

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

G.7718/Y.1709

(10/2020)

**SERIES G: TRANSMISSION SYSTEMS AND MEDIA,
DIGITAL SYSTEMS AND NETWORKS**

Data over Transport – Generic aspects – Transport
network control aspects

**SERIES Y: GLOBAL INFORMATION
INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS,
NEXT-GENERATION NETWORKS, INTERNET OF
THINGS AND SMART CITIES**

Internet protocol aspects – Operation, administration and
maintenance

Framework for the management of management-control components and functions

Recommendation ITU-T G.7718/Y.1709

ITU-T G-SERIES RECOMMENDATIONS
TRANSMISSION SYSTEMS AND MEDIA, DIGITAL SYSTEMS AND NETWORKS

INTERNATIONAL TELEPHONE CONNECTIONS AND CIRCUITS	G.100–G.199
GENERAL CHARACTERISTICS COMMON TO ALL ANALOGUE CARRIER-TRANSMISSION SYSTEMS	G.200–G.299
INDIVIDUAL CHARACTERISTICS OF INTERNATIONAL CARRIER TELEPHONE SYSTEMS ON METALLIC LINES	G.300–G.399
GENERAL CHARACTERISTICS OF INTERNATIONAL CARRIER TELEPHONE SYSTEMS ON RADIO-RELAY OR SATELLITE LINKS AND INTERCONNECTION WITH METALLIC LINES	G.400–G.449
COORDINATION OF RADIOTELEPHONY AND LINE TELEPHONY	G.450–G.499
TRANSMISSION MEDIA AND OPTICAL SYSTEMS CHARACTERISTICS	G.600–G.699
DIGITAL TERMINAL EQUIPMENTS	G.700–G.799
DIGITAL NETWORKS	G.800–G.899
DIGITAL SECTIONS AND DIGITAL LINE SYSTEM	G.900–G.999
MULTIMEDIA QUALITY OF SERVICE AND PERFORMANCE – GENERIC AND USER-RELATED ASPECTS	G.1000–G.1999
TRANSMISSION MEDIA CHARACTERISTICS	G.6000–G.6999
DATA OVER TRANSPORT – GENERIC ASPECTS	G.7000–G.7999
General	G.7000–G.7099
Transport network control aspects	G.7700–G.7799
PACKET OVER TRANSPORT ASPECTS	G.8000–G.8999
ACCESS NETWORKS	G.9000–G.9999

For further details, please refer to the list of ITU-T Recommendations.

Recommendation ITU-T G.7718/Y.1709

Framework for the management of management-control components and functions

Summary

Recommendation ITU-T G.7718 contains the framework for ASON management. It places automatically switched optical network (ASON) management within the TMN context and specifies how the TMN principles may be applied. A management view of the ASON control plane is developed. This view provides the bases for the ASON management requirements specified in this Recommendation. Identifier spaces needed in ASON management are specified. Examples of management system structures and ASON related management applications are contained in the appendices.

The 2010 version of this Recommendation adds the requirements to support permanent connection to soft permanent connection migration, configuration of routing controller adjacencies, call detail record for accounting management, and refresh of management plane and control plane views.

The 2020 edition of the Recommendation extends the scope from ASON management to the aspects of management of MC (management and control) components and functions.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T G.7718/Y.1709	2005-02-13	15	11.1002/1000/1892
2.0	ITU-T G.7718/Y.1709	2010-07-29	15	11.1002/1000/10897
3.0	ITU-T G.7718/Y.1709	2020-10-29	15	11.1002/1000/14542

Keywords

Context management, management-control system, management requirements, MC components, MC functions, MCS.

* To access the Recommendation, type the URL <http://handle.itu.int/> in the address field of your web browser, followed by the Recommendation's unique ID. For example, <http://handle.itu.int/11.1002/1000/11830-en>.

FOREWORD

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The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

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Table of Contents

		Page
1	Scope.....	1
	1.1 MC functions.....	1
	1.2 MC components.....	1
	1.3 Managing the MC functions and components.....	2
2	References.....	2
3	Definitions	3
4	Abbreviations and acronyms	4
5	Conventions	5
6	Architecture of managing MC components and functions	5
	6.1 MCC concept.....	6
	6.2 MC system/component/function	6
	6.3 Management of MC components and function	7
	6.4 DCN aspects	7
	6.5 Management aspects.....	8
7	Transport resource identification and allocation	10
	7.1 Transport resource identifiers.....	10
	7.2 Transport resource allocation	12
8	Management requirements of MC components and functions.....	12
	8.1 Lifecycle management requirements of the MC components/functions.....	13
	8.2 Configuration management requirements of the MC components/functions.....	13
	8.3 Fault management requirements of the MC components/functions.....	18
	8.4 Performance management requirements of the MC components/functions...	19
	8.5 Accounting management requirements of the MC components/functions	19
9	Context management	20
	9.1 Context lifecycle management	20
	9.2 Context's support of resource configuration.....	20
	9.3 Context interaction management	21
	Appendix I – Dispositioning/Mapping requirements.....	22

Recommendation ITU-T G.7718/Y.1709

Framework for the management of management-control components and functions

1 Scope

This Recommendation addresses the management aspects of the components that provide the functions of managing and/or controlling the transport network resources. The concept whereby management and control functions are considered to be a continuum is known as the management-control continuum (MCC); i.e., it expresses the view that management and control functions are essentially the same and, thus, they can be grouped into one set of functions. This set of functions is collectively called management and control (MC) functions. A component that provides one or more MC functions is called an MC component.

1.1 MC functions

The control functions considered for management in this Recommendation include the common control functions specified in [ITU-T G.7701], the SDN architecture specific control functions defined in [ITU-T G.7702] and the ASON architecture specific control functions defined in [ITU-T G.8080].

The management functions within the scope of ITU-T G.7718 in general follows the TMN principles specified in [ITU-T M.3010] and include the generic fault management, configuration management, account management, performance management and security management (FCAPS) functions specified in [ITU-T X.700], the transport-technology-neutral FCAPS management functions in [ITU-T G.7710], and the transport-technology-specific FCAPS management functions in [ITU-T G.784 series] for SDH, [ITU-T G.874 series] for OTN, [ITU-T G.8051 series] for Ethernet, [ITU-T G.8152 series] for MPLS-TP, [ITU-T G.7721 series] for synchronization, etc.

1.2 MC components

MC components provide functions for managing and controlling transport resources. They are used to construct scenarios for explaining the operation, interface and architecture of MCS. The related management operations/interfaces are studied in the aspects listed below:

- Between MC components;
- Between MC component and transport resources;
- Between administrative role (e.g., management-control system (MCS)) and MC components;
- MC components for control purposes are defined in [ITU-T G.7701], [ITU-T G.7702] and [ITU-T G.8080], including:
 - Connection controller (CC)
 - Calling/called party call controller (CCC)
 - Discovery agent (DA)
 - Directory service (DS)
 - Link resource manager (LRM)
 - Network call controller (NCC)
 - Protocol controller (PC)
 - Routing controller (RC)
 - Resource notification component (RNC)
 - Termination and adaptation performer (TAP)



- MC components for management purposes are defined in [ITU-T G.7710]. For example, Figure 7 of [ITU-T G.7710] depicts the fault management related components within the equipment management function (EMF) and their functional interactions. Illustration of the operations/interfaces to and from each of the fault management functions/components are described in clauses 7.2.1 to 7.2.14 of [ITU-T G.7710]. MC components for configuration management and performance management are specified in clauses 8 and 10.2 of [ITU-T G.7710].

1.3 Managing the MC functions and components

This Recommendation addresses the management, including administration, of the MC components and functions that manage and/or control the transport network resources.

In this edition of the Recommendation, only the control components and functions (i.e., those defined in [ITU-T G.7701], [ITU-T G.7702], and [ITU-T G.8080]) are considered. Management of the management components and functions (i.e., those defined in [ITU-T G.7710] and the transport-technology-specific Recommendations [ITU-T G.874], [ITU-T G.8051], etc.) are for study in future editions of this Recommendation.

The management aspects covered in this Recommendation include the management requirements of the MC components and the interfaces from the MC components to the administrative context and the client contexts. The management requirements include, but are not limited to, lifecycle management of the components and the contexts for transport services and/or resource, ranging from simple static connectivity service to client specific virtual network service.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

[ITU-T G.784]	Recommendation ITU-T G.784 (2008), <i>Management aspects of synchronous digital hierarchy (SDH) transport network elements</i> .
[ITU-T G.798]	Recommendation ITU-T G.798 (2017), <i>Characteristics of optical transport network hierarchy equipment functional blocks</i> .
[ITU-T G.800]	Recommendation ITU-T G.800 (2016), <i>Unified functional architecture of transport networks</i> .
[ITU-T G.805]	Recommendation ITU-T G.805 (2000), <i>Generic functional architecture of transport networks</i> .
[ITU-T G.806]	Recommendation ITU-T G.806 (2012), <i>Characteristics of transport equipment – Description methodology and generic functionality</i> .
[ITU-T G.874]	Recommendation ITU-T G.874 (2017), <i>Management aspects of optical transport network elements</i> .
[ITU-T G.875]	Recommendation ITU-T G.875 (2017), <i>Optical transport network: Protocol-neutral management information model for the network element view</i> .
[ITU-T G.7701]	Recommendation ITU-T G.7701 (2016), <i>Common control aspects</i> .

[ITU-T G.7702]	Recommendation ITU-T G.7702 (2018), <i>Architecture for SDN control of transport networks</i> .
[ITU-T G.7710]	Recommendation ITU-T G.7710/Y.1701 (2012), <i>Common equipment management function requirements</i> .
[ITU-T G.7711]	Recommendation ITU-T G.7711/Y.1702 (2018), <i>Generic protocol-neutral management Information Model for Transport Resources</i> .
[ITU-T G.7712]	Recommendation ITU-T G.7712/Y.1703 (2010), <i>Architecture and specification of data communication network</i> .
[ITU-T G.7713]	Recommendation ITU-T G.7713/Y.1704 (2009), <i>Distributed call and connection management (DCM)</i> .
[ITU-T G.7713.1]	Recommendation ITU-T G.7713.1/Y.1704.1 (2003), <i>Distributed call and connection management (DCM) based on PNNI</i> .
[ITU-T G.7713.2]	Recommendation ITU-T G.7713.2/Y.1704.2 (2003), <i>Distributed call and connection management: Signalling mechanism using GMPLS RSVP-TE</i> .
[ITU-T G.7713.3]	Recommendation ITU-T G.7713.3/Y.1704.3 (2003), <i>Distributed call and connection management: Signalling mechanism using GMPLS CR-LDP</i> .
[ITU-T G.7715]	Recommendation ITU-T G.7715/Y.1706 (2002), <i>Architecture and requirements for routing in the automatically switched optical networks</i> , including Amendment 1 (2007).
[ITU-T G.7715.1]	Recommendation ITU-T G.7715.1/Y.1706.1 (2004), <i>ASON routing architecture and requirements for link state protocols</i> .
[ITU-T G.8051]	Recommendation ITU-T G.8051/Y.1345 (2020), <i>Management aspects of the Ethernet transport (ET) capable network element</i> .
[ITU-T G.8080]	Recommendation ITU-T G.8080/Y.1304 (2012), <i>Architecture for the automatically switched optical network (ASON)</i> .
[ITU-T M.3010]	Recommendation ITU-T M.3010 (2000), <i>Principles for a telecommunications management network</i> , plus Amendment 1 (2003), and Amendment 2 (2005).
[ITU-T M.3100]	Recommendation ITU-T M.3100 (2005), <i>Generic network information model</i> .
[ITU-T M.3120]	Recommendation ITU-T M.3120 (2001), <i>CORBA generic network and network element level information model</i> , plus Amendment 1 (2002), and Amendment 2 (2003).
[ITU-T X.700]	Recommendation ITU-T X.700 (1992), <i>Management framework for Open Systems Interconnection (OSI) for CCITT applications</i> .
[ITU-T X.731]	Recommendation ITU-T X.731 (1992) ISO/IEC 10164-2:1993, <i>Information technology – Open Systems Interconnection – Systems management: State management function</i> .

3 Definitions

No new terms and definitions are defined in this Recommendation.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

AP	Access Point
ASON	Automatically Switched Optical Network
CC	Connection Controller
CCC	Calling/called party Call Controller
CCN	Control Communication Network
CoS	Class of Service
CP	Connection Point
CPI	Control Plane Interface
CRUD	Create/Read/Update/Delete
CTP	Connection Termination Point
DA	Discovery Agent
DCN	Data Communications Network
DS	Discovery Service
ECC	Embedded Communication Channel
EMF	Equipment Management Function
EMS	Element Management System
E-NNI	External Network-Network-Interface
FC	Forwarding Construct
FCAPS	Fault management, Configuration management, Account management, Performance management and Security management
FD	Forwarding Domain
FEpt	Forwarding End Port
FP	Forwarding Point
GNE	Gateway Network Element
GoS	Grade of Service
I-NNI	Internal Network-Network-Interface
LCAS	Link Capacity Adjustment Scheme
LRM	Link Resource Manager
LT	Layer Termination
LTP	Logical Termination Point
MC	Management-Control
MCC	Management-Control Continuum
MCS	Management and Control System
NCC	Network Call Controller
NE	Network Element

NMS	Network Management System
OAM	Operation, Administration and Maintenance
OSS	Operations Support System
OTN	Optical Transport Network
PC	Protocol Controller
PTP	Physical Termination Point
RA	Routing Area
RC	Routing Controller
RNC	Resource Notification Component
SC	Switched Connection
SDN	Software-Defined Networking
SNP	Subnetwork Point
SNPP	Subnetwork Point Pool
SPC	Soft Permanent Connection
SRG	Shared Risk Group
TAP	Termination and Adaptation Performer
TMN	Telecommunications Management Network
TP	Traffic Policing
TPE	Termination Point Encapsulation
TTP	Trail Termination Point
UNI	User-Network-Interface
UNI-C	User-Network Interface – Client
UNI-N	User-Network-Interface – Network
VCAT	Virtual Concatenation
VN	Virtual Network

5 Conventions

In this Recommendation, the following requirement key words are used:

- SHALL: This word means that the definition is an absolute requirement.
- SHALL NOT: This phrase means that the definition is an absolute prohibition.
- SHOULD: This word means that there may exist valid reasons in particular circumstances to ignore the requirement.
- MAY: This word means that the requirement is truly optional.

6 Architecture of managing MC components and functions

This clause briefly introduces the concept of management and control continuum, the management and control system, their relationship to the MC components, transport resource and service, and management aspects of MC component and functions.