International Telecommunication Union

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

G.872

Amendment 1

(11/2013)

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

Digital networks – Optical transport networks

Architecture of optical transport networks

Amendment 1

Recommendation ITU-T G.872 (2012) – Amendment 1

International Telecommunication Union

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
General aspects	G.800–G.809
Design objectives for digital networks	G.810–G.819
Quality and availability targets	G.820–G.829
Network capabilities and functions	G.830–G.839
SDH network characteristics	G.840–G.849
Management of transport network	G.850–G.859
SDH radio and satellite systems integration	G.860–G.869
Optical transport networks	**G.870–G.879**
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
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.872

Architecture of optical transport networks

Amendment 1

Summary

Amendment 1 to Recommendation ITU-T G.872 (2012) describes the use of the black link approach defined in Recommendations ITU-T G.698.1 and ITU-T G.698.2 within the context of an OTN network.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T G.872	1999-02-26	13	11.1002/1000/4576-en
2.0	ITU-T G.872	2001-11-29	15	11.1002/1000/5606-en
2.1	ITU-T G.872 (2001) Amd. 1	2003-12-14	15	11.1002/1000/7064-en
2.2	ITU-T G.872 (2001) Cor. 1	2005-01-13	15	11.1002/1000/7483-en
2.3	ITU-T G.872 (2001) Amd. 2	2010-07-29	15	11.1002/1000/10880-en
3.0	ITU-T G.872	2012-10-29	15	11.1002/1000/11786-en
3.1	ITU-T G.872 (2012) Amd. 1	2013-11-06	15	11.1002/1000/11986-en

* 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

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications, information and communication technologies (ICTs). The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

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.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure, e.g., interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the Recommendation is required of any party.

INTELLECTUAL PROPERTY RIGHTS

ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

As of the date of approval of this Recommendation, ITU had received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at http://www.itu.int/ITU-T/ipr/.

Table of Contents

Recommendation ITU-T G.872

Architecture of optical transport networks

Amendment 1

1) Introduction

This amendment contains extensions to the third version (10/2012) of Recommendation ITU-T G.872 which relate to:

– the use of the black link approach defined in [ITU-T G.698.1] and [ITU-T G.698.2] in the context of an OTN network.

2) Changes

2.1) Additions to clause 4

Add the following abbreviations to clause 4:

OCC Overhead Communications Channel

OCN Overhead Communications Network

2.2) Clause 8.4.2

Replace the text of the first paragraph of clause 8.4.2 with the following:

The media channel is a topological construct that represents both the path through the media and the resource (frequency slot) that it occupies. A media channel is bounded by ports on media elements. A media channel can span any combination of network elements and fibres. A media channel may not be capable of supporting any OCh-P signal. The size of a media channel is specified by its effective frequency slot, which is described by its nominal central frequency and its slot width [ITU-T G.694.1]. The effective frequency slot of a media channel is that part of the frequency slots of the filters along the media channel that is common to all of the filters' frequency slots. The parameters "n" and "m" as defined in clause 7 of [ITU-T G.694.1], are used to describe the effective frequency slot with the exception that n and m (for cases where the n value of the constituent filters' frequency slots are not all the same) may have a granularity of 0.5 rather than being integers. A media channel may be dimensioned to carry more than one OCh-P signal. Also the effective slot width of a media channel may be administratively set to be less than the maximum slot width supported by the filter components on the media channel. A media channel may be configured before it has been decided which OCh-P signals it will be allocated to.

2.3) Clause 10.2.1

Modify the text in the connectivity supervision part of clause 10.2.1 as follows:

Connectivity supervision

Connectivity supervision refers to the set of processes for monitoring the integrity of the routing of the connection between source and sink trail terminations.

Connectivity supervision is necessary to confirm proper routing of a connection between trail termination source and sink during the connection set-up process. Furthermore, connectivity supervision is needed to ensure that connectivity is maintained while the connection is active.

The following process is identified for connectivity supervision:

- Trail trace identification (TTI)

  TTI is necessary to ensure that the signal received by a trail termination sink originates from the intended trail termination source. The following requirements are identified:

  – TTI is necessary in the OTS_ME to ensure proper cable connection;

  – TTI is not needed in the OMS_ME because there is a one-to-one relationship between the OTS and the OMS_ME, i.e., media connectivity in the OMS_ME is fixed; therefore, the OMS-P channel is already covered by the OTS-O TTI. Flexible connectivity in the OMS-P channel is not envisaged. TTI at the OCh-P layer is not needed because there is a one-to-one relationship between the OCh-P trail and the OTU trail;

  – TTI is necessary at the OTU layer to ensure proper OCh connections;

  – TTI is necessary at the ODU layer to ensure proper ODU layer connections.

When the OCh-O is carried by an OCN/OCC (see clause 12) it is necessary to carry a TTI and the nominal central frequency of the associated OCh-P with the OCh-O in the OCC to ensure there are no misconnections across the OCN.

Detection of connectivity defects will lead to the same consequent actions as described above for the detection of loss of continuity for the characteristic information.

2.4) Clause 12

Replace clause 12 with the text below:

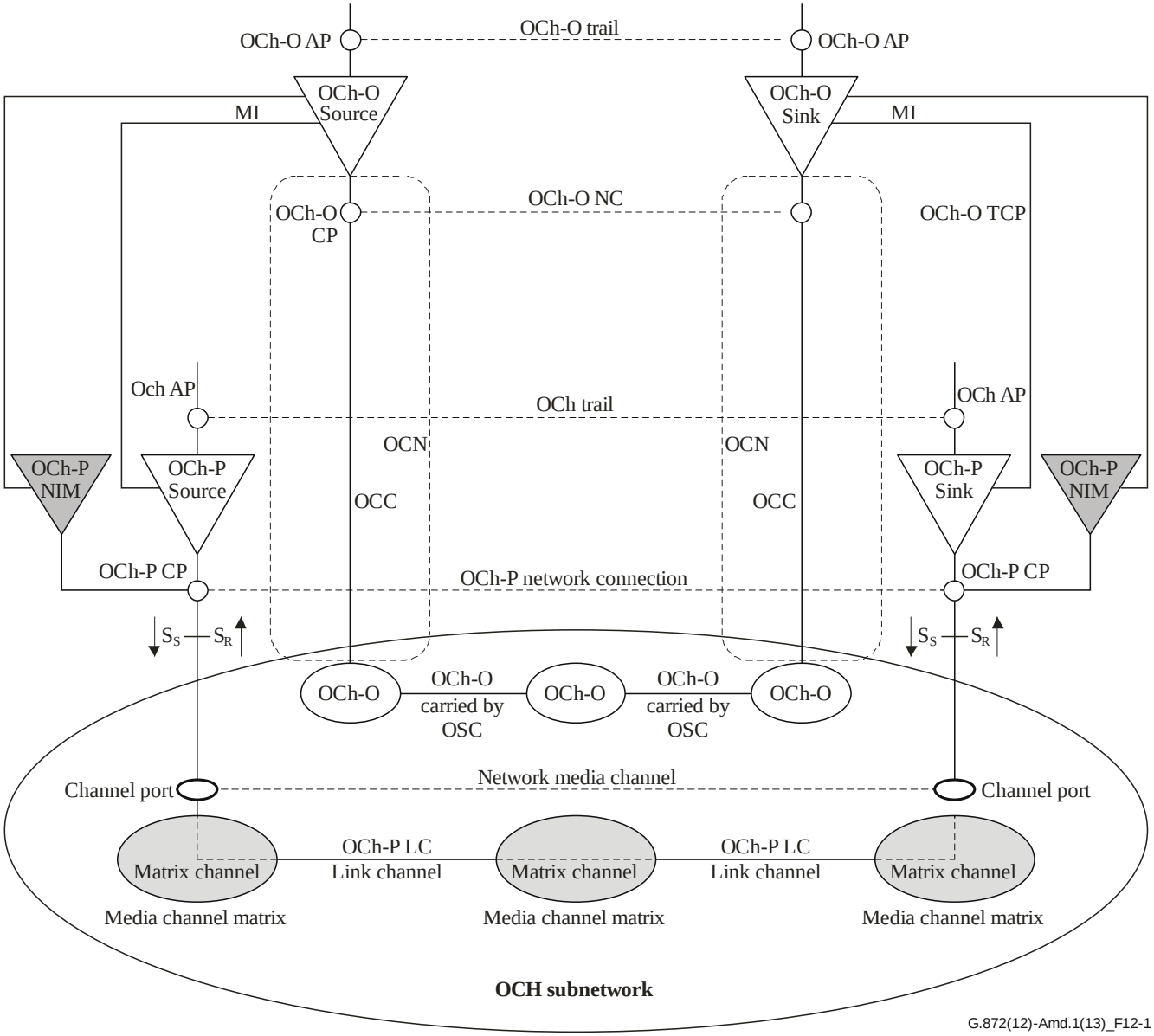
12 The black link approach

The black link approach is described in [ITU-T G.698.1] and [ITU-T G.698.2]. The specification method used in these Recommendations uses a "black link" approach which means that optical interface parameters for only (single-channel) optical tributary signals and the transfer function of the media path are specified by a set of application codes. Use of a common application code ensures the compatibility of the media path, transmitter and receiver. This approach enables transverse compatibility at the single-channel point using a direct wavelength-multiplexing configuration. However, it does not enable transverse compatibility at the multichannel points.

The black link approach may be used to provide an OCh-P network connection between an OCh source/sink pair as shown in Figure 12-1. The OCh-P network connection is supported by a network media channel that is terminated by an OCh-P source and an OCh-P sink where each of these components may be provided by different vendors but must all be within the domain of a single network operator.

The black link approach provides a media path, which is pre-certified for a particular intra-domain OCh-P, the characteristics of this signal at the S_S and R_S reference points are defined in [ITU-T G.698.1] and [ITU-T G.698.2]. The media path is terminated by an OCh-P termination (which makes it the path that carries an OCh-P network connection) and has no internal structure visible from either termination.

The OCh-O must also be supported; however, in this application it cannot be carried across the complete OCh network connection by the OSC as described in clause 8. To complete the OCh-O connection, it is carried across the interface between the OCh subnetwork and the OCh source/sink by an OCC within the OCN as shown in Figure 12-1.



NOTE – S_s and R_s in Figure 12-1 identify the reference points defined in [ITU-T G.698.1] and [ITU-T G.698.2].

Figure 12-1 – Example OCh subnetwork using the black link approach

3) Deletions

3.1) Appendix III

Delete Appendix III – An example of the use of the black link approach.

4) Editorial changes

4.1) Clause 6

Modify footnote 3 in clause 6 as follows:

[3] This separation is necessary to allow the description of media elements that may act on more than a single OCh-P signal. The relationship between the model provided in this Recommendation and the existing functions and processes described in [ITU-T G.798] is provided in Appendix III~~IV~~.

4.2) Appendix IV

Renumber Appendix IV as Appendix III and renumber Figure IV.1 as Figure III.1.

Modify the text of Appendix III (previously Appendix IV) as follows:

This appendix describes the relationship between the model provided in this Recommendation and the existing functions and processes described in [ITU-T G.798]. Figure ~~IV~~III.1 illustrates that the additions to this Recommendation that support configurable media elements and the ability to manage the media at a granularity that is greater than a single OCh-P have no effect on processes defined in [ITU-T G.798].

SERIES OF ITU-T RECOMMENDATIONS

Series A	Organization of the work of ITU-T
Series D	General tariff principles
Series E	Overall network operation, telephone service, service operation and human factors
Series F	Non-telephone telecommunication services
Series G	**Transmission systems and media, digital systems and networks**
Series H	Audiovisual and multimedia systems
Series I	Integrated services digital network
Series J	Cable networks and transmission of television, sound programme and other multimedia signals
Series K	Protection against interference
Series L	Construction, installation and protection of cables and other elements of outside plant
Series M	Telecommunication management, including TMN and network maintenance
Series N	Maintenance: international sound programme and television transmission circuits
Series O	Specifications of measuring equipment
Series P	Terminals and subjective and objective assessment methods
Series Q	Switching and signalling
Series R	Telegraph transmission
Series S	Telegraph services terminal equipment
Series T	Terminals for telematic services
Series U	Telegraph switching
Series V	Data communication over the telephone network
Series X	Data networks, open system communications and security
Series Y	Global information infrastructure, Internet protocol aspects and next-generation networks
Series Z	Languages and general software aspects for telecommunication systems

Printed in Switzerland
Geneva, 2014