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**Information technology — Quality of  
service: Framework**

*Technologies de l'information — Qualité du service: Cadre*

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## Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

International Standard ISO/IEC 13236 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 33, *Distributed application services*, in collaboration with ITU-T. The identical text is published as ITU-T Recommendation X.641.

Annex A forms an integral part of this International Standard. Annexes B to E are for information only.

## Introduction

The purpose of this Recommendation | International Standard is to provide a common basis for the coordinated development and enhancement of the wide range of standards that specify or reference Quality of Service (QOS) requirements or mechanisms in an Information Technology (IT) environment. It offers a means of developing or enhancing standards relating to QOS and provides concepts and terminology that will assist in maintaining the consistency of related standards. This Recommendation | International Standard is complementary to existing ITU-T Recommendations which define performance objectives and network signalling of QOS and it is not the intention of this Framework to lead to a need to revise any such Recommendations.

The initial work in developing this Framework for QOS was done with the objective of supplementing and clarifying the description of QOS contained in the Basic Reference Model of Open Systems Interconnection (OSI) (see ITU-T Rec. X.200 | ISO/IEC 7498-1). It is recognised, however, that management of QOS is important not only in OSI communications but also in a much wider context, and that there is value in encouraging a common approach to QOS that can extend to other IT and communications architectures, to distributed processing in general and to Open Distributed Processing (ODP) in particular.

Hence this Recommendation | International Standard is structured and written in such a way as to make it easy for many communities to adopt its approach, concepts, terminology and definitions. Its concepts and terms are defined without reference to any particular architecture, so that they can be adopted and applied by other communities to a variety of architectures and protocols. This general treatment is supplemented by examples from OSI, ODP and elsewhere.

To assist the OSI community, Annex A defines how the general framework applies to the specific case of OSI communications, both peer-to-peer and multi-peer.

This QOS Framework contains an introduction, a scope and field of application and a set of QOS-related definitions and abbreviations. The concepts of QOS are introduced in clause 5, which also highlights user requirements. Clause 6 defines QOS characteristics with respect to the user requirements. Clauses 7, 8 and 9 cover QOS management, QOS mechanisms and the expression of specific QOS requirements, respectively. QOS verification is discussed in clause 10, and conformance, consistency and compliance are discussed in clause 11.

Annexes are provided which stipulate:

- the model of QOS for OSI;
- statistical derivations of characteristics;
- a standards structure with respect to QOS;
- a discussion of the issue of 'cost'; and
- a bibliography.

Other standards communities are encouraged to study this Recommendation | International Standard and, in the interests of consistency, to consider the adoption of the parts that are relevant to their field, when this can be accomplished to good effect, without destabilisation of existing Recommendations | International Standards.



## INTERNATIONAL STANDARD

## ITU-T RECOMMENDATION

## INFORMATION TECHNOLOGY – QUALITY OF SERVICE: FRAMEWORK

**1 Scope**

This QOS Framework is a structured collection of concepts and their relationships which describes QOS (Quality of Service) and enables the partitioning of, and relationships between, the topics relevant to QOS in Information Technology (IT) to be expressed by a common means of description. In particular, this QOS Framework is directed at IT systems and their use in providing Open Distributed Processing services.

This QOS Framework is intended to assist those designing and specifying IT systems, and those defining communications services and protocols, by providing guidance on QOS applicable to systems, services and resources of various kinds. It describes how QOS can be characterized, how QOS requirements can be specified, and how QOS can be managed.

This QOS Framework defines terminology and concepts for QOS in IT. It introduces the concept of QOS characteristics, which represent the fundamental aspects of QOS that are to be managed in various ways; and it defines a number of QOS characteristics of particular importance. These definitions are independent of how QOS is represented or controlled in a real system.

This Framework describes how QOS requirements can be expressed, and identifies a number of QOS mechanisms (such as three-party negotiation) that can be used as components of QOS management functions to meet QOS requirements of various kinds. It also describes the circumstances in which various combinations of mechanisms may be appropriate.

This QOS Framework provides a basis for the specification of extensions and enhancements to existing or planned standards, as a result of the need for, and application of, the QOS concepts defined in this Recommendation | International Standard. It is not the intent of this Recommendation | International Standard to destabilise any existing Recommendations | International Standards; rather, it is intended that this QOS Framework may be used by:

- developers of new or revised IT-related standards which define or use QOS mechanisms; and
- IT users expressing requirements for QOS.

This QOS Framework does not attempt to provide a basis for the specification of performance objectives or network signalling of QOS in public communications networks. The QOS aspects of these communications services are addressed by other ITU-T Recommendations.

The intent of this Recommendation | International Standard is to provide a common vocabulary to both service providers and service users. Nothing in this Recommendation | International Standard should be construed as placing requirements on either service providers or service users. It is hoped that a common approach and vocabulary for QOS will assist multiple service providers to deliver end-to-end QOS to end-systems.

This QOS Framework specifically excludes the detailed specification of QOS mechanisms. It is not the intent of this Recommendation | International Standard to serve as an implementation specification, to be a basis for appraising the conformance of implementations, or to define particular services and protocols. Rather, it provides a conceptual and functional framework for QOS which allows independent teams of experts to work productively on the development of Recommendations | International Standards.

As applied to OSI, this QOS Framework is consistent with the OSI Basic Reference Model in that it describes operations and mechanisms which are assignable to layers as specified in the OSI Basic Reference Model. It is consistent with the OSI Management Framework (see ITU-T Rec. X.700 | ISO/IEC 7498-4) and the Systems Management Overview (see ITU-T Rec. X.701 | ISO/IEC 10040) in its assignment of functions to management entities. In Annex A, this QOS Framework presents a model of QOS for OSI which identifies the entities that participate in the management of QOS, defines the flow of QOS-related information between them and describes how this information is used.

## 2 Normative references

The following Recommendations and International Standards contain provisions which, through reference in this text, constitute provisions of this Recommendation | International Standard. At the time of publication, the editions indicated were valid. All Recommendations and Standards are subject to revision, and parties to agreements based on this Recommendation | International Standard are encouraged to investigate the possibility of applying the most recent edition of the Recommendations and Standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards. The Telecommunication Standardization Bureau of the ITU maintains a list of currently valid ITU-T Recommendations.

### 2.1 Identical Recommendations | International Standards

- ITU-T Recommendation X.200 (1994) | ISO/IEC 7498-1:1994, *Information technology – Open Systems Interconnection – Basic Reference Model: The Basic Model*.
- ITU-T Recommendation X.210 (1993) | ISO/IEC 10731:1994, *Information technology – Open Systems Interconnection – Basic Reference Model: Conventions for the definition of OSI services*.
- ITU-T Recommendation X.746 (1995) | ISO/IEC 10164-15:1995, *Information technology – Open Systems Interconnection – Systems management: Scheduling function*.
- ITU-T Recommendation X.902 (1995) | ISO/IEC 10746-2:1996, *Information technology – Open distributed processing – Reference Model: Foundations*.

### 2.2 Paired Recommendations | International Standards equivalent in technical content

- CCITT Recommendation X.700 (1992), *Management framework for Open Systems Interconnection (OSI) for CCITT applications*.  
ISO/IEC 7498-4: 1989, *Information processing systems – Open Systems Interconnection – Basic Reference Model – Part 4: Management Framework*.

### 2.3 Additional references

- CCITT Recommendation X.140 (1992), *General Quality of Service parameters for communication via public data networks*.

## 3 Definitions

For the purposes of this Recommendation | International Standard, the following definitions apply.

### 3.1 Basic Reference Model of Open Distributed Processing definitions

This Recommendation | International Standard uses the following term drawn from ITU-T Rec. X.902 | ISO/IEC 10746-2:

- Quality of Service (QOS): A set of qualities related to the collective behaviour of one or more objects.

### 3.2 Basic Reference Model – OSI Management Framework definitions

This Recommendation | International Standard uses the following term drawn from CCITT Rec. X.700 | ISO/IEC 7498-4:

- Managed Object (MO): The OSI Management view of a resource within the OSI Environment that may be managed through the use of OSI Management protocol(s).

### 3.3 Service Conventions definitions

This Recommendation | International Standard uses the following terms drawn from ITU-T Rec. X.210 | ISO/IEC 10731:

- (N)-service-facility;
- (N)-service-provider;
- (N)-service-user;