

International Telecommunication Union

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

K.72

(04/2008)

SERIES K: PROTECTION AGAINST INTERFERENCE

Protection of telecommunication lines using metallic conductors against lightning – Risk management

Recommendation ITU-T K.72



International
Telecommunication
Union
Documents

Document Sharing Hub

Recommendation ITU-T K.72

Protection of telecommunication lines using metallic conductors against lightning – Risk management

Summary

Recommendation ITU-T K.72 gives the methodology for evaluating the need for protection measures against lightning of telecommunication lines using metallic conductors.

This method is based on the risk assessment: protection measures are necessary when the risk is greater than the tolerable risk. Maximum value of the tolerable risks is suggested.

This Recommendation considers the risk of loss of service of the telecommunication network.

The risk is evaluated through the risk components caused by lightning, which is the source of damage on telecommunication line as a function of the striking point with respect to the telecommunication line (lightning flashes direct to the line, near the line, or directly to the structures connected at the ends of the line).

This Recommendation shall be used together with Recommendation ITU-T K.47, which provides the risk assessment and the protection measures against lightning flashes direct to the telecommunication line and to structures connected at the ends of the telecommunication line, and Recommendation ITU-T K.46, which provides the risk assessment and the protection measures against lightning flashes near the telecommunication line.

Source

Recommendation ITU-T K.72 was approved on 13 April 2008 by ITU-T Study Group 5 (2005-2008) under Recommendation ITU-T A.8 procedure.

Keywords

Lightning, node, protection, risk, risk assessment, SPD, surge, telecommunication line.

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 not 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/>.

© ITU 2009

All rights reserved. No part of this publication may be reproduced, by any means whatsoever, without the prior written permission of ITU.

CONTENTS

	Page
1 Scope	1
2 References.....	1
3 Definitions	2
4 Abbreviations and acronyms	3
5 Reference configuration.....	4
6 Explanation of terms.....	5
6.1 Damage and loss.....	5
6.2 Risk and risk components.....	6
6.3 Composition of risk components related to a telecommunication network ...	7
7 Risk management	7
7.1 Basic procedure	7
7.2 Tolerable risk R_T	7
7.3 Specific procedure to evaluate the need for protection	7
7.4 Protection measures.....	8
7.5 Selection of protection measures.....	8

Copyright International Telecommunication Union/ITU Telecommunication Sector

Introduction

Lightning flashes to earth may be hazardous to telecommunication networks.

The hazard to telecommunication networks can result in:

- injury of people inside the structures connected to the telecommunication line;
- physical damage (e.g., cable destruction) to the telecommunication line;
- failure (e.g., insulation breakdown) of the telecommunication line;
- failure of the associated electrical and electronic equipment inside the structure (i.e., exchange, customer's building, or remote electronic site).

To reduce the loss due to lightning, protection measures may be required. Whether they are needed, and to what extent, should be determined by the risk assessment.

The risk, defined in this Recommendation as the probable average annual service loss in a telecommunication network due to lightning flashes, depends on:

- the annual number of lightning flashes influencing the telecommunication line;
- the probability of damage by one of the influencing lightning flashes;
- the mean amount of consequential loss.

Lightning flashes influencing the telecommunication line may be divided into:

- flashes terminating on the telecommunication line;
- flashes terminating near the telecommunication line;
- flashes direct to a structure connected to the telecommunication line.

Flashes to a telecommunication line may cause physical damage. Flashes near the telecommunication line, as well as flashes to a structure connected to a telecommunication line, may cause failure of the telecommunication line and of electrical and electronic systems inside the structures due to overvoltages resulting from resistive and inductive coupling of these systems with the lightning current.

The number of lightning flashes influencing the telecommunication network depends on the dimensions and the characteristics of the telecommunication network, on the environment characteristics, as well as on lightning ground flash density in the region where the telecommunication network is located.

The probability of lightning damage depends on the telecommunication network, on the lightning current characteristics, as well as on the type and efficiency of applied protection measures.

The annual mean amount of the consequential loss depends on the extent of damage and the consequential effects which may occur as result of a lightning flash.

The effect of protection measures results from the features of each protection measures and may reduce the damage probabilities or the amount of consequential loss.

The assessment of risk due to all possible effects of lightning flashes to telecommunication networks is given in this Recommendation.

The decision to provide lightning protection may be taken regardless of the outcome of any risk assessment where there is a desire that there be no avoidable risk.