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Optical fibre maintenance criteria for access networks

ITU-T Recommendation L.53

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Optical fibre maintenance criteria for access networks

Summary

This Recommendation deals with optical fibre maintenance criteria for access networks. It describes the fundamental requirements, maintenance section, testing and maintenance items, and methods for developing a suitable guide to maintaining point-to-multipoint and ring optical networks, respectively.

Source

ITU-T Recommendation L.53 was approved by ITU-T Study Group 6 (2001-2004) under the ITU-T Recommendation A.8 procedure on 14 May 2003.

FOREWORD

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CONTENTS

Page

1	Scope	1
2	References.....	1
3	Terms and definitions	2
4	Abbreviations.....	2
5	Fundamental requirements.....	3
5.1	Network topologies	3
5.2	Maintenance section	4
5.3	Testing and maintenance items	4
6	Testing and maintenance methods.....	5
6.1	Testing and maintenance methods for point-to-multipoint access networks	5
6.2	Testing and maintenance methods for ring access networks.....	6
7	Testing and maintaining wavelength.....	7
	Appendix I – Practical solutions for point-to-multipoint access network	8
I.1	Japanese experience.....	8
	Appendix II – Practical solutions for ring access network	12
II.1	Indonesian experience	12
II.2	Japanese experience.....	15
	Appendix III – Information of fibre optic water submersion-detecting sensor	17
III.1	Introduction	17
III.2	Structure of the sensor	18
III.3	Principle of water detection.....	18
III.4	Characteristics of the sensor	19

Introduction

Recently, networks with several types of topology including the passive optical network (PON) and the ring network using add-drop multiplexers (ADM) have been installed in the field because of the diversification of optical communication services. The point-to-multipoint and ring network architectures are very important in terms of constructing optical fibre networks both effectively and inexpensively. However, the testing and maintenance method used for conventional single star networks (see ITU-T Recs L.25 and L.40) cannot be adapted to these network architectures. Optical fibre networks have expanded rapidly because of the increase in IP services. In order to test and maintain optical fibre networks effectively, it is necessary to establish identical maintenance criteria for both point-to-multipoint and ring networks.

ITU-T Rec. L.53 (05/2003)

ITU-T Recommendation L.53

Optical fibre maintenance criteria for access networks

1 Scope

This Recommendation describes the maintenance section, testing and maintenance functions, methods, and criteria for both point-to-multipoint and ring networks in the access network.

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 Recommendation G.652 (2003), *Characteristics of a single-mode optical fibre cable*.
- ITU-T Recommendation G.694.1 (2002), *Spectral grids for WDM applications: DWDM frequency grid*.
- ITU-T Recommendation G.694.2 (2002), *Spectral grids for WDM applications: CWDM wavelength grid*.
- ITU-T Recommendation G.983.1 (1998), *Broadband optical access systems based on Passive Optical Networks (PON)*.
- ITU-T Recommendation G.983.2 (2002), *ONT management and control interface specification for B-PON*.
- ITU-T Recommendation G.983.3 (2001), *A broadband optical access system with increased service capability by wavelength allocation*.
- ITU-T Recommendation G.983.4 (2001), *A broadband optical access system with increased service capability using Dynamic Bandwidth Assignment (DBA)*.
- ITU-T Recommendation G.983.5 (2002), *A broadband optical access system with enhanced survivability*.
- ITU-T Recommendation G.983.6 (2002), *ONT management and control interface specifications for B-PON system with protection features*.
- ITU-T Recommendation G.983.7 (2001), *ONT Management and Control Interface specification for Dynamic Bandwidth Assignment (DBA) B-PON system*.
- ITU-T Recommendation G.983.8 (2003), *B-PON OMCI support for IP, ISDN, video, VLAN tagging, VC cross-connections, and other select functions*.
- ITU-T Recommendation G.984.1 (2003), *Gigabit-capable Passive Optical Networks (GPON): General characteristics*.
- ITU-T Recommendation L.25 (1996), *Optical fibre cable network maintenance*.
- ITU-T Recommendation L.40 (2000), *Optical fibre outside plant maintenance support, monitoring and testing system*.
- ITU-T Recommendation L.41 (2000), *Maintenance wavelength on fibres carrying signals*.

- ITU-T Recommendation L.42 (2003), *Extending optical fibre solutions into the access network*.
- ITU-T Recommendation L.52 (2003), *Deployment of Passive Optical Networks (PON)*.
- IEC 61746 Ed.1.0 (2001), *Calibration of optical time-domain reflectometers (OTDRs)*.

3 Terms and definitions

For the purpose of this Recommendation, the definitions given in ITU-T Recs G.652, G.694.1, G.694.2, G.983.1 to G.983.8, L.25, L.40, L.41, L.42, L.52, and IEC 61746 Ed.1.0 apply.

3.1 access network: A network of optical fibres that extend from a carrier's central office into individual homes and businesses, etc. for FTTH, FTTC, and so on.

3.2 point-to-multipoint access network: The access network accommodating OLT in the central office and several ONUs [L.52].

3.3 ring network: A network of loop optical fibres accommodating OLT in central office and ONU in some customer buildings [L.42].

3.4 maintenance section: An area of optical fibres that is tested and maintained in an access network.

3.5 surveillance: To monitor the condition of network elements (NE). Surveillance has two functions: to inform of NE degradation before trouble occurs, and to inform of NE abnormality when trouble occurs [L.25, L40].

3.6 control: To restore NE to normal or to take action to maintain service quality [L.25, L40].

4 Abbreviations

This Recommendation uses the following abbreviations:

ADM	Add-Drop Multiplexer
B-OTDR	Brillouin Optical Time Domain Reflectometer
CB	Customer Building
CO	Central Office
FTTC	Fibre to the Curb
FTTH	Fibre to the Home
H-OTDR	High spatial resolution Optical Time Domain Reflectometer
ID light	Identification light
OLT	Optical Line Terminal
ONU	Optical Network Unit
OTDR	Optical Time Domain Reflectometer
PON	Passive Optical Network
RT	Remote Terminal

5 Fundamental requirements

5.1 Network topologies

5.1.1 Point-to-multipoint access network

The basic configuration of a point-to-multipoint access network is shown in Figure 1.

Case 1: Indoor splitter in CO;

Case 2: Outdoor splitter (passive and active);

Case 3: Indoor splitter (passive and active) in CB.

5.1.2 Ring access network

The basic configuration of a ring access network is shown in Figure 2.

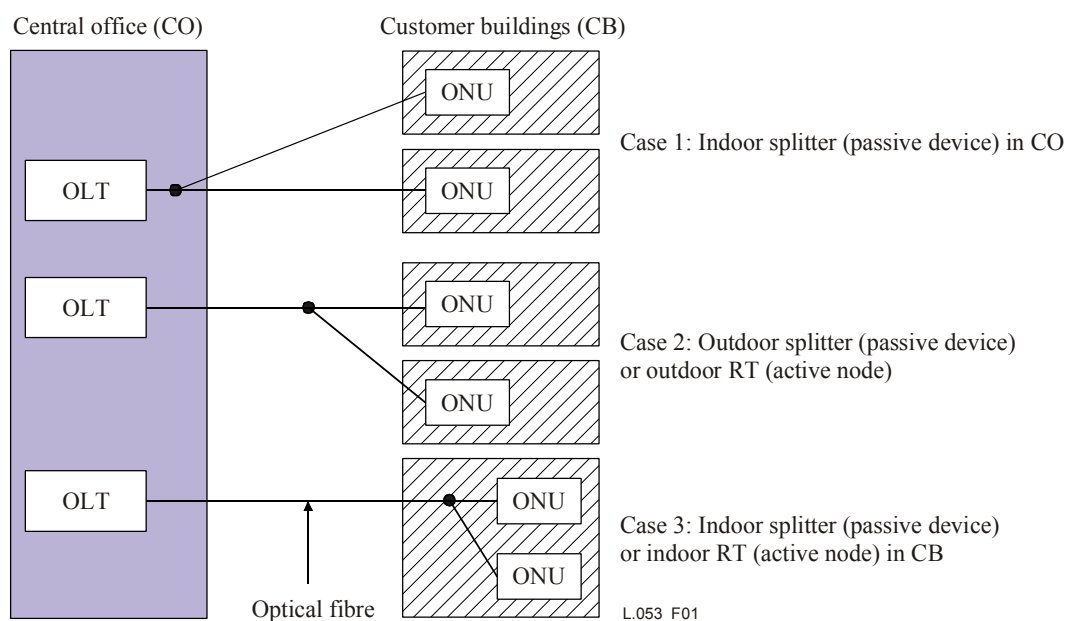


Figure 1/L.53 – Configuration of point-to-multipoint access network

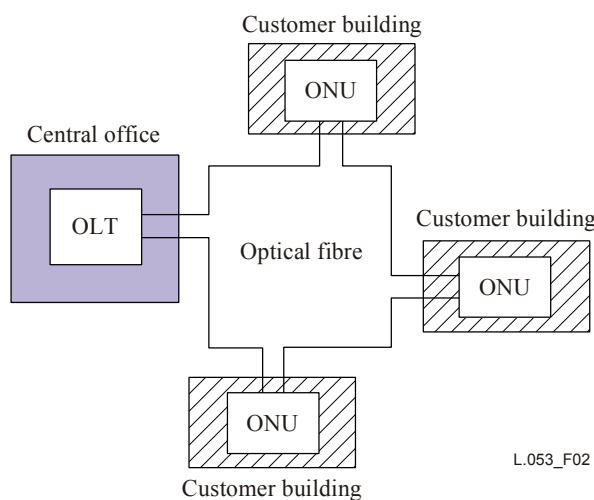


Figure 2/L.53 – Configuration of ring access network