

Overview of SG15 Question 14's Work Programs

Q14/15: Management and Control of Transport Systems and Equipment

H. Kam LAM
Lucent Technologies



SG15 Question 14 (Q14/15)

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ITU-T Study Group 15
Optical and other Transport Network Infrastructures

ITU-T Working Party 1/15
Optical and metallic access network

ITU-T Working Party 2/15
Optical transport network technology

ITU-T Working Party 3/15
Optical transport network structure

Q.3/15 Gen. characteristics optical transport networks

Q.9/15 Transport equipment and network protection/restoration

Q.11/15 Signal structures, interfaces and interworking for transport networks

Q.12/15 Transport network architectures

Q.13/15 Network synchronization and time distribution performance

Q.14/15 Management and control of transport systems and equipment

Lead Study Group on Access Network Transport and on Optical Technology



- Management requirements and info models
 - Based on the TMN management framework, architecture, principles, functions, and generic info models, e.g., as contained in M.3010, M.3400, & M.3100, etc.
 - Driven by the transport equipment functional specifications, e.g., G.783 (SDH), G.798 (OTN), etc.
- Protocol-neutral control requirements and protocol solutions ASON^{*}
 - Based on the ASON framework and architecture as defined in G.8080
 - Covers ASON Signaling, ASON Routing, Auto-discovery

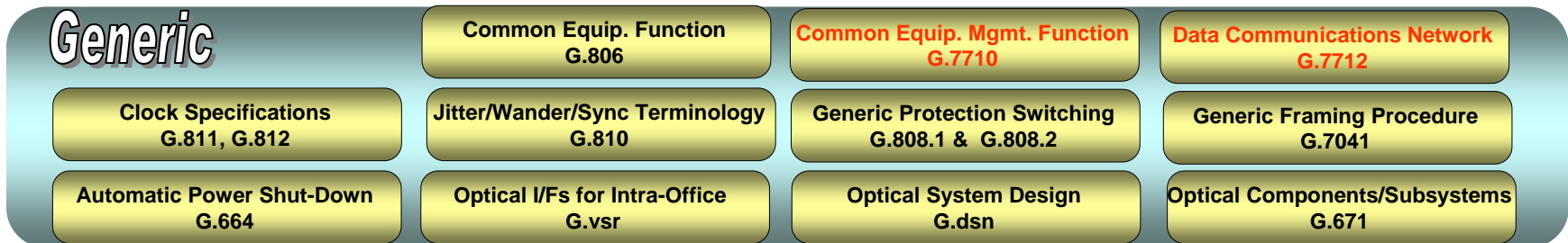
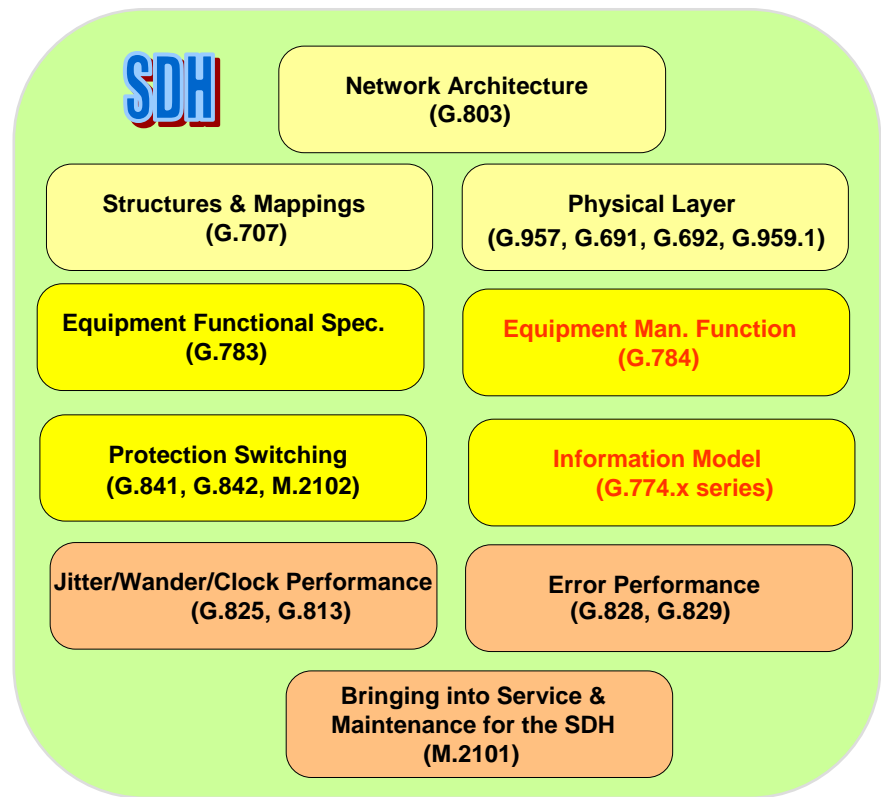
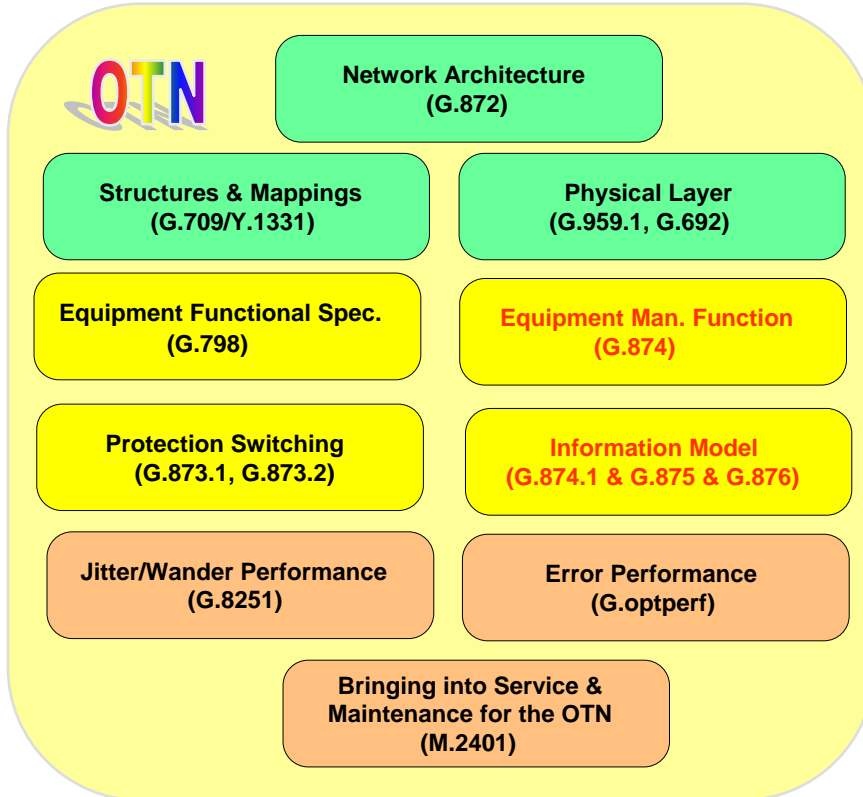
^{*} *ASON: Automatically Switched Optical Network*



Connectivity Standards

Examples: OTN & SDH

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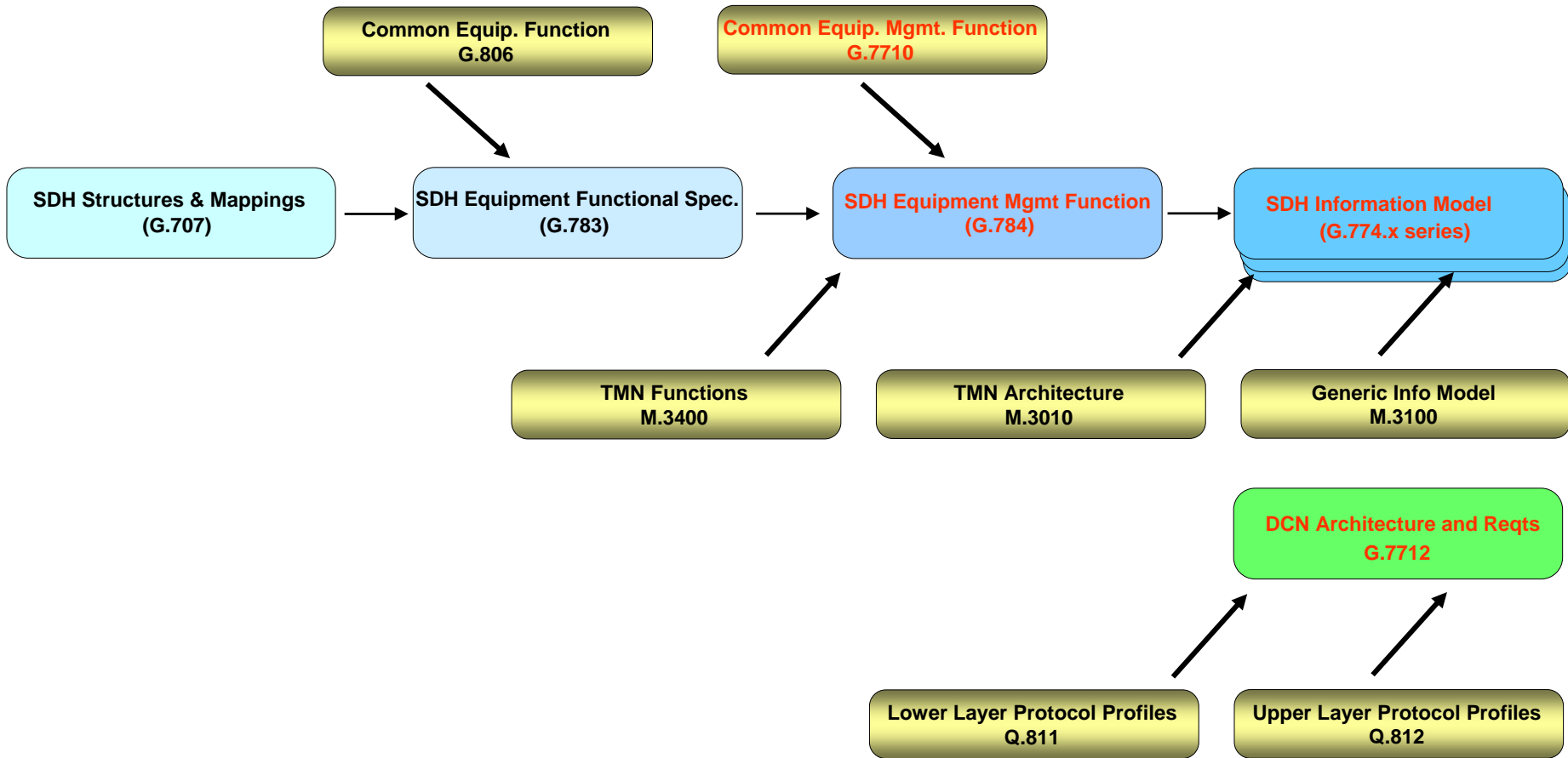




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SDH

Specification Relationships Examples: SDH



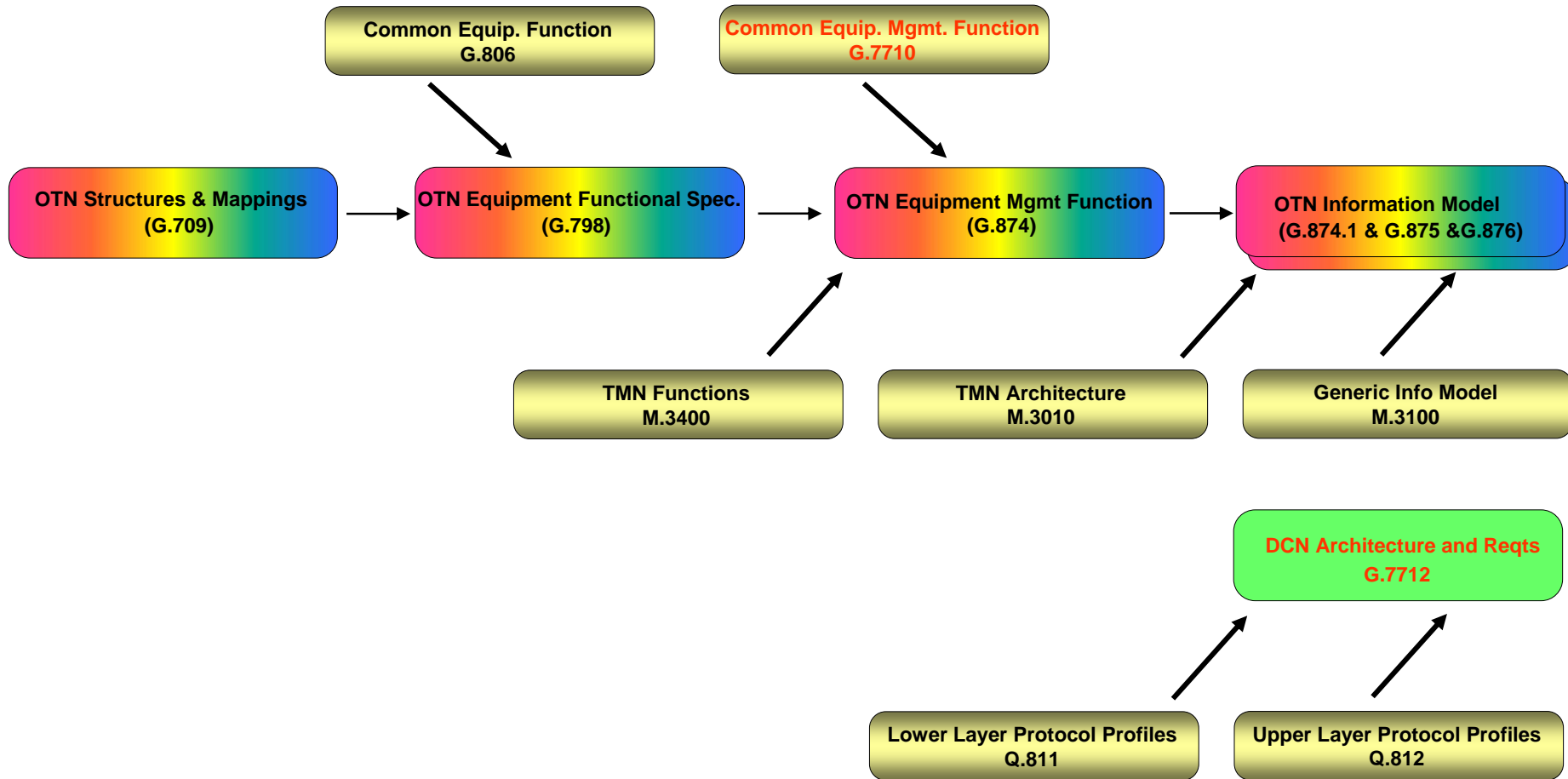


Specification Relationships

Examples: OTN

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OTN





Generic info flow (G.806): Transport Atomic Fn ← MP → Equipment Mgmt Fn

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Mgmt Point	Process	Input to AF	Output from AF
TT_So_MP	Trace identifier	MI_TxTI	
TT_Sk_MP	TP/port mode	MI_TPmode: MON, <u>NMON</u> MI_Portmode: MON, (<u>AUTO</u>), <u>NMON</u>)	
	Continuity supervision		MI_cLOS, MI_cUNEQ, MI_cLTC
	Connectivity supervision	MI_ExTI MI_TIMdis: <u>true</u> , false MI_TIMAISdis: true, <u>false</u>	MI_AcTI MI_cTIM
	Signal quality supervision (Poisson-based)	MI_EXC_X: <u>10⁻³</u> , 10 ⁻⁴ , 10 ⁻⁵ MI_DEG_X: 10 ⁻⁵ , <u>10⁻⁶</u> , 10 ⁻⁷ , 10 ⁻⁸ , 10 ⁻⁹	MI_cEXC MI_cDEG
	Signal quality supervision (Burst-based)	MI_DEGTHR: 0.. <u>(30)</u> ..100% or 0...N MI_DEGM: 2.. <u>10</u>	MI_cDEG
	Maintenance signals processing	MI_AIS_Reported: true, <u>false</u> MI_SSF_Reported: true, <u>false</u> MI_RDI_Reported: true, <u>false</u> MI_ODI_Reported: true, <u>false</u>	MI_cAIS, MI_cIncAIS MI_cSSF MI_cRDI MI_cODI
	Performance monitoring	1 second period indications (MI_1second)	MI_pN_EBC, MI_pN_DS, MI_pF_EBC, MI_pF_DS, ...



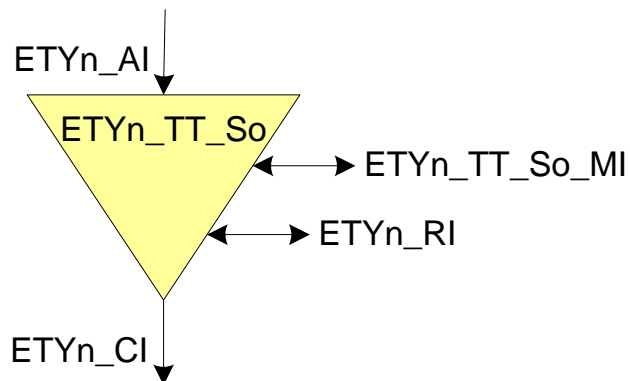
Generic info flow (G.806): Transport Atomic Fn ← MP → Equipment Mgmt Fn (cont)

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Mgmt Point	Process	Input to AF	Output from AF
A_So_MP	Selection	MI_Active: true, <u>false</u>	
	Performance monitoring		MI_pPJC+, MI_pPJC-
A_Sk_MP	Selection	MI_Active: true, <u>false</u>	
	Maint. signal processing	MI_AIS_Reported: true, <u>false</u>	MI_cAIS
	Payload type supervision		MI_AcSL MI_cPLM
	Alignment supervision		MI_cLOF, MI_cLOM, MI_cLOP
C_MP	Connection management	Matrix connection selection	
	Protection	Protection group selection (set of CP, protection architecture, switching type, operation type, APS usage, extra traffic) MI_ExtCmd: LO, FS, MS, EXER, CLR External control command (LOW) HoldOff time value (MI_HOtime) MI_WTRtime: 0..(5)..12 minutes	MI_cFOP

ETYn Trail Termination Source function (ETYn_TT_So)

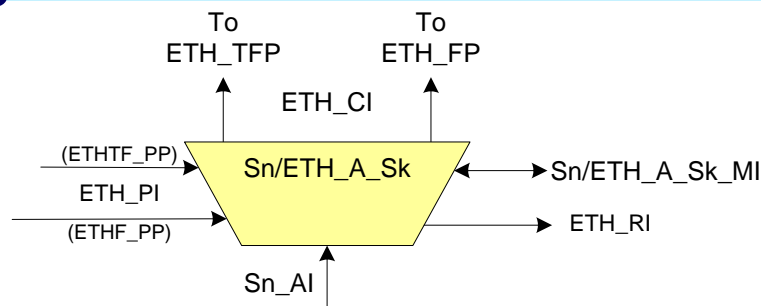
Fig.10-1 & Table 10-2 /G.8021



Inputs	Outputs
<p>ETYn_AP:</p> <ul style="list-style-type: none"> ETYn_AI_Data ETYn_AI_Clock ETYn_AI_SSFE <p>THYn_RP:</p> <ul style="list-style-type: none"> ETYn_RI_RSF <p>ETYnTT_So_MP:</p> <ul style="list-style-type: none"> ETYn_TT_So_MI_FTSEnable 	<p>ETYn_TFP:</p> <ul style="list-style-type: none"> ETYn_CI_Data ETYn_CI_Clock <p>ETYn_RP:</p> <ul style="list-style-type: none"> ETYn_RI_FTS <p>ETYn_TT_So_MP:</p> <ul style="list-style-type: none"> ETYn_TT_So_MI_PHYType ETYn_TT_So_MI_PHYTypeList

VC-n / ETH Adaptation Sink function (Sn/ETH_A_Sk)

Fig.11-3 & Table 12-2 /G.8021



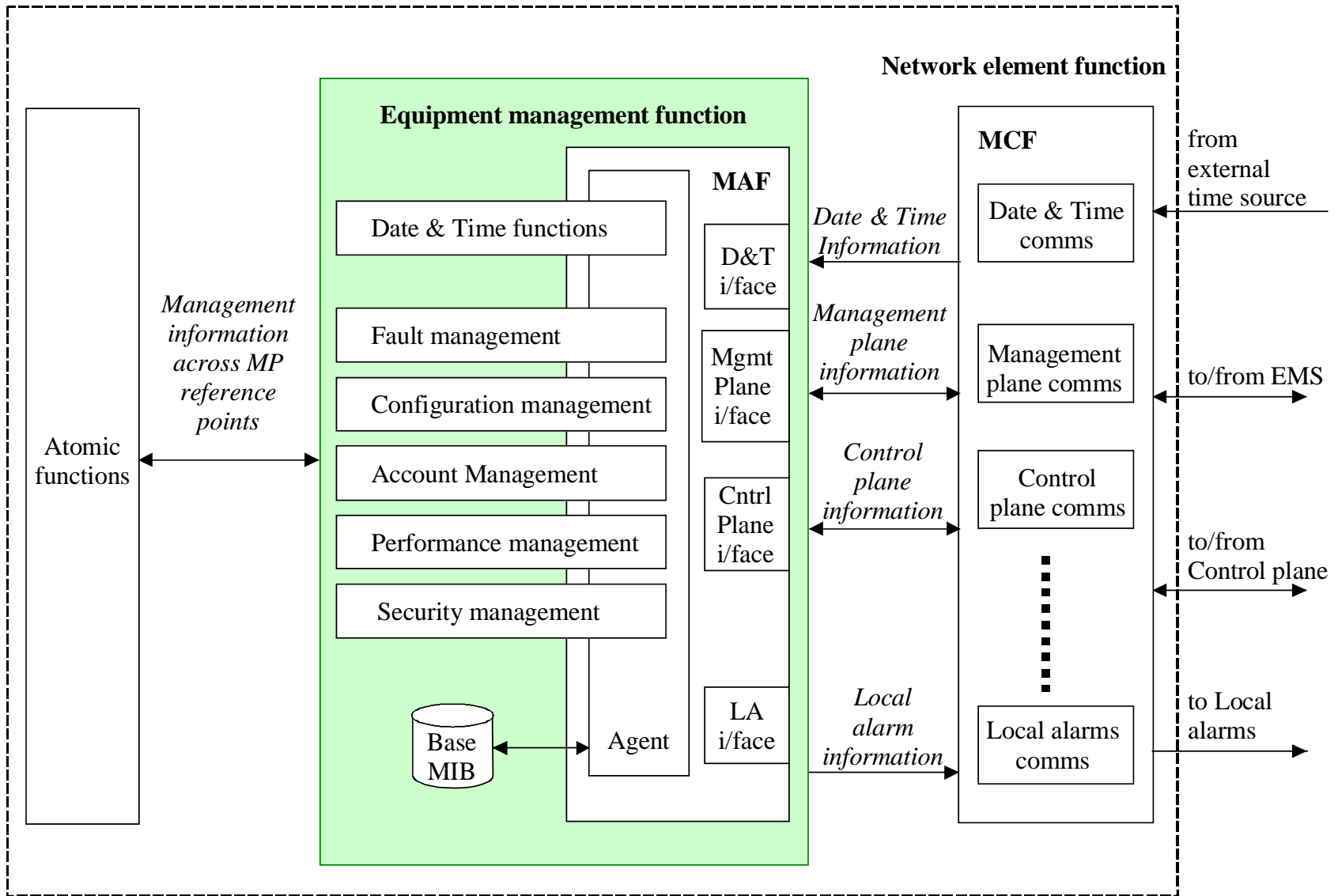
Inputs	Outputs
Sn_AP: Sn_AI_Data Sn_AI_Clock Sn_AI_FrameStart Sn_AI_TSF ETHF_PP: ETH_PI_Data ETHTF_PP: ETH_PI_Data Sn/ETH_A_Sk_MI: Sn/ETH_A_Sk_MI_FilterConfig Sn/ETH_A_Sk_MI_CSF_Reported Sn/ETH_A_Sk_MI_MAC_Length	ETH_TFP: ETH_CI_Data ETH_CI_SSF ETH_FP: ETH_CI_Data ETH_CI_SSF ETH_RP: ETH_RI_RSF Sn/ETH_A_Sk_MI: Sn/ETH_A_Sk_MI_AcSL; Sn/ETH_A_Sk_MI_AcEXI Sn/ETH_A_Sk_MI_AcUPI; Sn/ETH_A_Sk_MI_cPLM Sn/ETH_A_Sk_MI_cLFD; Sn/ETH_A_Sk_MI_cUPM Sn/ETH_A_Sk_MI_cEXM; Sn/ETH_A_Sk_MI_cCSF Sn/ETH_A_Sk_MI_pErrors



Equipment Management Function process block diagram

Fig. 4/G.7710

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Q14/15 Study Items

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- o ASON control architecture based protocol-neutral requirements and associated protocol solutions, including packet transport networks (e.g., T-MPLS)
- o Management aspect of control planes, including interaction between a control plane and a management plane
- o Management and control aspects of Ethernet over Transport
- o Management aspects of:
 - SDH equipment
 - Optical Network equipment
 - Flexible multiplexing equipment
 - PDH multiplexing equipment
 - ATM equipment
 - NGN equipment
 - Access equipment
 - Generic Framing Procedure (GFP) to include client signals such as Fiber Channel clients, FC_BB_GFPT
 - Virtual Concatenation
 - Link Capacity Adjustment Scheme (LCAS)
 - MPLS
 - Management data communication capability



Q14/15 Current Tasks

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ITU-T SG15 Q.14/15

Management and control of transport systems and equipment

- **G.7710**
Transport NE management **common requirements**
- **G.7712**
DCN architecture and requirements
- **G.7713; G.7713.1, G.7713.2, G.7713.3**
ASON signaling requirements; PNNI, RSVP-TE, CR-LDP
- **G.7714; G.7714.1**
Automatic **discovery**; In SDH & OTN networks
- **G.7715; G.7715.1, G.7715.2***
ASON routing architecture reqt; Link state protocol reqt; PC
- **G.7716**
Optical control plane initialization, re-configuration, restoration
- **G.7718; G.7718.1**
Optical **control plane management**; protocol-neutral info model
- **G.874; G.875, G.876**
OTN NE management requirements and info models
- **G.784; G.774, G.774.1, ..., G.774.10**
SDH NE management requirements and info model

- **G.vcm***
VCAT/LCAS management
- **G.eot-mgmt***
EoT management
- **G.eot-mgmt-info***
EoT management info mod
- **G.tmpls-mgmt***
T-MPLS management
- **G.tmpls-mgmt-Info***
T-MPLS management info

* New Recommendations

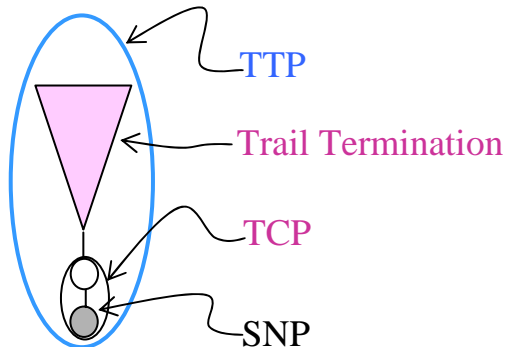
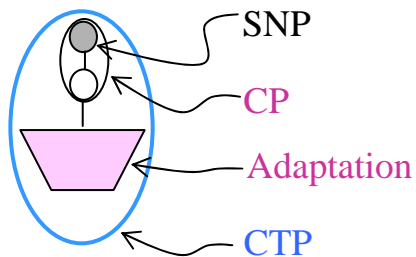


Typical Context of a transport management specification

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- 5 XXX (OTN) management functions
 - 5.1 Network management architecture
 - 5.2 Equipment management function
- 6 Date and time
 - 6.1 Date and time applications and requirements
 - 6.2 Date and time functions
- 7 Fault management
 - 7.1 Fault management applications
 - 7.2 Fault management functions
- 8 Configuration management
 - 8.1 Configuration management applications
 - 8.2 Configuration management functions
- 9 Account management
- 10 Performance management
 - 10.1 Performance management applications
 - 10.2 Performance management functions
- 11 Security management

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Transport entities

Adaptation function

Trail Termination function

CP: Connection point

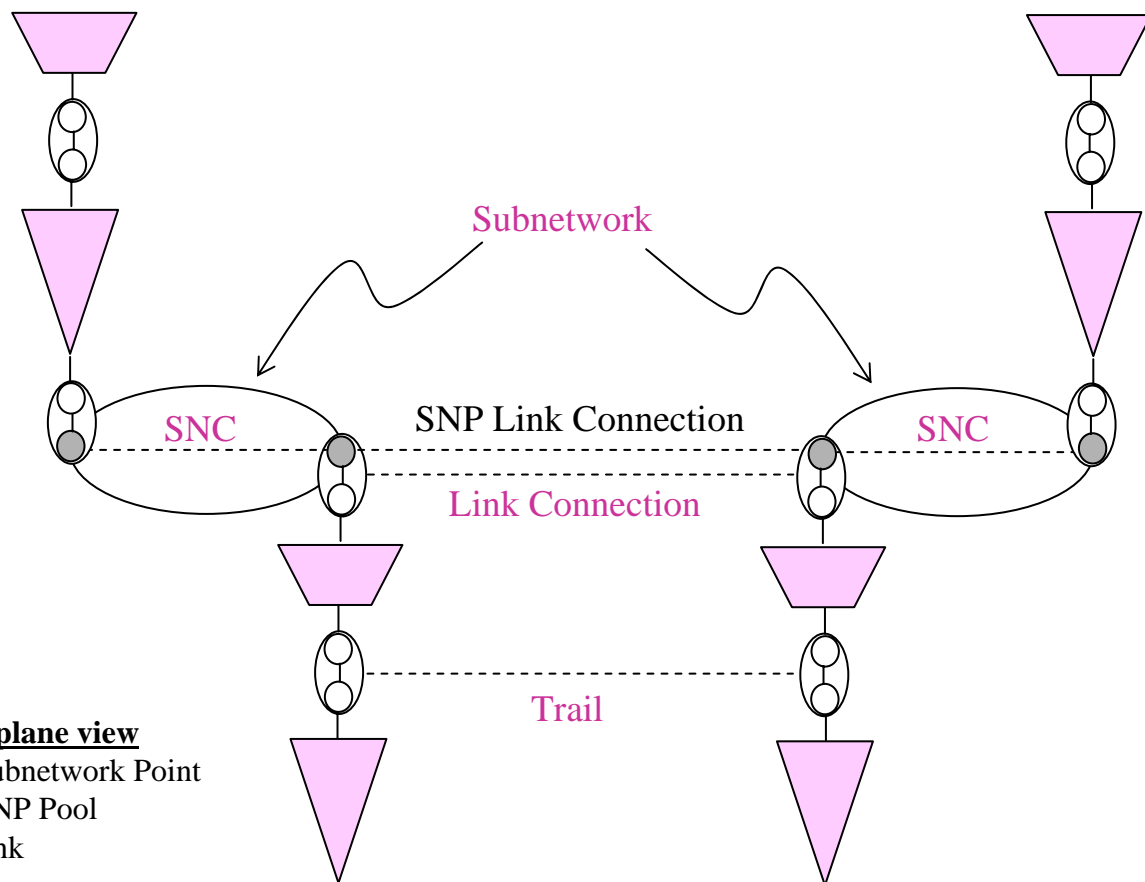
TCP: Termination connection point

Management plane view

TTP: Trail Termination Point

CTP: Connection Termination Point

Relationship between the architectural entities in **Transport plane**, **Management plane**, and **Control plane**



Control plane view

SNP: Subnetwork Point

SNPP: SNP Pool

SNPP Link



Relationship with Other SDOs

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- Study Groups:
 - ITU-T SG 4 on TMN and network management
 - ITU-T SG 13 on NGN operation and maintenance
 - ITU-T SG 16 for the transport of Multimedia
 - ITU-T SG 17 on data networks and security
 - ITU-R WP 9B for radio relay system
- Standardization bodies, forums and consortia:
 - OIF (Signaling, Architecture, Carrier, and OAM&P WGs)
 - IETF WGs in Operations and Management, Transport, and Routing
 - TeleManagement Forum (MTNM and IPNM Teams)
 - MEF on Ethernet management
 - ATIS Committee OPTXS on transport management aspects
 - ATIS Committee TMOC on generic management aspects
 - OMG on CORBA technology
 - W3C on XML
 - IEEE 802 on Ethernet management



Representative to Other SDOs Q14/15-related

ITU-T

- o TMN Project Management Team (SG 4)
 - Kam LAM (Lucent)
- o TMF MTMN Team
 - Bernd ZEUNER (DT)
- o IETF on Transport Network Management
 - Kam LAM (Lucent)
- o ETF ccamp
 - Lyndon ONG (Ciena)
- o IETF ccamp on the GMPLS/ASON Lexicography
 - Ben MACK-CRANE (Tellabs)
- o IETF (isis, ospf, idr, rpsec, udlr) - Routing Issues
 - Jonathan SADLER (Tellabs)



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Current Active Collaborations

o IETF

- CCAMP WG on ASON/GMPLS Signaling
- PCE WG on path computing
- Routing area and WGs on routing
- M & O area on management

o OIF

- ASON Architecture, Signaling, & Routing

o TMF

- MTNM on control plane management
- MTNM on Ethernet management (*also with MEF & Q10/4*)



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- SG4
 - Telecommunication Management Plan
 - Q3/4 on transport network and service operations procedures for performance and fault management
 - Q10/4 on Ethernet management
 - Q11/4 on DCN
- NGN Management Focus Group
 - Control plane management
- MEF
 - Ethernet management



- o http://ties.itu.int/u/tsg15/sg15/xchange/wp3/q14/q14_index.htm

Thank you!