

---

**Navodila za tehnično načrtovanje zagotovitve komunikacijskega omrežja (IEC 61907:2009)**

Guidance on communication network dependability engineering (IEC 61907:2009)

Zuverlässigkeit von Telekommunikationsnetzen (IEC 61907:2009)

Recommandation pour l'ingénierie de la sûreté de fonctionnement des réseaux de communication (CEI 61907:2009)

**Ta slovenski standard je istoveten z: EN 61907:2010**

SIST EN 61907:2010  
<https://standards.iteh.ai/catalog/standards/sist/60682e93-7dfe-4c4c-a543-7c5e57aaf9ab/sist-en-61907-2010>

**ICS:**

21.020	Značilnosti in načrtovanje strojev, aparatov, opreme	Characteristics and design of machines, apparatus, equipment
33.040.40	Podatkovna komunikacijska omrežja	Data communication networks
35.110	Omreževanje	Networking

**SIST EN 61907:2010****en,fr**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 61907:2010

<https://standards.iteh.ai/catalog/standards/sist/6bb82e93-7dfe-4c4c-a543-7c5e57aaf9ab/sist-en-61907-2010>

EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 61907**

February 2010

ICS 21.020; 33.040.40

English version

**Communication network dependability engineering**  
(IEC 61907:2009)

Ingénierie de la sûreté de fonctionnement  
des réseaux de communication  
(CEI 61907:2009)

Zuverlässigkeit  
von Kommunikationsnetzen  
(IEC 61907:2009)

This European Standard was approved by CENELEC on 2010-02-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

**CENELEC**

European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

**Central Secretariat: Avenue Marnix 17, B - 1000 Brussels**

## Foreword

The text of document 56/1339/FDIS, future edition 1 of IEC 61907, prepared by IEC TC 56, Dependability, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61907 on 2010-02-01.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN and CENELEC shall not be held responsible for identifying any or all such patent rights.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2010-11-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2013-02-01

Annex ZA has been added by CENELEC.

---

## Endorsement notice

The text of the International Standard IEC 61907:2009 was approved by CENELEC as a European Standard without any modification. (standards.iteh.ai)

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

- SIST EN 61907:2010  
<https://standards.iteh.ai/catalog/standards/sis/6bb82e93-7dfe-4c4c-a543-7c5e57aaf9ab/sist-en-61907-2010>
- [1] IEC 60300-1 NOTE Harmonized as EN 60300-1.
  - [2] IEC 60300-2 NOTE Harmonized as EN 60300-2.
  - [3] IEC 60300-3-1 NOTE Harmonized as EN 60300-3-1.
  - [4] IEC 60300-3-3 NOTE Harmonized as EN 60300-3-3.
  - [5] IEC 60300-3-11 NOTE Harmonized as EN 60300-3-11.
  - [6] IEC 60300-3-12 NOTE Harmonized as EN 60300-3-12.
  - [7] IEC 60812 NOTE Harmonized as EN 60812.
  - [8] IEC 61025 NOTE Harmonized as EN 61025.
  - [9] IEC 61078 NOTE Harmonized as EN 61078.
  - [10] IEC 61165 NOTE Harmonized as EN 61165.
-

## Annex ZA (normative)

### Normative references to international publications with their corresponding European publications

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60050-191	-	International Electrotechnical Vocabulary (IEV) - Chapter 191: Dependability and quality of service	-	-
IEC 60300-3-15	-	Dependability management - Part 3-15: Application guide - Engineering of system dependability	EN 60300-3-15	-

**ITeH STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 61907:2010

<https://standards.iteh.ai/catalog/standards/sist/6bb82e93-7dfe-4c4c-a543-7c5e57aaf9ab/sist-en-61907-2010>

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 61907:2010

<https://standards.iteh.ai/catalog/standards/sist/6bb82e93-7dfe-4c4c-a543-7c5e57aaf9ab/sist-en-61907-2010>



IEC 61907

Edition 1.0 2009-12

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

---

Communication network dependability engineering

STANDARD PREVIEW

(standards.iteh.ai)

Ingénierie de la sûreté de fonctionnement des réseaux de communication

SIST EN 61907:2010

<https://standards.iteh.ai/catalog/standards/sist/6bb82e93-7dfe-4c4c-a543-7c5e57aaf9ab/sist-en-61907-2010>

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

PRICE CODE  
CODE PRIX

**XB**

---

ICS 21.020; 33.040.40

ISBN 2-8318-1072-8

## CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references.....	7
3 Terms, definitions and abbreviations.....	7
3.1 Terms and definitions.....	7
3.2 Abbreviations.....	10
4 Overview of communication network dependability.....	10
4.1 Network dependability framework.....	10
4.2 Network life cycle and evolution process.....	11
5 Network dependability implementation.....	12
5.1 Dependability engineering applications.....	12
5.2 Network technology consideration.....	21
5.3 Network service functions consideration.....	22
5.4 Network performance consideration.....	23
5.5 Integrity of network data and information.....	26
5.6 Quality of service (QoS).....	27
6 Network dependability assessment and measurement.....	30
6.1 Network dependability analysis.....	30
6.2 Network dependability fault insertion test.....	31
6.3 Measurement of network dependability attributes.....	32
6.4 Network dependability assessment methods.....	32
7 Quality of service measurement.....	34
7.1 QoS measurement overview.....	34
7.2 Generic user-oriented QoS parameters and requirements.....	35
Annex A (informative) Generic communication network model and related concepts.....	37
Annex B (informative) Network life cycle and evolution process.....	46
Annex C (informative) Criteria for establishing network security services.....	56
Bibliography.....	60
Figure A.1 – A generic communication network model.....	37
Figure A.2 – A process model on interactions of areas of influence.....	38
Figure A.3 – OSI reference model.....	39
Figure A.4 – QoS, dependability and network performance relationships.....	41
Figure B.1 – Network evolution process incorporated in the network life cycle stages.....	46
Table 1 – A matrix for capturing user’s QoS data.....	36
Table A.1 – Examples of dependability influencing factors affecting network technology.....	42
Table A.2 – Examples of dependability influencing factors affecting network service functions.....	43
Table A.3 – Examples of dependability influencing factors affecting delivery of network performance.....	44
Table A.4 – Examples of dependability influencing factors affecting integrity of network data and information and provision of QoS.....	45



Table C.1 – Four basic types of vulnerability causes..... 57

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 61907:2010

<https://standards.iteh.ai/catalog/standards/sist/6bb82e93-7dfe-4c4c-a543-7c5e57aaf9ab/sist-en-61907-2010>

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## COMMUNICATION NETWORK DEPENDABILITY ENGINEERING

## FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61907 has been prepared by IEC technical committee 56: Dependability.

The text of this standard is based on the following documents:

FDIS	Report on voting
56/1339/FDIS	56/1350/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

## **iTeh STANDARD PREVIEW (standards.iteh.ai)**

[SIST EN 61907:2010](https://standards.iteh.ai/catalog/standards/sist/6bb82e93-7dfe-4c4c-a543-7c5e57aaf9ab/sist-en-61907-2010)

<https://standards.iteh.ai/catalog/standards/sist/6bb82e93-7dfe-4c4c-a543-7c5e57aaf9ab/sist-en-61907-2010>

## INTRODUCTION

Communication networks are today growing in complexity to meet diverse market demands and public communication needs; networks such as mobile phones, e-commerce, intranet and Internet services.

At the same time, communication technologies are developing rapidly to provide efficient network services and dependable performance needed in worldwide communications. The essential communication services such as information exchange, data processing and network connections enable public and private communications work to be carried out cost-effectively. Business and private sectors greatly depend on these communication services that have become pivotal in their daily routines. A key factor in ensuring network performance and network service functions is dependability.

Network dependability is the ability of a network to perform as and when required and to meet users' communication needs for continuous network performance and service operation. From a user's perspective, dependability infers that the provision of network service functions is trustworthy and capable of performing the desirable service upon demand. Network dependability is characterized by its performance attributes including availability of network performance and quality of service.

The network concept is an extension of the systems concept, addressing a common framework for the interaction of network elements and interoperability of service functions that together achieve specific communication objectives.

The network requires specific performance characteristics in order to deliver both its service functions and communication services. Network dependability engineering is a specific risk-based technical discipline intended to deal with the diverse applications and deployment of essential communication services. Unlike the system life cycle where system retirement exists, a network seldom reaches retirement. A network evolves with time to accommodate innovative feature applications and provision of continual communication service needs. The network life cycle is evolutionary and has to address technology convergence issues and renewal processes as well as characterize specific dependability attributes to meet network performance objectives. The need for network dependability standardization is essential to achieve cost-effective development and implementation of communication networks.

Communication network dependability provides important performance attributes for network equipment developers and suppliers, network integrators and providers of network service functions who are mainly concerned with global competitive environments. The primary reason is that dependability can seriously impact revenue generation and affect return-on-investments. Users of network service functions and communication services rely heavily on network functions and reliable services that guarantee network security and uninterrupted network connections for voice, video and data transmission.

This International Standard provides a generic framework for communication network dependability. The communication network includes telecommunications networks, Internet and intra-networks utilizing information technology. This standard describes the influence of dependability attributes and their impact on network performance. It provides the criteria and methodology for network technology designs, security service functions, dependability assessment and quality of service evaluation. This is to guide engineering and implementation processes for realization of network dependability performance objectives.

This standard constitutes part of a framework of standards on system aspects of dependability by extending the system dependability concepts of IEC 60300-3-15 for network applications, and to support IEC 60300-1 and IEC 60300-2 on dependability management. The network performance and communication services in this standard are referenced in the International Telecommunication Union Telecommunication standardization sector (ITU-T) series of recommendations.

# COMMUNICATION NETWORK DEPENDABILITY ENGINEERING

## 1 Scope

This International Standard gives guidance on dependability engineering of communication networks. It establishes a generic framework for network dependability performance, provides a process for network dependability implementation, and presents criteria and methodology for network technology designs, performance evaluation, security consideration and quality of service measurement to achieve network dependability performance objectives.

This standard is applicable to network equipment developers and suppliers, network integrators and providers of network service functions for planning, evaluation and implementation of network dependability.

## 2 Normative references

The following referenced documents are indispensable for the application of this standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050-191, *International Electrotechnical Vocabulary – Chapter 191: Dependability and quality of service*

IEC 60300-3-15, *Dependability management – Part 3-15: Application guide – Engineering of system dependability*

<https://standards.iteh.ai/catalog/standards/sist/6bb82e93-7dfe-4c4c-a543-7c5e57aaf9ab/sist-en-61907-2010>

## 3 Terms, definitions and abbreviations

### 3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-191 and the following apply.

#### 3.1.1

##### **communication network**

system of communication nodes and links that provides transmission of analog or digital signals

EXAMPLES Telecommunications networks, Internet, intranet, extranet, Wide Area Networks (WAN), Local Area Networks (LAN) and computer networking utilizing information technology.

NOTE 1 A network has its boundary. All nodes at the network boundary are called ends. In some applications, the term “node” is used instead of “end” as a communication access point to the network, as well as for interconnections between the transmission links.

NOTE 2 A “backbone” communication network consists of core network and high-speed transmission lines (national or international), connecting between major switching network nodes (interconnection of transmission lines) at various locations in a country or region.

#### 3.1.2

##### **(network) dependability**

ability to perform as and when required to meet specified communication and operational requirements

**3.1.3****(network) availability**

ability to be in a state to perform as and when required, under given conditions, assuming that the necessary external resources are provided

NOTE 1 Availability depends on the combined characteristics of the reliability, maintainability, and recoverability of the item, and generally, on the maintenance support performance.

NOTE 2 Given conditions would include aspects that affect reliability, maintainability and maintenance support performance.

**3.1.4****(network) reliability**

ability to perform as required for a given time interval, under given conditions

NOTE 1 Given conditions would include aspects that affect reliability, such as: mode of operation, stress levels, environmental conditions.

NOTE 2 Reliability may be quantified using appropriate measures such as meantime to failure, or the probability of no failure within a specified period of time.

**3.1.5****(network) maintainability**

ability to be retained in, or restored to, a state in which it can perform as required under given conditions of use and maintenance

NOTE 1 "Given conditions of use" may include storage.

NOTE 2 "Given conditions of maintenance" include the procedures and resources to be used.

NOTE 3 Maintainability may be quantified using such measures as, mean time to restoration, or the probability of restoration within a specified period of time.

[SIST EN 61907:2010](https://standards.iteh.ai/catalog/standards/sist/6bb82e93-7dfe-4c4c-a543-7c5e57aaf9ab/sist-en-61907-2010)

**3.1.6****maintenance support**

resources to conduct maintenance according to a given maintenance concept and policy

**3.1.7****maintenance support performance**

ability of an organization to complete specified network maintenance support upon demand under given conditions

NOTE The "given conditions" include those related to the maintenance organization, and to the conditions under which the item is used, maintained, and relevant maintenance policies and procedures.

**3.1.8****(network) recoverability**

ability to recover from a failure, without corrective maintenance

NOTE 1 The ability to recover may or may not require external actions.

NOTE 2 Recoverability may be quantified using such measures as, mean time to restoration, or the probability of restoration within a specified period of time.

**3.1.9****(network) element**

subsystem or component of a communication network

EXAMPLES Terminals, nodes, links and switches.

NOTE 1 A network element may involve human input to perform its service function.

NOTE 2 Network nodes and access points are connected by network links.

**3.1.10****(network) link**

electrical, wireless or optical connection between network nodes

**3.1.11****(network) performance**

ability to provide the service functions related to communications between users

[ITU Recommendation I.350]

NOTE Network dependability performance refers to the ability of the network to provide or demonstrate the dependability attributes in network operation to achieve network objectives and quality of service requirements.

**3.1.12****(network) management**

application of organized processes and resources to manage the performance, configuration, accounting, fault, and security activities

**3.1.13****(network) service function**

program or application that interacts with the network users or within the network infrastructure to transmit or exchange data and information in the network

NOTE A network service function may consist of hardware and software elements, and may involve human interactions for realizing a specific function.

**3.1.14****network services**

provision of network service functions and communication services to the network users

NOTE 1 Communication services are the network services subscribed by the end-users.

NOTE 2 A bearer service is a communication service function that allows transmission of user-information signals between user-network interfaces.

**3.1.15****quality of service**

collective effect of service performance that determines the degree of satisfaction of a user of the service

**3.1.16****network failure**

loss of network ability to perform its function as required

NOTE The failure may be due to, for example, equipment failure, natural disasters or human-caused disturbance.

**3.1.17****network fault**

state characterized by the inability of the network to perform its function as required

NOTE 1 In the context of network operation, a fault may be natural due to an abnormal condition, or malfunction resulting in a network element failure, or induced by external means such as fault insertion.

NOTE 2 A degraded state in network performance is a situation where one or more performance characteristics do not conform to requirements.

**3.1.18****service provider**

organization that provides communication network services

EXAMPLES Telephone companies, data carriers, mobile services, Internet service providers, and cable television operators.