



INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

L.44

(10/2000)

SERIES L: CONSTRUCTION, INSTALLATION AND
PROTECTION OF CABLES AND OTHER ELEMENTS OF
OUTSIDE PLANT

Electric power supply for equipment installed as outside plant

ITU-T Recommendation L.44

(Formerly CCITT Recommendation)



Documents
Document Sharing Hub

Electric power supply for equipment installed as outside plant

Summary

This Recommendation describes the provision of electric power supply for outside plants of telecommunication networks. It deals with the methods of power feeding and backup systems.

Source

ITU-T Recommendation L.44 was prepared by ITU-T Study Group 6 (1997-2000) and approved by the World Telecommunication Standardization Assembly (Montreal, 27 September – 6 October 2000).

ITU-T L.44 (10/2000)

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications. 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.

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 not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

© ITU 2001

All rights reserved. No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from ITU.

CONTENTS

	Page
1 Introduction	1
2 References	1
3 Power supply methods.....	1
3.1 Power supply from central office	2
3.1.1 Metallic transmission	2
3.1.2 Optical transmission.....	2
3.2 Local power supply	3
3.2.1 Metallic transmission	3
3.2.2 Optical transmission.....	4
3.3 Individual power supply	5
3.3.1 Metallic transmission	5
3.3.2 Optical transmission.....	6
4 Power sources for usual operation.....	6
4.1 Power company	7
4.2 Generator	7
4.3 Battery	7
5 Power wiring	7
5.1 Individual power cable	7
5.2 Superimposition method.....	7
5.3 Composite cable (combined power and communication cable).....	8
6 Power sources for backup.....	8
6.1 Generator	8
6.2 Battery	8
7 Environment for each equipment	8
7.1 Temperature condition.....	8
7.2 Humidity	9
7.3 Others	9
Appendix I	10

Introduction

Some equipment (e.g. repeaters) needing a power supply had existed before optical fibres were installed. At that time, electrical power had been mainly supplied from the central office by using a superimposition technique or by having insulated communication and power conductors in the same cable.

After optical fibres were introduced, many kinds of optical/electrical equipment which require a power supply system were installed into a telecommunication network, in order to increase capacity. The problem is that optical fibre cannot be used to directly transmit electrical power.

Power is supplied by one of three ways:

- to feed power from the central office by using metallic wires. To connect the power supply between the central office and the equipment, individual metallic cables or cables with both fibres and copper conductors may be used;
- to use a local power supply. In this method, one power supply provides power to all the equipment located within its area by using metallic cables or cables with both fibres and copper conductors. The numbers of equipment that can be supported in this way may be from two to several tens;
- each equipment has its own power supply.

This Recommendation deals with the methods of the power feeding and back-up systems.

ITU-T L.44 (10/2000)

Electric power supply for equipment installed as outside plant

1 Introduction

Some equipment (e.g. repeaters) needing a power supply had existed before optical fibres were installed. At that time, electrical power had been mainly supplied from the central office by using a superimposition technique or by having insulated communication and power conductors in the same cable.

After optical fibres were introduced, many kinds of optical/electrical equipment which require a power supply system were installed into a telecommunication network, in order to increase capacity. The problem is that optical fibre cannot be used to directly transmit electrical power.

Power is supplied by one of three ways:

- to feed power from the central office by using metallic wires. To connect the power supply between the central office and the equipment, individual metallic cables or cables with both fibres and copper conductors may be used;
- to use a local power supply. In this method, one power supply provides power to all the equipment located within its area by using metallic cables or cables with both fibres and copper conductors. The numbers of equipment that can be supported in this way may be from two to several tens;
- each equipment has its own power supply.

This Recommendation deals with the methods of the power feeding and back-up systems.

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.

- [1] ITU-T Recommendation K.50 (2000), *Safe limits of operating voltages and currents for telecommunication systems powered over the network*.
- [2] ITU-T Recommendation K.51 (2000), *Safety criteria for telecommunication equipment*.

3 Power supply methods

In order to select a power supply method, telecommunication companies should consider:

- 1) the outage rate of commercial power suppliers;
- 2) the cost when using commercial power suppliers;
- 3) the time to repair power source failure.

Based on the suitability of the electric power supplies in each country, telecommunication companies should select a power supply method from the following.

3.1 Power supply from central office

3.1.1 Metallic transmission

In case of transmission with copper conductors, the superimpose method may be used in order to feed the electrical power. The basic configuration of this method is shown in Figure 1. Communication signals and electrical power are combined and launched on the same conductors or alternatively communication copper pairs and power copper wires (insulated conductors) are combined into one cable at the central office. The sent signal and power are divided at the electrical network unit (ENU).

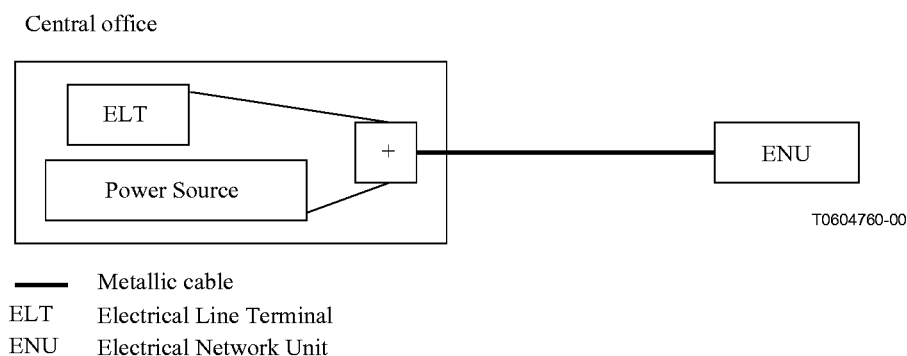
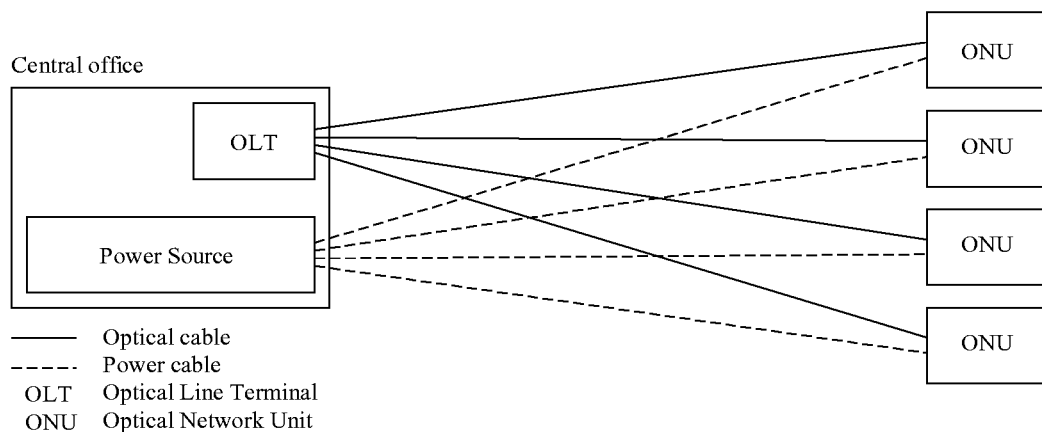


Figure 1/L.44 – Structure of power supply from central office (Metallic transmission)

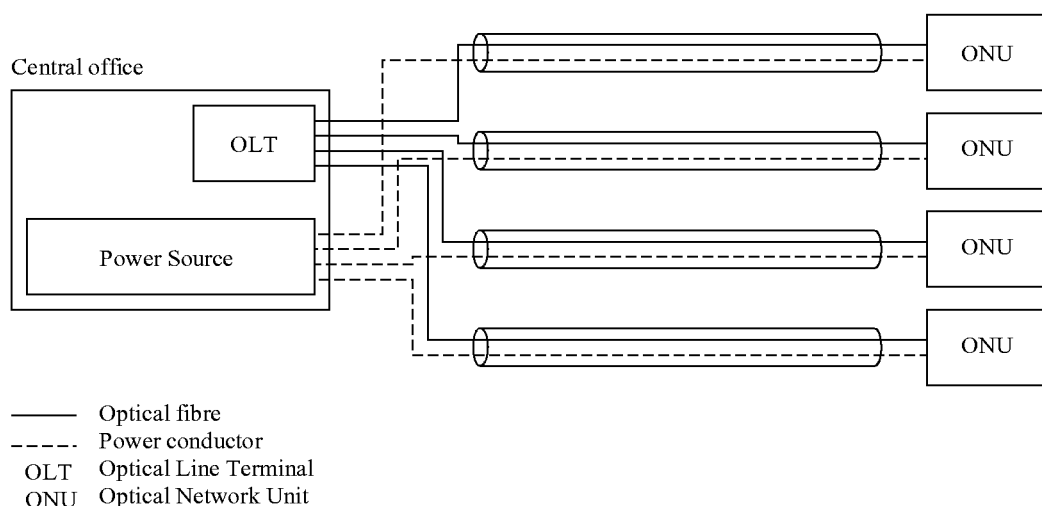
3.1.2 Optical transmission

When optical transmission is used, the basic structure of power supplies from the central office is shown in Figure 2. The power source is located in the central office. Power is fed by power cables or composite cables (power conductors and optical fibres). This method allows telecommunication companies to control the quality of electrical power (that is, those technical issues covering the stability of the current, voltage and frequency, and the outage rate). However, the telecommunication companies then have the duty to operate and manage power networks.



a) Individual cables for optical transmission and power feeding

T0604770-00



b) Power feeding through composite cable

T0604780-00

Figure 2/L.44 – Structure of power supply from central office (Optical transmission)

3.2 Local power supply

3.2.1 Metallic transmission

This type of power supply is not usual. The principle of this method is shown in Figure 3. Communication signals and electric power are combined either by superimposition or on separate conductors in the same cable between the local station and the ENU. Power is fed into the cables at the local station.

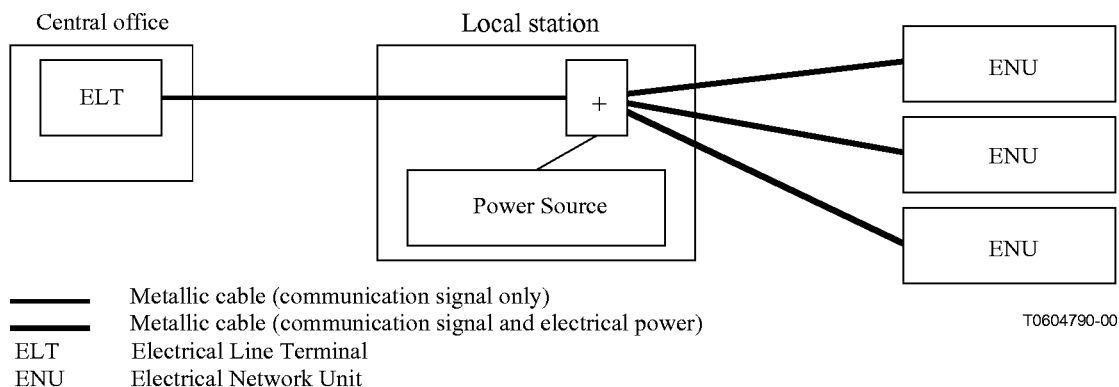
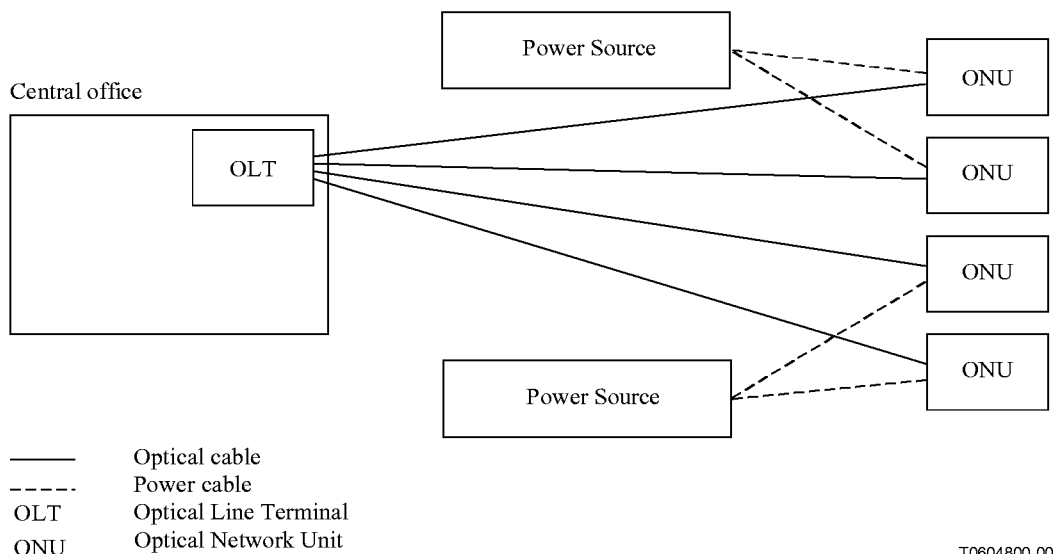


Figure 3/L.44 – Structure of local power supply (Metallic transmission)

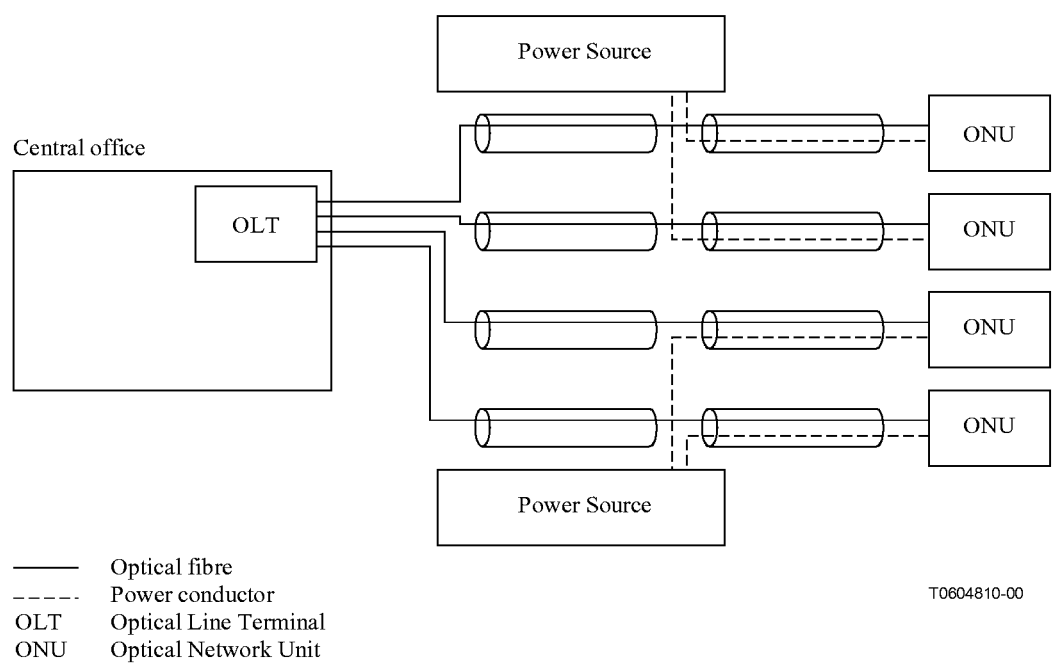
3.2.2 Optical transmission

Using optical transmission, the basic structure of local power supplies is shown in Figure 4. Power sources are set up near the ONU locations. Power can be supplied to several ONUs from each power source. The number of ONUs which are covered by one power source is dependent upon supplied power from the power source, the power consumption of ONUs and the power losses in the power cables. Power is fed by power cables or composite cables (combined power and communication cables).

To control the local power supplies, monitoring systems or alarm systems are set up in the central office in order to obtain information about the condition of the power sources. Usually, the duty to operate and manage the power sources belongs to telecommunication company. However, when the power sources are located in the customer premises, then customers may operate and manage the power sources themselves. The supply of electrical power from other customers' power sources should be avoided.



a) Individual cables for optical transmission and power feeding



b) Power feeding through composite cable

Figure 4/L.44 – Structure of local power supply (Optical transmission)

3.3 Individual power supply

3.3.1 Metallic transmission

In case of transmission with metallic wire, this type of power supply method would be used for digital or high speed transmission. The basic configuration of this method is shown in Figure 5. Electric power is fed to each ENU from each power source. Usually, the duty to operate and manage the power source belongs to the customers.

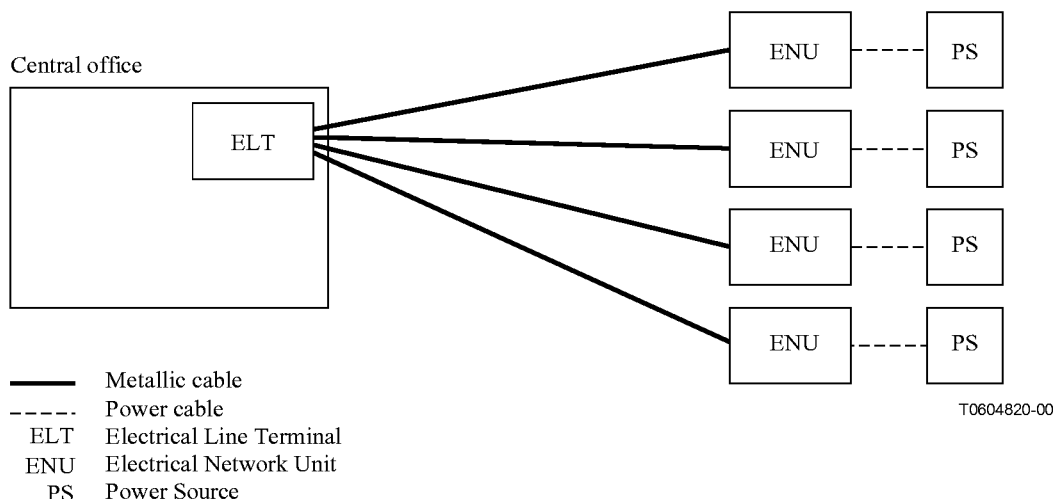


Figure 5/L.44 – Individual power supply (Metallic transmission)

3.3.2 Optical transmission

The basic configuration of this method is shown in Figure 6. Electrical power is fed to each Optical Network Unit (ONU) from each power source. Usually, the duty to operate and manage the power source belongs to the customers.

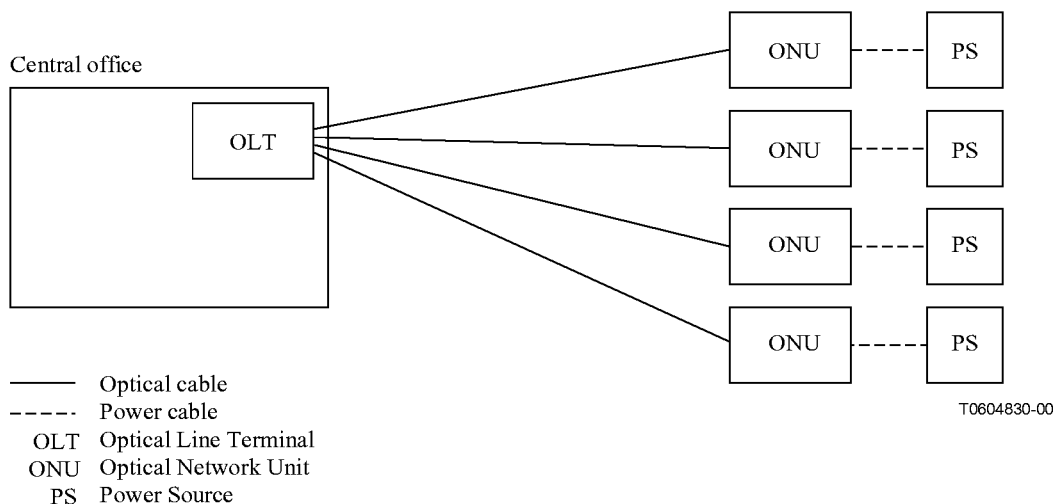


Figure 6/L.44 – Individual power supply (Optical transmission)

4 Power sources for usual operation

In order to select a power source for usual operation, the following should be considered:

- capacity;
- stability of power feeding;
- quality of electrical power;
- operating cost.