ETSI NFV m-SDO IM Workshop

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ITU-T Study Group 15 Information Modeling Progress Since 1/2016

Malcolm Betts
SG15 WP3 Vice Chair
Malcolm.BETTS@zte.com.cn

Kam Lam
SG15 WP3 Q14 Rapporteur
Kam.Lam@Nokia.com

Scott Mansfield
SG15 Q14 Associate Rapporteur
Scott.Mansfield@Ericsson.com

Specific Louisville Issues Addressed and Proposal Accomplished

- Louisville Issue #13:
  - ❖ Different and un-harmonized CIMs: Difficulty to find out commonality among the different model
- Proposal 1:
  - – A common approach to the development of information models. Common guidelines, methodology, tooling, etc.
    - ❖ ITU-T SG15 is accomplishing this via its decision to leverage the publicly available material
      - ✓ IISOMI 513 UML Modeling Guidelines
      - ✓ IISOMI 515 Papyrus Guidelines
      - ✓ IISOMI 531 UML-YANG Mapping Guidelines
      - ✓ Tool 《xmi2yang tool-v2.0》
- Proposal 2:
  - – Agree on key elements of a common core model. Have a common core model, and allow for the extensions as needed by each organization, with a common Model-Extension approach
    - ❖ ITU-T SG15 is accomplishing this via sharing of modeling works and allowing re-use of results in publication
      - ❖ Same common Core Model in ITU-T G.7711 and ONF TR-512

Progress made since Jan. 2016 (1/2)

- Progressed and approved the technology-specific and technology-neutral information models
  - All followed the common
    - Papyrus guidelines; UML modeling guidelines; and Open Model Profile
- G.874.1 – OTN (L0, L1)
  - v3 (9/2016) approved
    - ❖ Key object classes: OCh/OTU/ODUCn/ODUflex TTP, CTP, TCM (MEP), SN (FD), SNC (FC), PG (FcSwitch)
- G.8052 – Carrier Ethernet
  - v2 (9/2016) approved
    - ❖ Key object classes: ETH/ETY TTP, CTP, MEP, MIP, Proactive/On-Demand OAM & PM Control
- G.8152 – MPLS-TP
  - v1 (9/2016)
    - ❖ Key object classes: MPLS-TP TTP, CTP, MEP, MIP, Proactive/On-Demand OAM & PM Control
    - ❖ Support both G.8113.1 and G.8113.2 protocols
- G.7711 – Generic Core Model, Nodal and Network view
  - v2 (9/2016)
    - ❖ Same Core Model as ONF TR-512 v1.2 (11/2016)
    - ❖ Key object classes: LTP, LP, Link, LinkPort, FD, FC, FcPort, FcSwitch, FcRoute,
    - ❖ Also cover Synchronization Network Management (preliminary)

Progress made since Jan. 2016 (2/2)

- Automatic generation of YANG data models from the base transport UML information models
- Tool: 《xmi2yang tool-v1.3》
  - IISOMI Open Source UML-to-YANG translation tool
    - ❖ https://github.com/OpenNetworkingFoundation/EAGLE-Open-Model-Profile-and-Tools/tree/UmlYangTools
  - Developed based on the IISOMI UML-YANG mapping guidelines (ONF TR-531 / IISOMI 531)
    - ❖ IISOMI UML to YANG Mapping Guidelines 1.0
  - The YANG modules output from the 《xmi2yang tool-v1.3》 tool have been validated by using the YANG tool available at http://www.yangvalidator.com/
- Base UML model translated:
  - G.7711 v1.02
  - G.874.1 v2.11
  - G.8052 v1.10
- The result was liaised on July 2016 to multiple SDOs,
  - ETSI NFV, ONF, TM Forum, MEF, OIF, BBF, IETF (netmod wg, lime wg, ccamp wg, teas wg, OPS area, RTG area), IEEE 802.1, IEEE 802.3, ITU-T SG2 Q7/WP2

Motivation of YANG generation from base UML IM

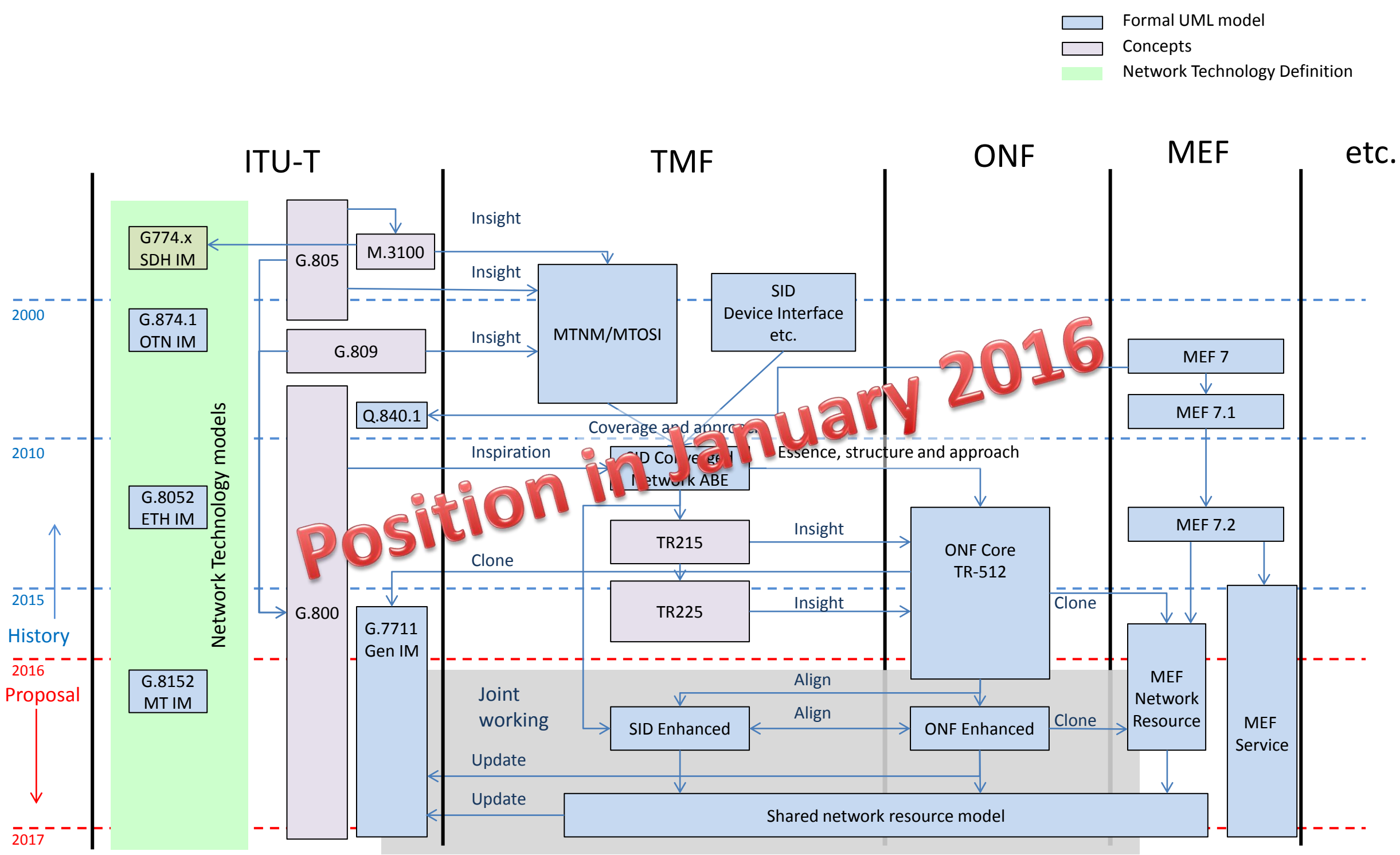
- Demonstrated the feasibility of automatic YANG generation
- Showed confidence that the base UML models can be pruned and refactored (i.e., take a subset of the base model and in some cases simplify the structure) to provide purpose-specific UML models from which protocol-specific APIs (e.g., encoded YANG or JSON) may be compiled.
- The use of the base UML model (with suitable pruning and refactoring) provides a coherent and inter-operable suite of purpose specific data models.
- This approach avoids the need for hand crafted pair-wise mediation when the same base network resources are used for different purposes (e.g., YANG models for OAM and topology that reference the same underlying resources but have been developed independently without referencing a common base model).

- Value/Benefit demonstrated in the ONF TAPI work

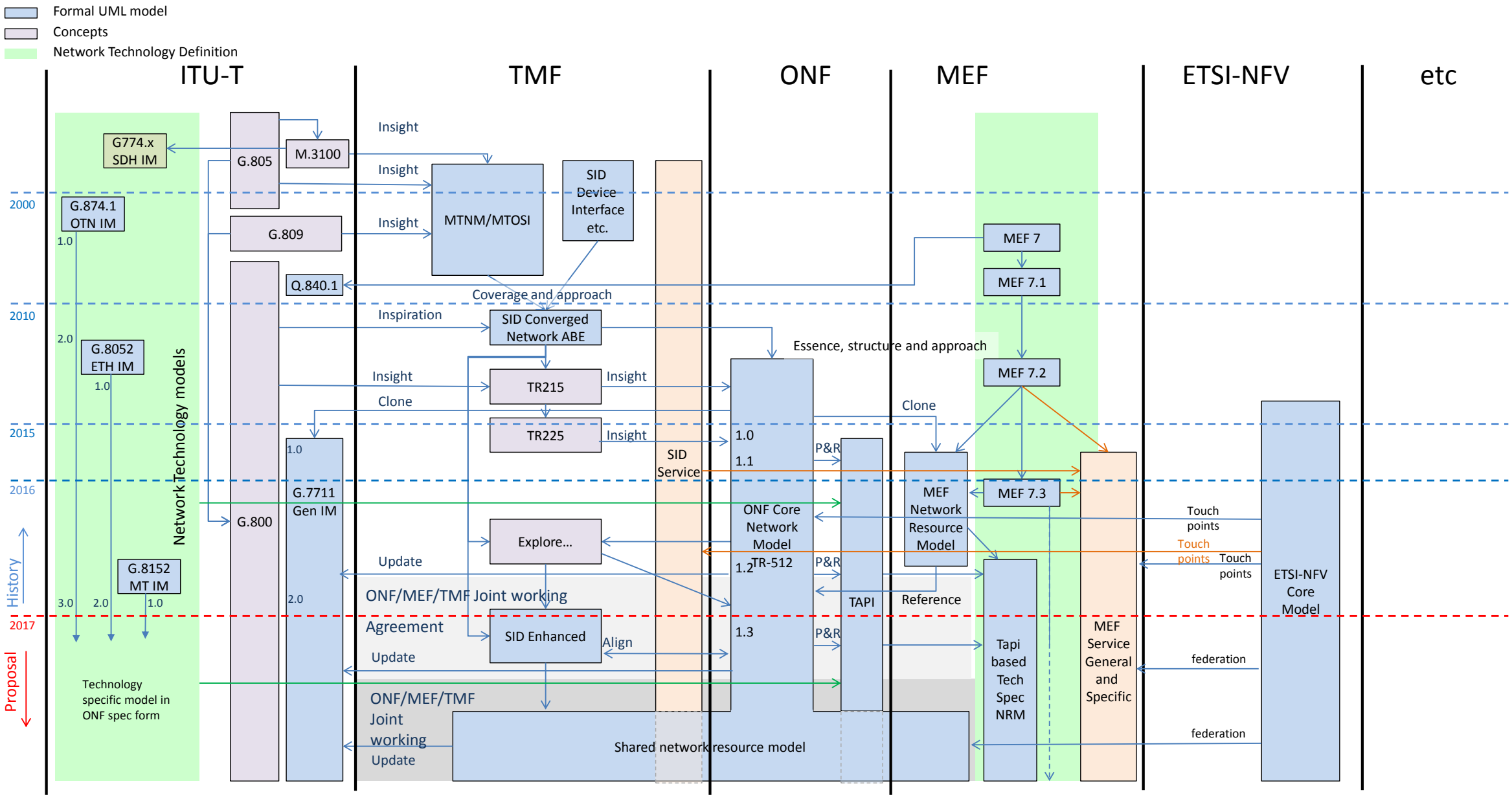
Proposals for Way Forward

- The informal IISOMI effort demonstrated the value of individuals who have been participating in different standards organizations working together and sharing information
- Formalize the process to allow SDO participation
- Continue progressing on the guidelines
- Continue progressing on tooling
- Continue progressing on the Open Model Profiles
- Joint CIM modeling for common constructs

Jan. 2016 Louisville: Model Evolution History & Proposal



Dec. 2016 Bonn: Model Evolution History & Proposal for Joint Work



THANK YOU

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

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