ASON
Current Status of Standardization Work

Global Interoperability in Multi-Domain and Multi-Layer ASON/GMPLS Networks

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Outline

- Introduction
- Related work in other Standard Development Organizations
- Overview on ITU-T ASON standards and status of work
- Review on 2007 and next steps
- Conclusions

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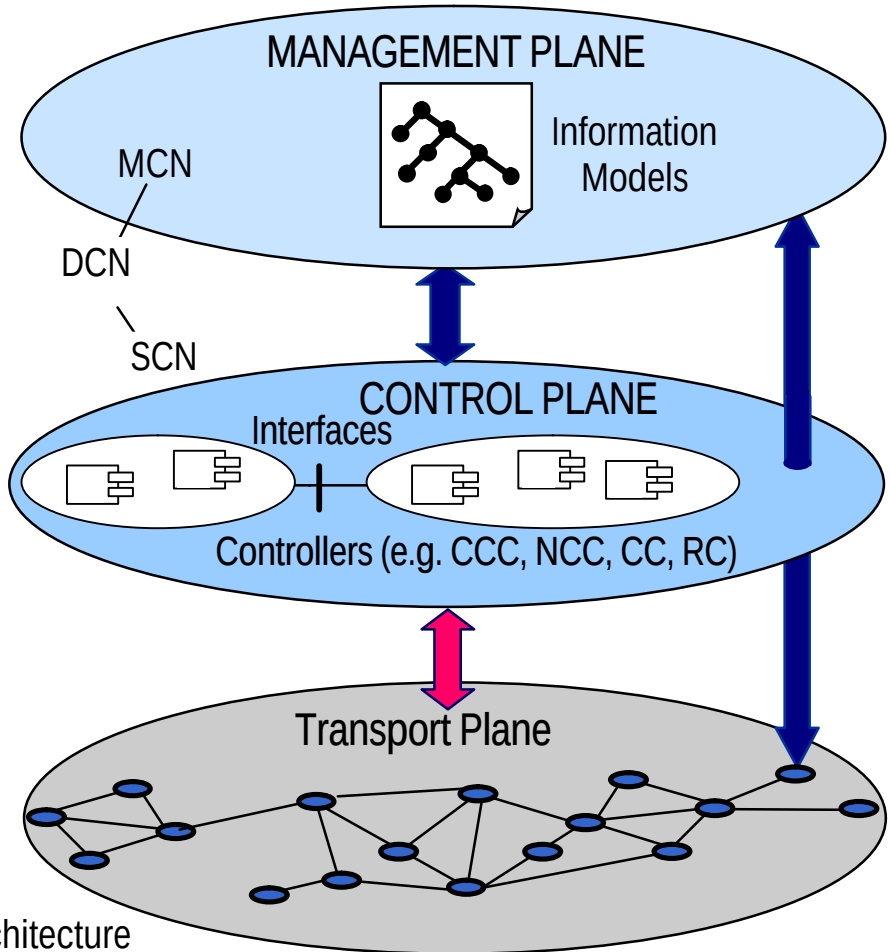
Introduction

- ASON: Automatically Switched Optical Network
  - ASON is the “ITU-T version” of IETF’s GMPLS
  - Adds Control Plane (CP) to Transport Networks
  - CP provides Signalling, Routing, and Discovery
  - CP functionality can be used:
    - by Management Plane
    - directly by Customers (via UNI)
- ITU International Telecommunication Union
  - Question 14 of Study Group 15 specifies Recommendations for “ASON Management”:
    - Data Communication Network (DCN)
    - Signalling
    - Discovery
    - Routing
    - Control Plane configuration and lifecycle
  - Question 12 of Study Group 15 specifies ASON Architecture



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Other ASON related SDOs

- IETF
  - CCAMP (Common Control and Measurement Plane) WG
    - Routing-, Signalling-, Discovery-Protocols
- tmforum
  - mTOP (multi Technology OSS Program) provides an EMS-NMS Interface specification with:
    - Retrieval of Control Plane resources and network topology
    - End-to-End Call/Connection management
- OIF OPTICAL INTERNETWORKING FORUM
  - Architecture and Signaling Working Group
    - E-NNI
    - UNI 1.0 revision 2
    - UNI 2.0
  - Carrier Group

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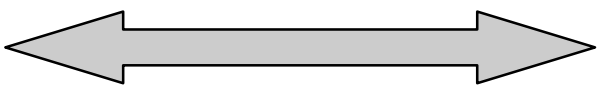
Collaboration between ITU-T Q.14/15 and IETF CCAMP

- IETF specifies protocols in the area of GMPLS
- ITU-T specifies ASON using IETF's GMPLS protocols wherever possible
  → Goal: no ASON specific protocol specification in ITU-T
- ITU-T liaise ASON specific protocol requirements to IETF
- IETF enhances the GMPLS protocols based on ASON requirements
- ITU-T refers to IETF GMPLS protocols
- Main enhancements by ASON:
  - Call / Connection separation
  - Multi-Layer Networking

CCAMP WG

Routing-, Signalling-, Discovery-Protocols



RFC 4397: A Lexicography for the Interpretation of GMPLS Terminology within the Context of the ITU-T's ASON Architecture

Q.14/15

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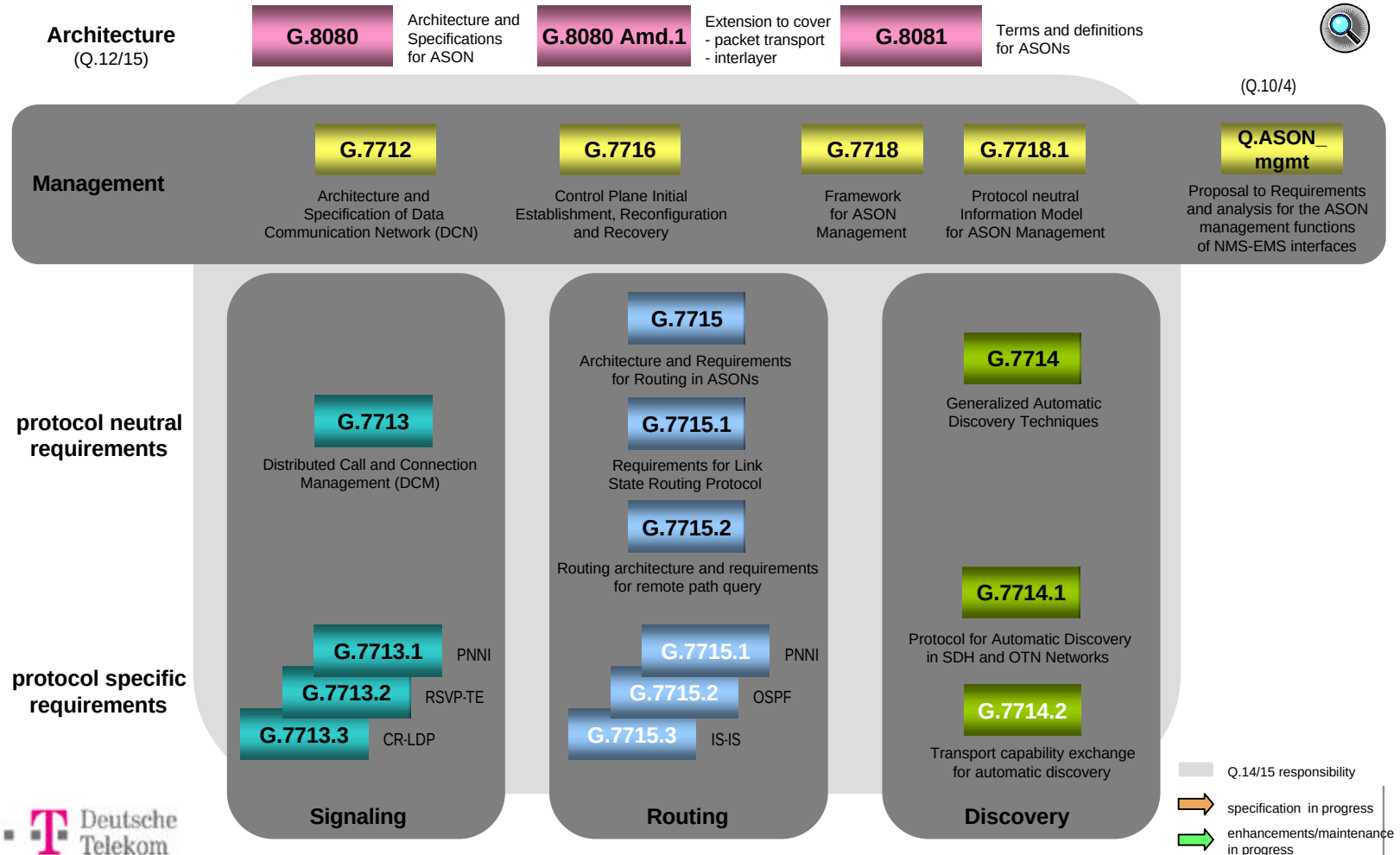
Detailed overview on ITU-T ASON Recommendations



ITU-T ASON Architecture

- G.8080: Architecture for ASON
  - Specifies the architecture and requirements for the ASON as applicable to SDH transport networks and Optical Transport Networks
  - Describes the set of Control Plane Components used to manipulate transport network resources

- G.8081: Terms and definitions for ASONs
  - Provides terms, definitions, and abbreviations used in ASON Recommendations
  - Note: IETF RFC 4397 provides a Lexicography for the Interpretation of GMPLS Terminology within the Context of the ITU-T's ASON Architecture

ITU-T ASON Management

- G.7712: Architecture and Specification of Data Communications Network (DCN)
  - Defines the architecture requirements for a DCN supporting distributed signalling communications related to ASON
- G.7716: Control plane initial establishment, reconfiguration, and recovery
  - Defines the functions necessary for the whole Control Plane Lifecycle
  - Approval planned for 02/2008
- G.7718: Framework for ASON Management
  - Defines requirements for the management view of the ASON Control Plane
- G.7718.1: Protocol neutral Information Model for ASON Management
  - Defines the Information Model for the interface between the Control Plane and Management Plane
- *Liaison from SG4 on Q.ASON_mgmt: Requirements for and analysis of the ASON management functions of NMS-EMS interfaces*

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ITU-T ASON Signalling

- G.7713: Distributed Call and Connection Management (DCM)
  - Defines the requirements for the DCM for both the User Network Interface (UNI) and the Network Node Interface (NNI) to effect automated Call and Connection operations
- G.7713.1: DCM - PNNI Implementation
  - Defines the signalling protocol specifications for DCM based on PNNI/Q.2931
  - Will not be enhanced
- G.7713.2: DCM - RSVP-TE Implementation
  - Defines the signalling protocol specifications for DCM based on GMPLS RSVP-TE
- G.7713.3: DCM - CR-LDP Implementation
  - Defines the signalling protocol for DCM based on GMPLS CR-LDP
  - Will not be enhanced

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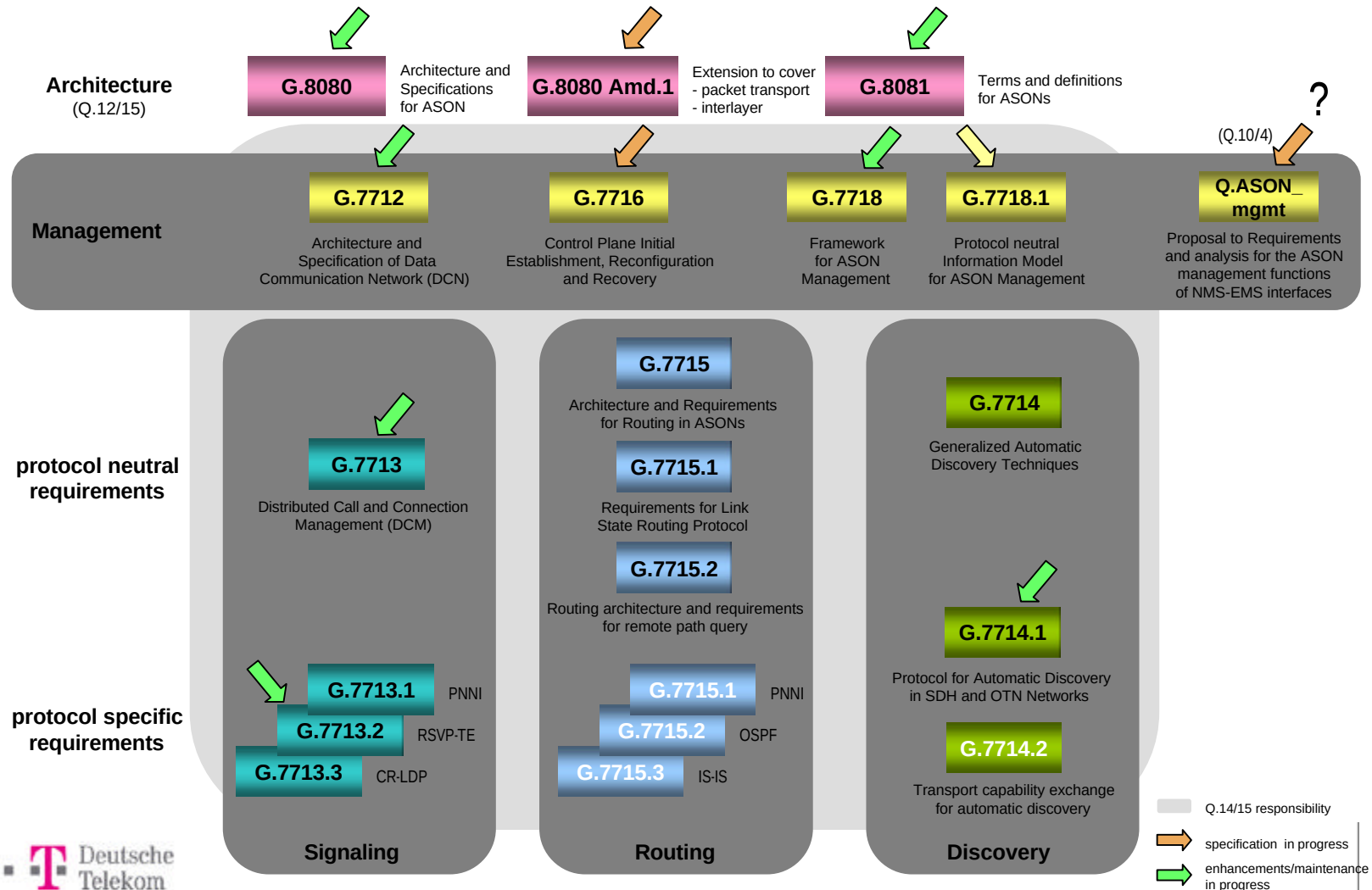
ITU-T ASON Routing

- G.7715: Architecture and Requirements for Routing in ASONs
  - Defines the ASON routing architecture, functional components including path selection, routing attributes, abstract messages and state diagrams
- G.7715.1: ASON routing architecture and requirements for link state protocols
  - Defines the protocol-neutral requirements for a hierarchical link state routing derived from G.8080 and G.7715 in a distributed environment
- G.7715.2: ASON routing architecture and requirements for remote path query
  - Defines the requirements and architecture for the functions performed by Routing Controllers (RC) during the operation of Remote Route Query

ITU-T ASON Discovery

- G.7714: Generalized automatic discovery techniques
  - Defines the discovery process for transport entities, their sub-processes and basic interactions in a protocol-neutral manner
- G.7714.1: Protocol for automatic discovery in SDH and OTN networks
  - Defines the methods, procedures, and transport plane mechanisms for discovering Layer Adjacency in ASONs, SDH, and OTN networks
- G.7714.2: Transport capability exchange for automatic discovery
  - Defines the methods, procedures and transport plane mechanisms for discovering Transport Capabilities in ASONs, SDH, and OTN networks
  - To be created

Overview on Status of ITU-T ASON Recommendations



2007 Review

- Approval of Amendment 1 to ITU-T Rec. G.7715 “Architecture and Requirements for Routing in ASONs” in February 2007:
  - Remote Route Query
  - Routing Message enhancements
- Approval of ITU-T Rec. G.7715.2 “ASON routing architecture and requirements for remote route query” in February 2007:
  - Path routing by using collaboratively a group of (external) Routing Controllers
- Finalization of Control Plane Management in TMF MTNM Release 3.5 (CORBA EMS – NMS Interface) in March 2007

Next steps

- ITU
  - Finalisation of ITU-T Recommendation G.7716 “Control plane initial establishment, reconfiguration, and recovery”
  - Small enhancements to existing Recommendations
- TMF
  - Specification of an XML based Interface (WEB Services) for Control Plane Management
- Information exchange between SDOs in this area (ITU-T, TMF, OIF, IETF)

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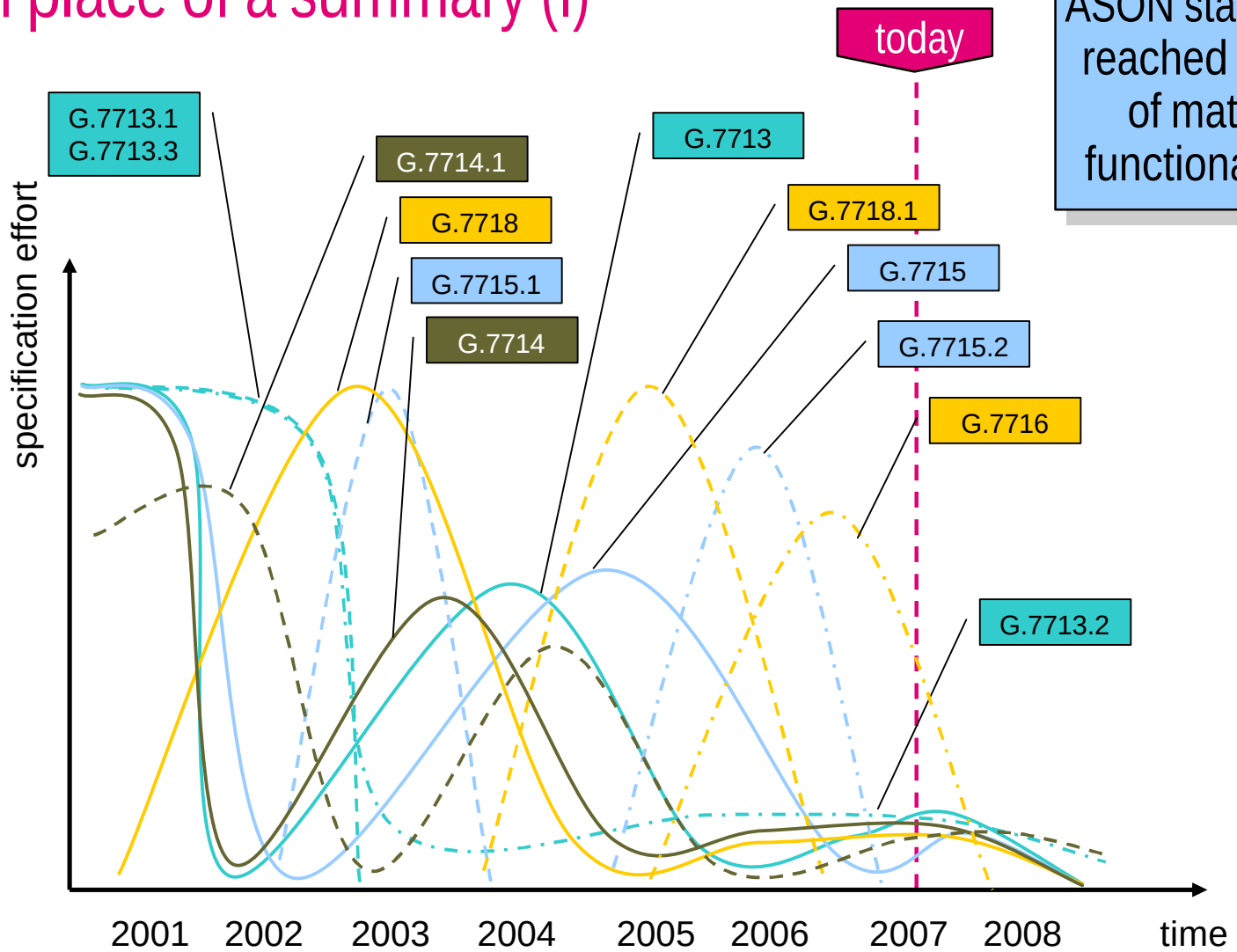
In place of a summary (I)



ASON standards have reached a high level of maturity and functional coverage

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In place of a summary (II)

CCAMP WG

Routing-, Signalling-,
Discovery-Protocols

multi Technology OSS Program

ASON Management Information Model

Q.14/15

UNI and E-NNI Interface Specifications

Architecture and Signalling WG
Carrier Group

Distributed approaches
can be successful

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ASON
Current Status of Standardization Work

Thank you for your attention!

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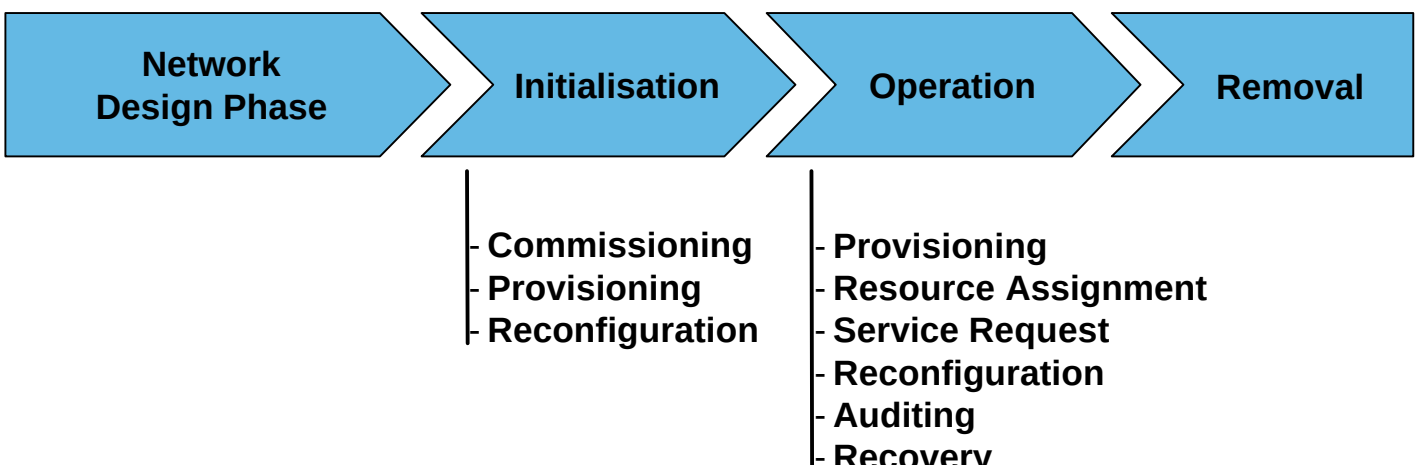
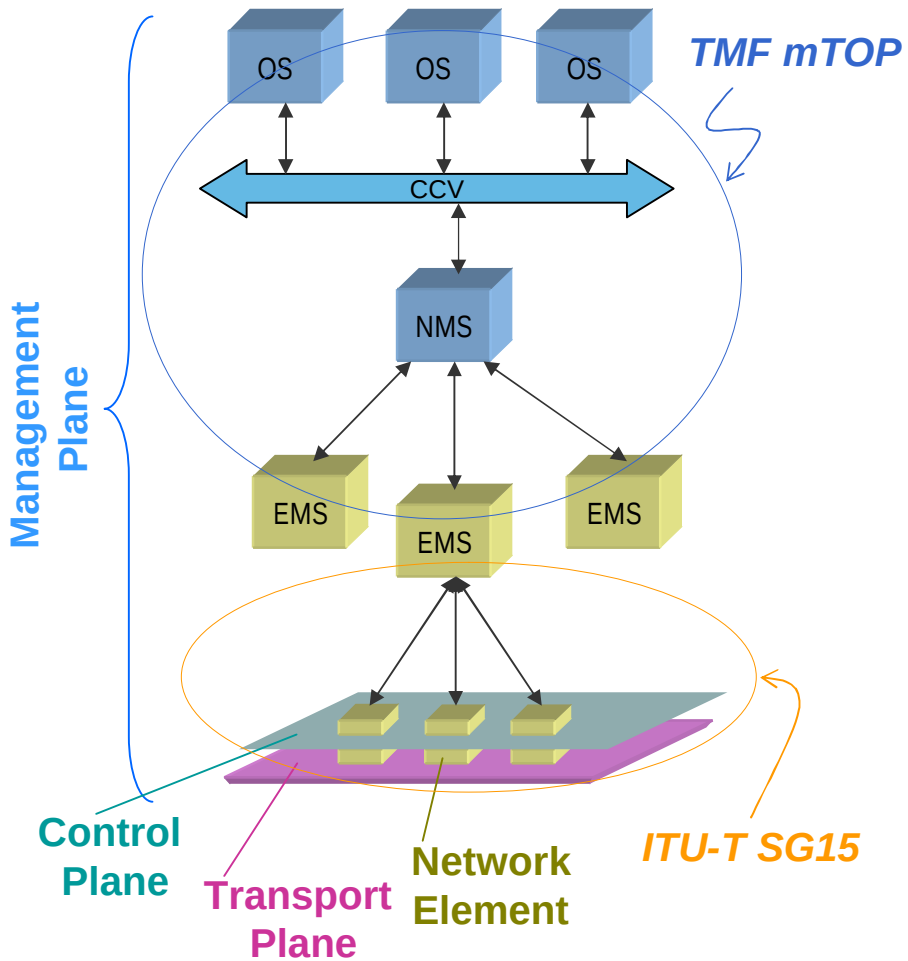
G.7716: Control Plane Lifecycle



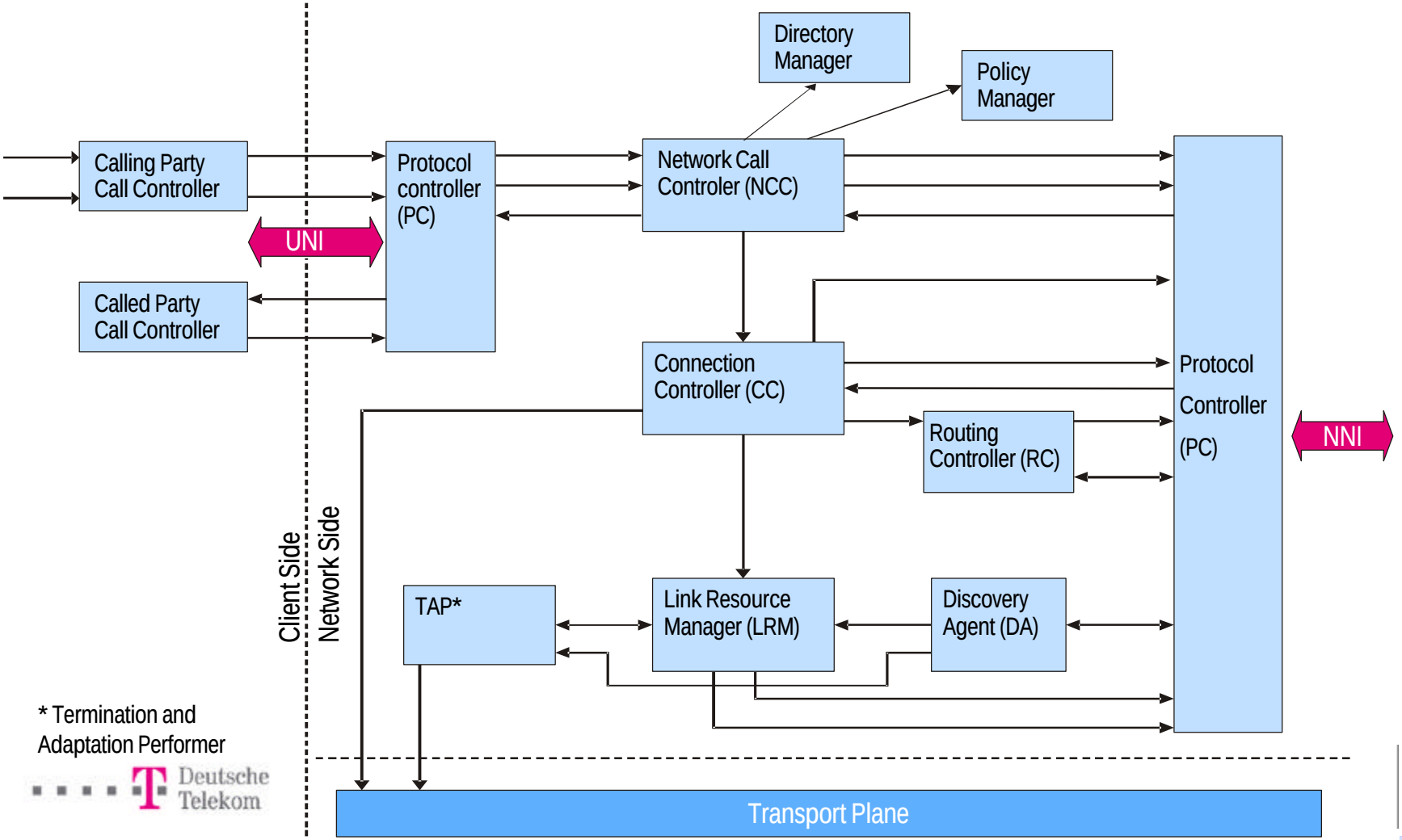
ITU-T and TMF work on Network Management

Scope of specifications on Network Management



G.8080 Control Plane Components

Example of interconnection of components (from G.8080)



Q14/15 Joint Interim Meeting for ASON in Stuttgart, 10 – 14 September 2007

Main results

- G.8080 extensions to cover CO-PS
  - Scope: Clarification of SNP states in TAP/LRM
  - Amendment of G.8080 planned for February 2008
  - Impact also on G.7713 and G.7718
- IETF Liaisons on GMPLS Calls:
  - How to carry ASON call information across a GMPLS network s ?
  - How to deal with VCAT (single/multiple calls) ?
  - Results: further exchange; additions to G.7713 living list.
- IETF Liaison on Loop prevention
  - Loop prevention for hierarchical routing
  - Result: further exchange.
- Liaison from OIF on issues regarding SCN communications
  - Alignment of GCC/DCC specification
  - Separation of SCN and MCN
  - Result: inclusion in next revision of G.7712 (planned for consent in 2008)
- Liaison from SG4 on new work on network-level management requirements for ASON
  - Keep a single industry solution for ASON management
  - Proposal not to continue work on Q.ASON-mgmt as a separate Recommendation
  - Continue identifying missing management support in MTNM with respect to the G.7718 requirements
  - Reference to Q.14/15 ongoing liaisons with TMF on MTNM release 3.5

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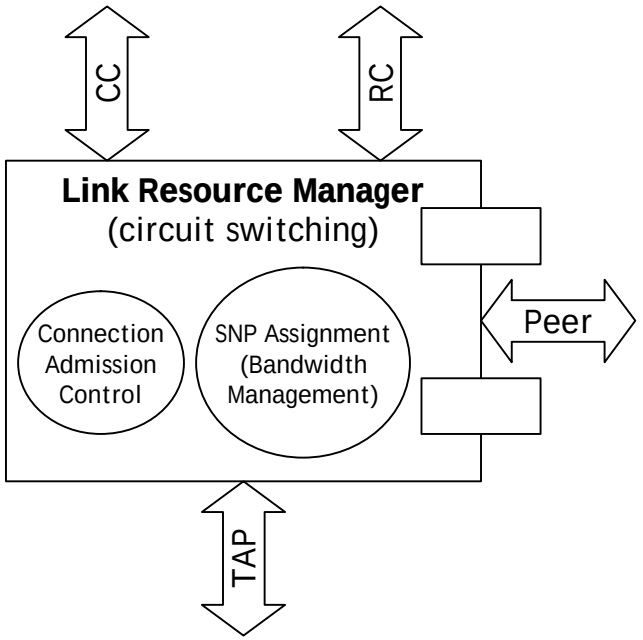
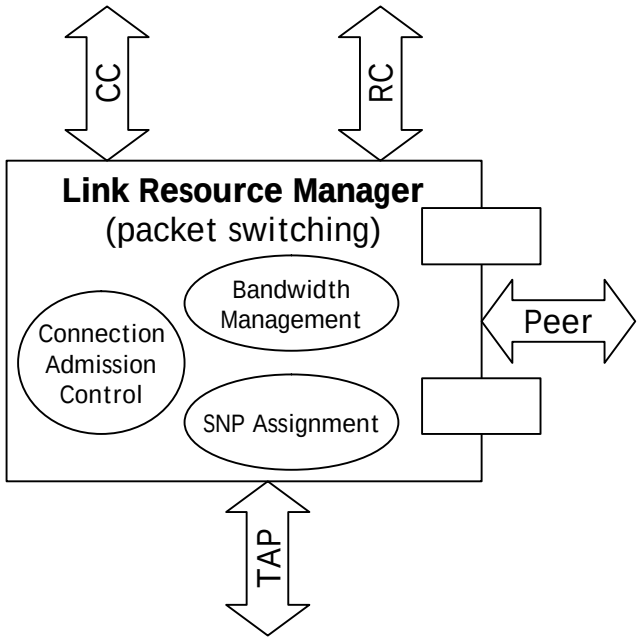
Basic LRM functions for circuit and packet switching





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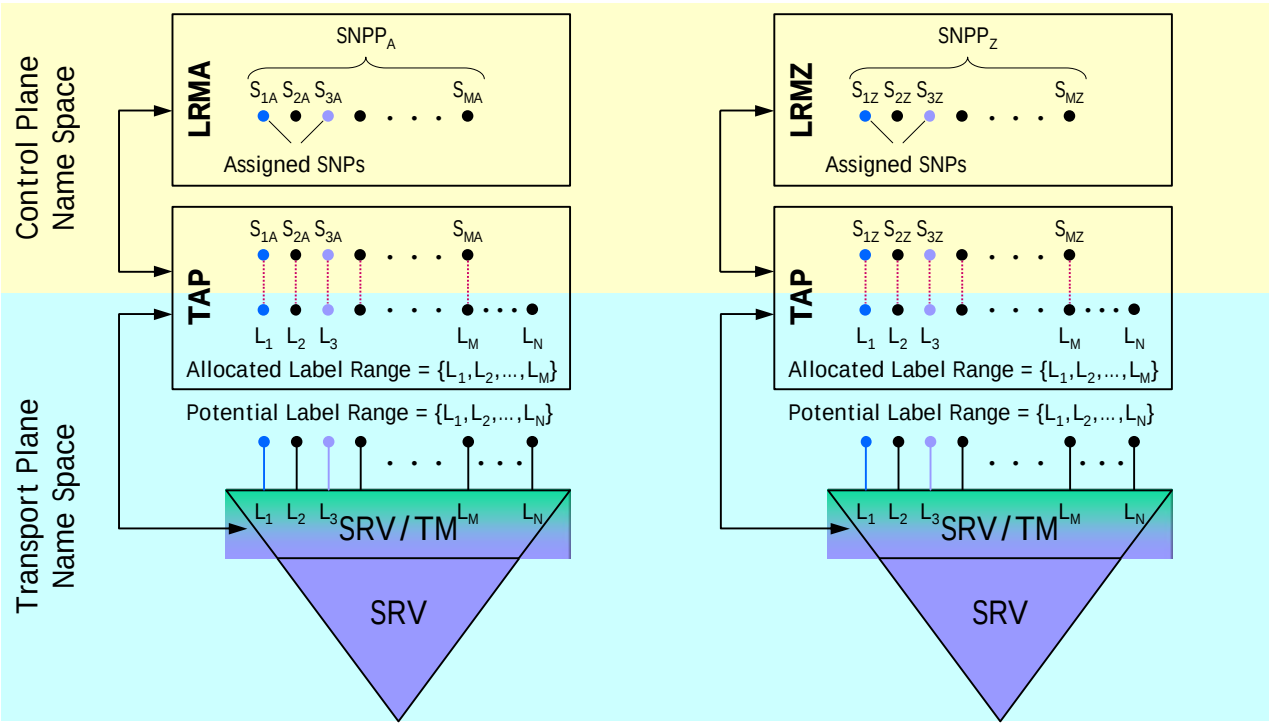
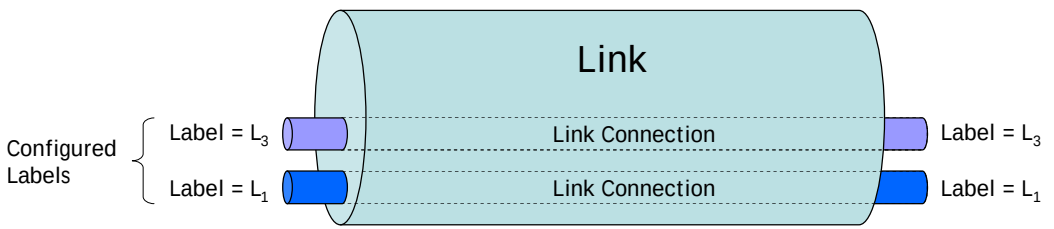
Control plane and transport plane organizational model





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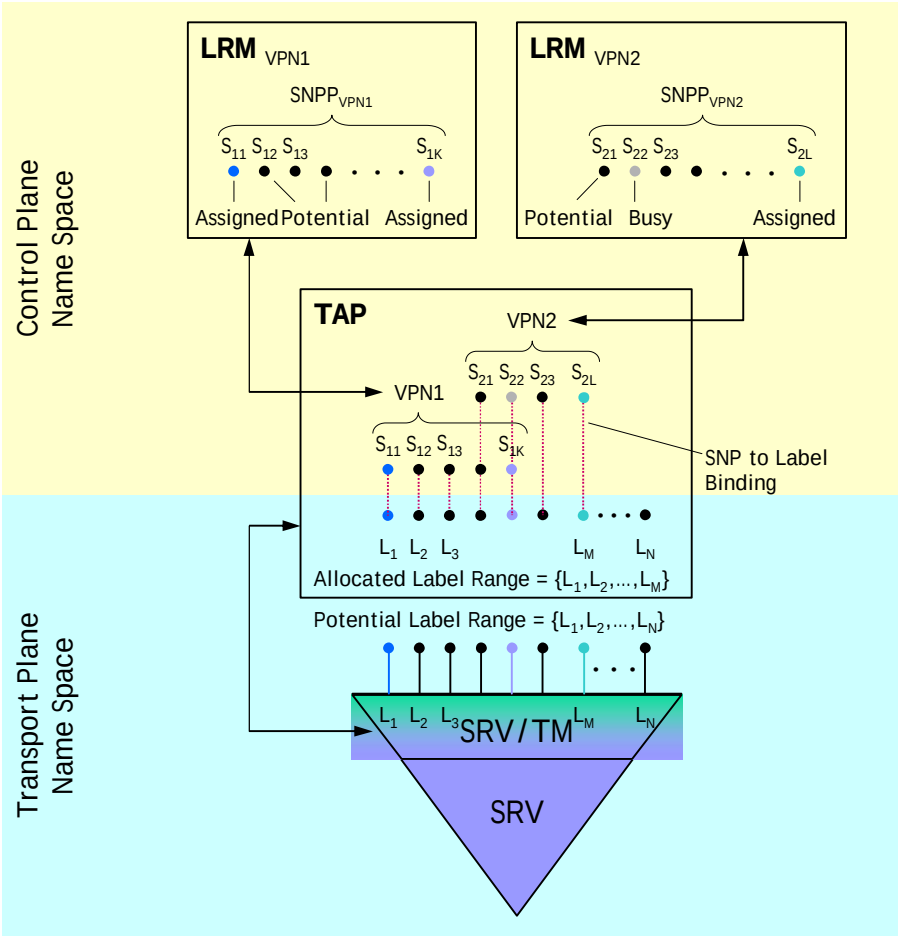
Control plane organizational model for VPNs



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