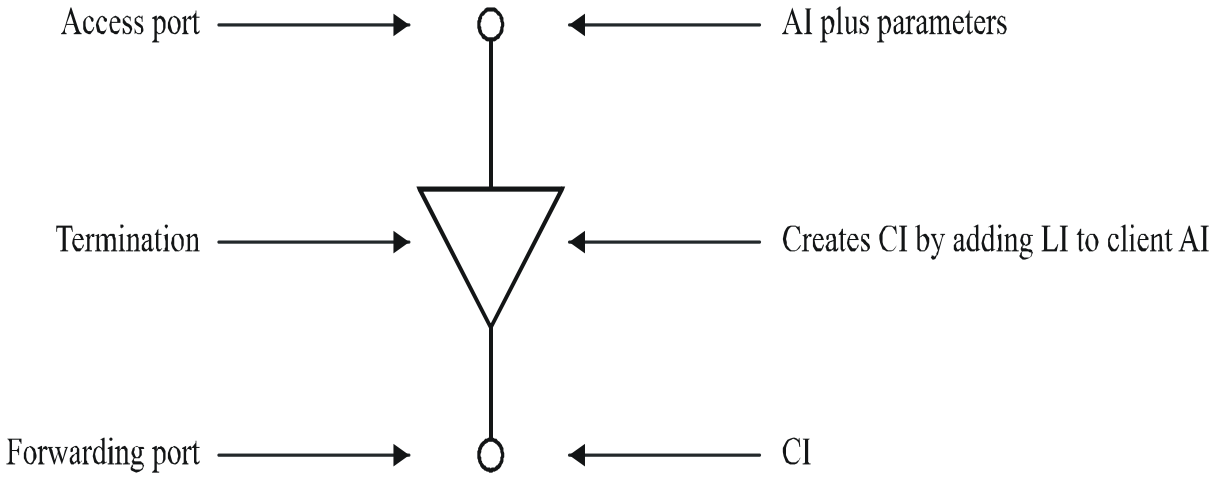
- G.800 / G.805 functional model
  - Adaptation, Termination, Link, Subnetwork, Layer network, Recursion, Partitioning



G.800(07)_F.10



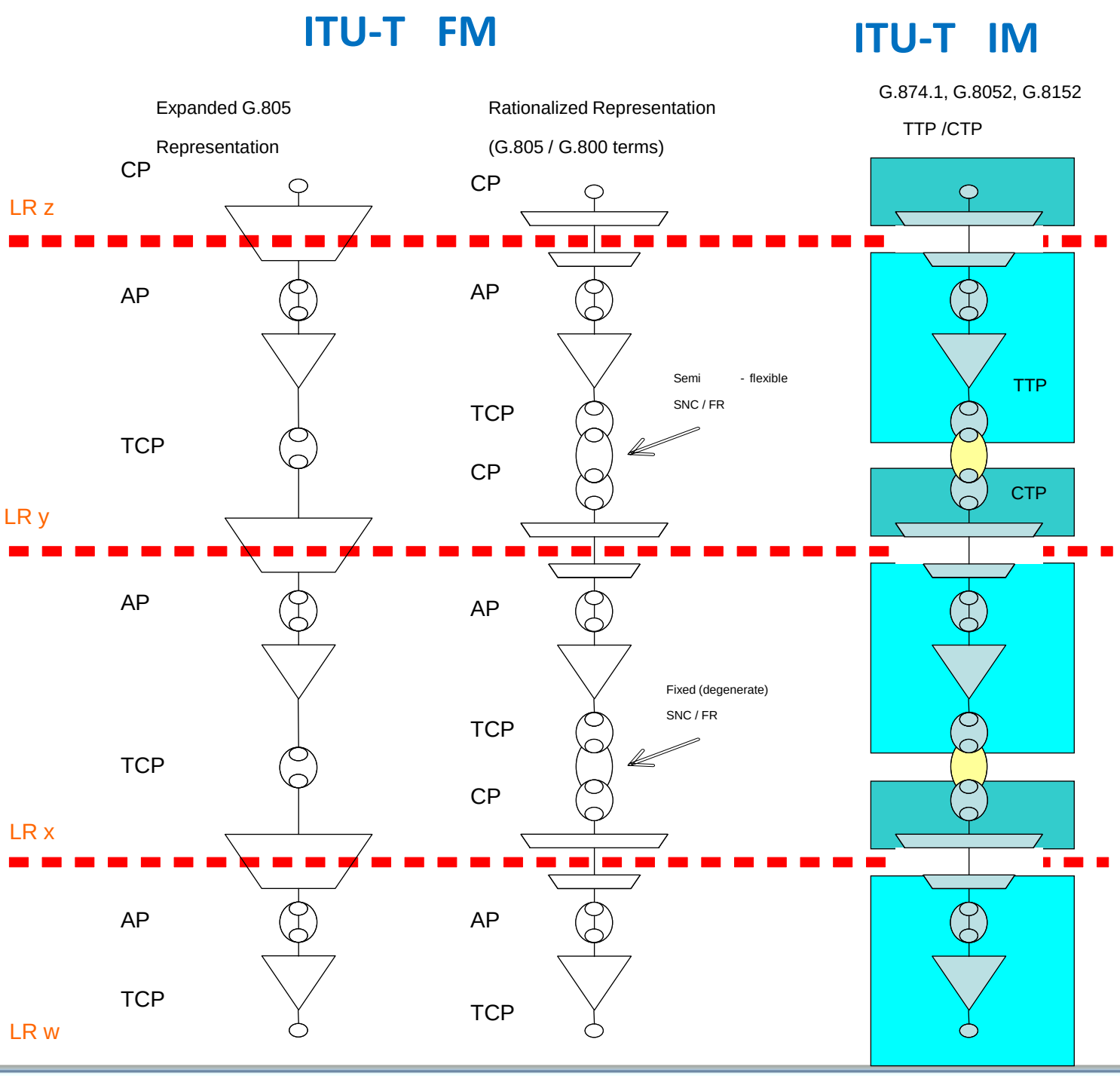
G.800-Amd.1(09)_F06



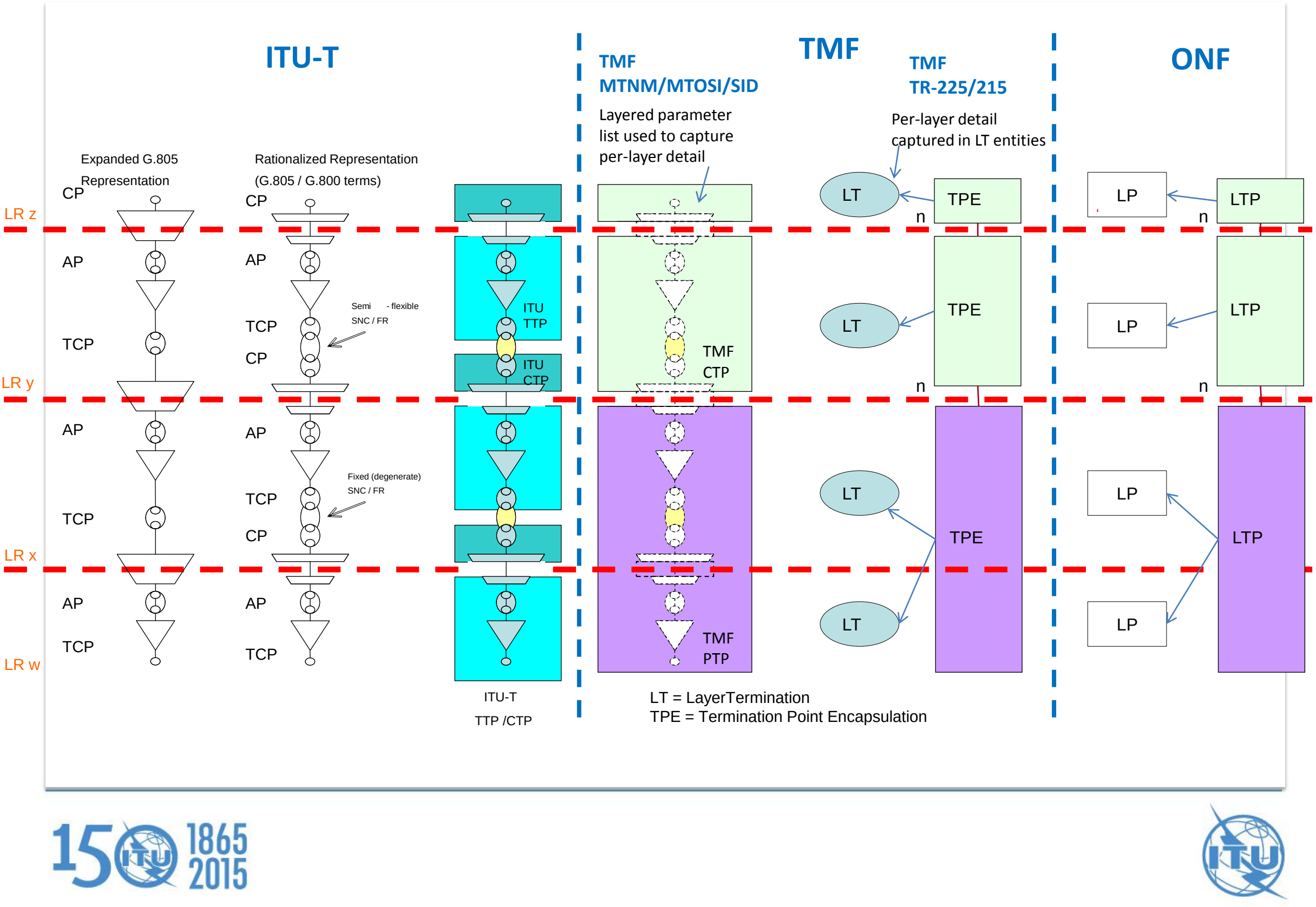
G.800(07)_F.11

Transport Functional Model (FM) to Information Model (IM) modeling

Layer examples
LR x = OTU
LR y = ODU (HO)
LR z = ODU (LO)



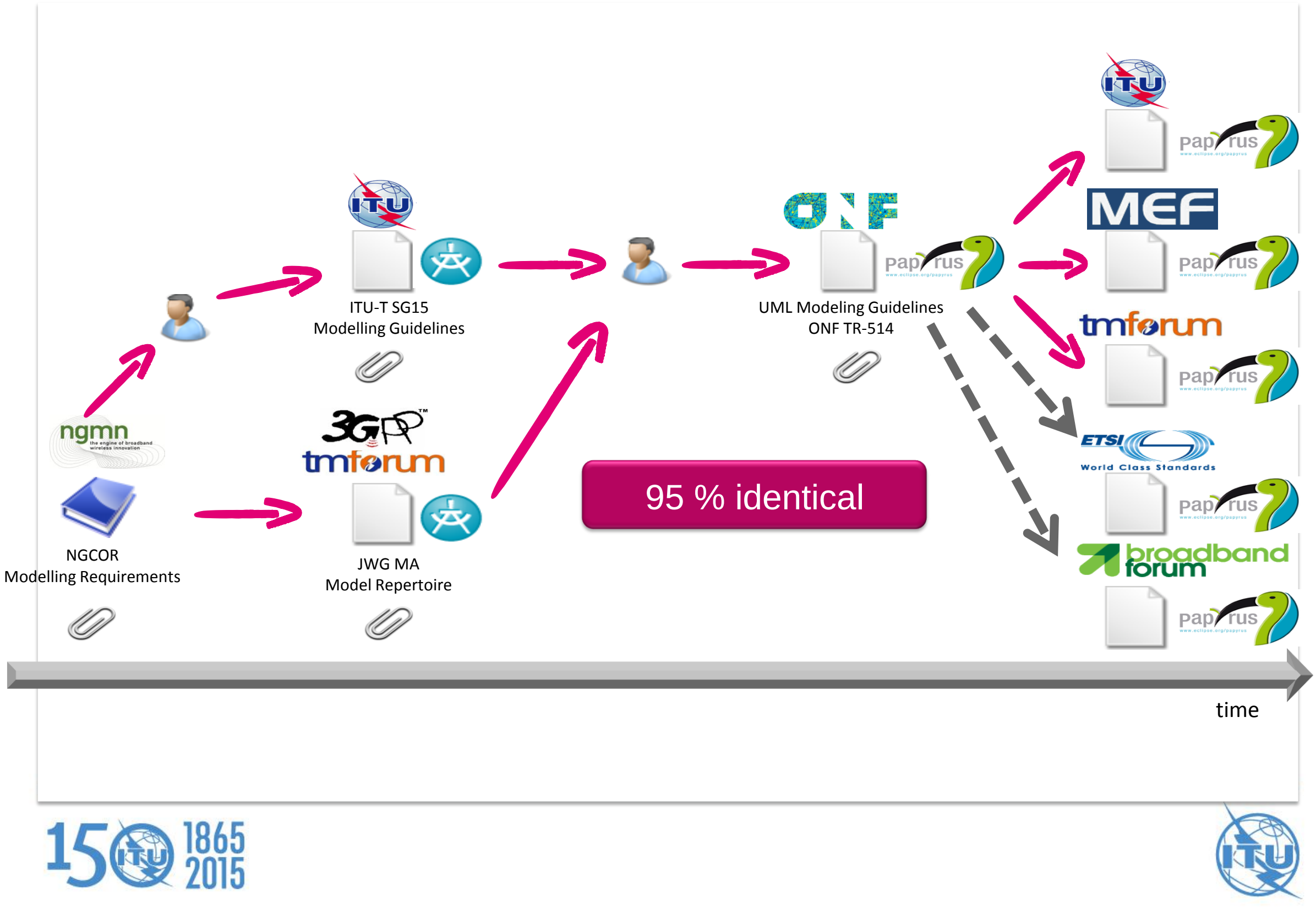
Derivation of LTP & LP from TTP & CTP



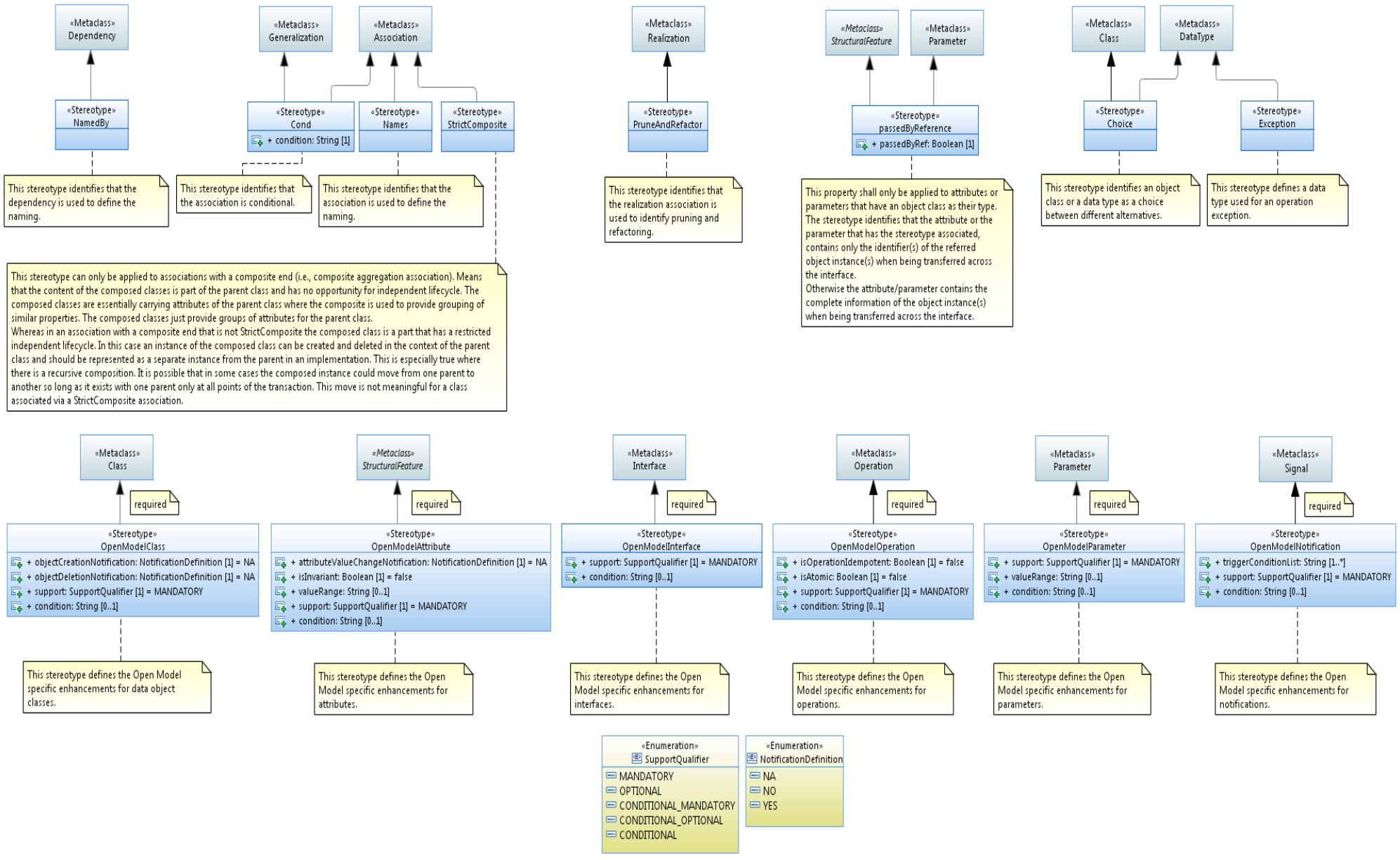
Technology-specific and Generic Information Model

- G.874.1 – OTN (L0, L1)
  - V1 (01/2002); UML using Rational Rose
  - V2 (10/2012); UML using IBM RSA; Same modeling guidelines and profile with G.8052
  - V3 (draft); Using Papyrus; Same UML Modeling Guidelines and Open Model Profile with ONF
    - ❖ Key object classes: OCh/OTU/ODU TTP, CTP, TCM (MEP), SN (FD), SNC (FC), PG (FcSwitch)
- G.8052 – Carrier Ethernet
  - V1 (08/2013); UML using IBM RSA; Same modeling guidelines and profile with G.874.1
  - V2 (draft); Using Papyrus; Same UML Modeling Guidelines and Open Model Profile with ONF
    - ❖ Key object classes: ETH/ETY TTP, CTP, MEP, MIP, Proactive/On-Demand OAM & PM Control
- G.8152 – MPLS-TP
  - V1 (draft); Using Papyrus; Same UML Modeling Guidelines and Open Model Profile with ONF
- G.7711 – Generic, Nodal and Network view
  - v1 (08/2015); Using Papyrus; Same UML Modeling Guidelines and Open Model Profile with ONF
  - Same Core Model as ONF TR-512
    - ❖ Key object classes: LTP, LP, Link, LinkPort, FD, FC, FcPort, FcSwitch, FcRoute,

UML Modeling Guidelines History



Open Model Profile



PNG image

Figure 6-3/G.874.1 – OTN Object Class to Atomic Function Mapping

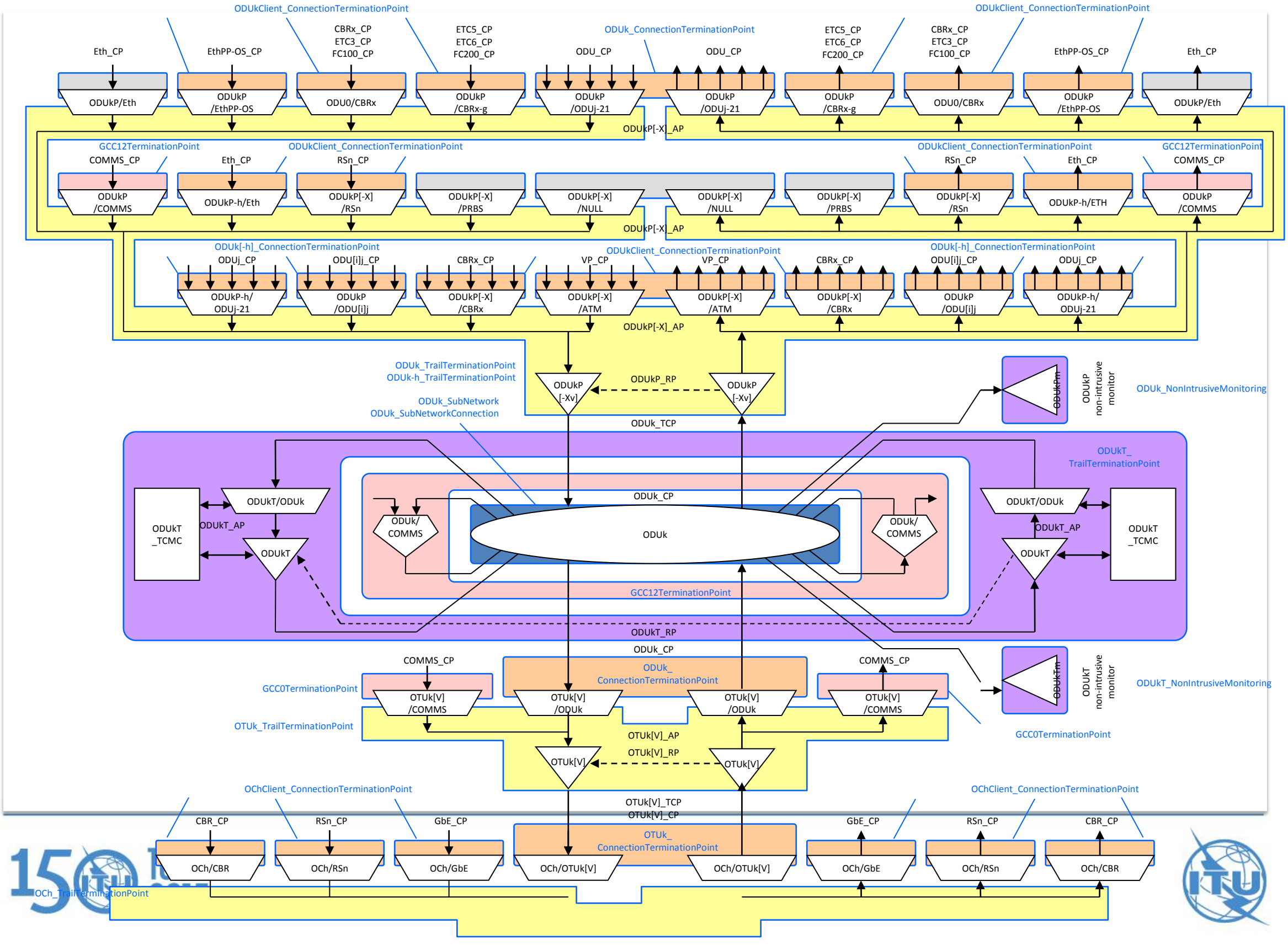
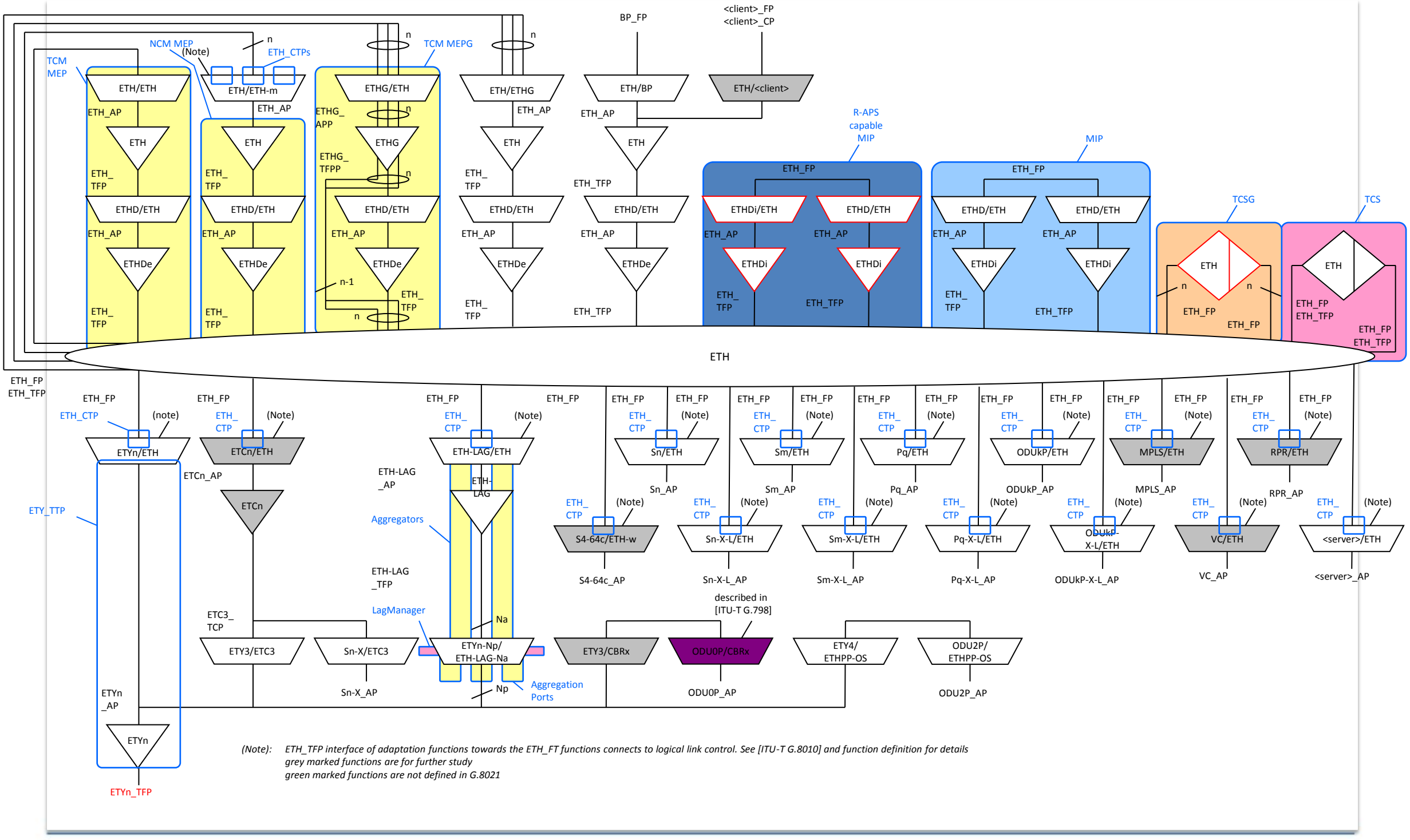
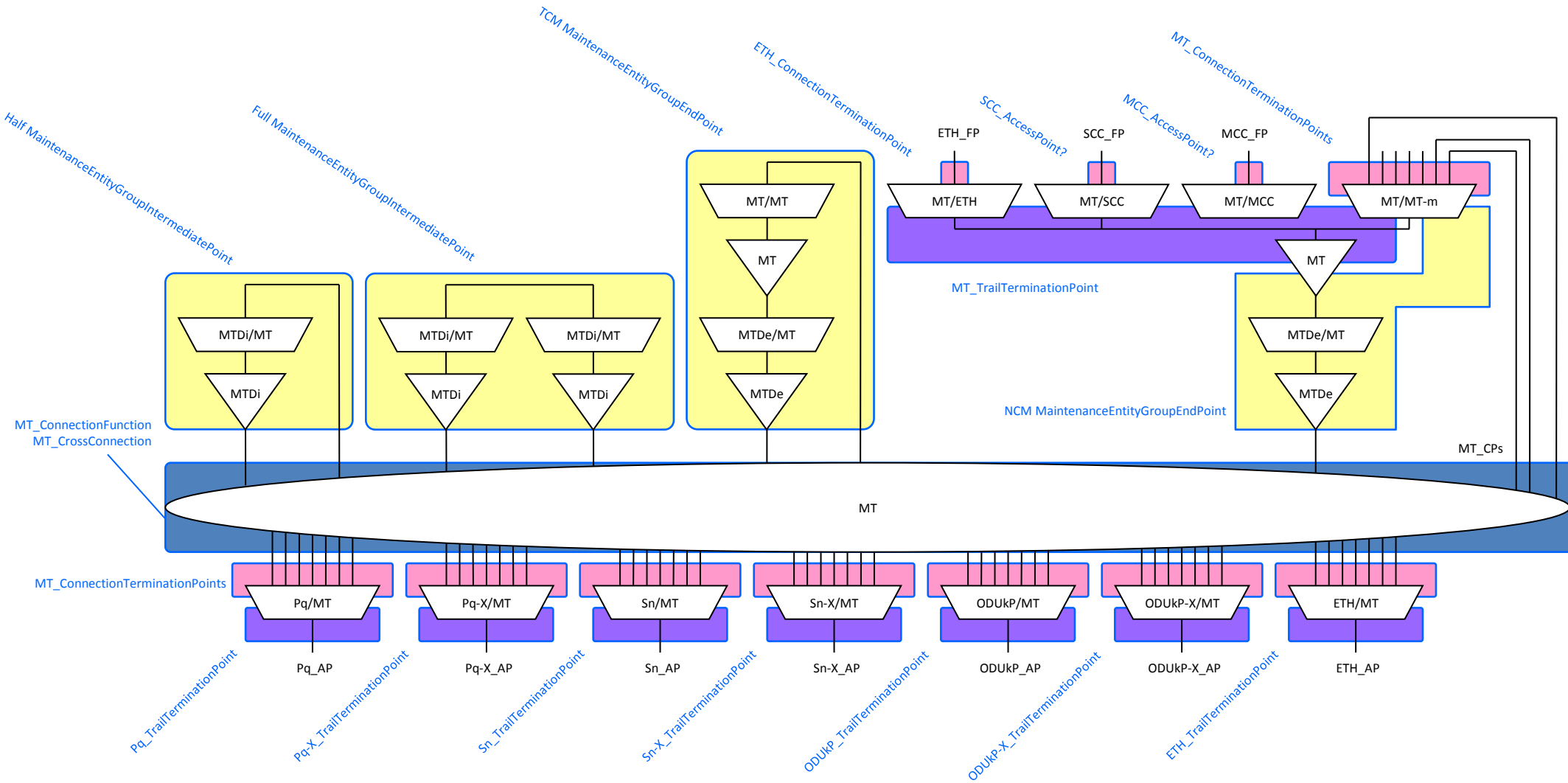


Figure 6-1/G.8052 – Ethernet object class to atomic function mapping



(Note): ETH_TFP interface of adaptation functions towards the ETH_FT functions connects to logical link control. See [ITU-T G.8010] and function definition for details
grey marked functions are for further study
green marked functions are not defined in G.8021

Figure 6-1/G.8152 – MPLS-TP object class to atomic function mapping



Relevance of the ITU-T information models to NFV

- For NFV to realize its full potential, it is necessary to have dynamically configurable networking to support the interconnection of VNFs.
  - ❖ The ITU-T information modeling works on the management and control of transport networks would appear to be relevant to NFV.

Links to ITU-T Recommendations

- G.774 “SDH: Management information model for the network element view” http://www.itu.int/rec/T-REC-G.774/en
- G.783 “Characteristics of synchronous digital hierarchy (SDH) equipment functional blocks” http://www.itu.int/rec/T-REC-G.783/en
- G.784 “Management aspects of synchronous digital hierarchy (SDH) transport network elements” http://www.itu.int/rec/T-REC-G.784/en
- G.798 “Characteristics of optical transport network hierarchy equipment functional blocks” http://www.itu.int/rec/T-REC-G.798/en
- G.800 “Unified functional architecture of transport networks” http://www.itu.int/rec/T-REC-G.800/en
- G.803 “Architecture of transport networks based on the synchronous digital hierarchy (SDH)” http://www.itu.int/rec/T-REC-G.803/en
- G.805 “Generic functional architecture of transport networks” http://www.itu.int/rec/T-REC-G.805/en
- G.806 “Characteristics of transport equipment - Description methodology and generic functionality” http://www.itu.int/rec/T-REC-G.806/en
- G.809 “Functional architecture of connectionless layer networks” http://www.itu.int/rec/T-REC-G.809/en
- G.872 “Architecture of optical transport networks” http://www.itu.int/rec/T-REC-G.872/en
- G.874 “Management aspects of optical transport network elements” http://www.itu.int/rec/T-REC-G.874/en
- **G.874.1** “OTN: Protocol-neutral management information model for the network element view” http://www.itu.int/rec/T-REC-G.874.1/en
- G.7710 “Common equipment management function requirements” http://www.itu.int/rec/T-REC-G.7710/en
- **G.7711** “Generic protocol-neutral information model for transport resources” http://www.itu.int/rec/T-REC-G.7711/en
- G.8010 “Architecture of Ethernet layer networks” http://www.itu.int/rec/T-REC-G.8010/en
- G.8021 “Characteristics of Ethernet transport network equipment functional blocks” http://www.itu.int/rec/T-REC-G.8021/en
- G.8051 “Management aspects of the Ethernet transport (ET) capable network element” http://www.itu.int/rec/T-REC-G.8051/en
- **G.8052** “Protocol-neutral management information model for the Ethernet transport capable network element” http://www.itu.int/rec/T-REC-G.8052/en
- G.8110.1 “Architecture of the Multi-Protocol Label Switching transport profile layer network” http://www.itu.int/rec/T-REC-G.8110.1/en
- G.8121 “Characteristics of MPLS-TP equipment functional blocks” http://www.itu.int/rec/T-REC-G.8121/en
- G.8151 “Management aspects of the MPLS-TP network element” http://www.itu.int/rec/T-REC-G.8151/en
- **G.8152** “Protocol-neutral management information model for the MPLS-TP network element” (Draft in progress)
- M.3100 “Generic network information model” http://www.itu.int/rec/T-REC-M.3100/en
- Q.840.1 “Requirements and analysis for NMS-EMS management interface of Ethernet over Transport and Metro Ethernet Network (EoT/MEN)” http://www.itu.int/rec/T-REC-Q.840.1/en

THANK YOU