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**Information technology — Enhanced  
communications transport protocol:  
Specification of QoS management for  
duplex multicast transport**

*Technologies de l'information — Protocole de transport de  
communications amélioré: Spécification de la gestion de QoS pour le  
transport duplex en multidiffusion*

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. 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.

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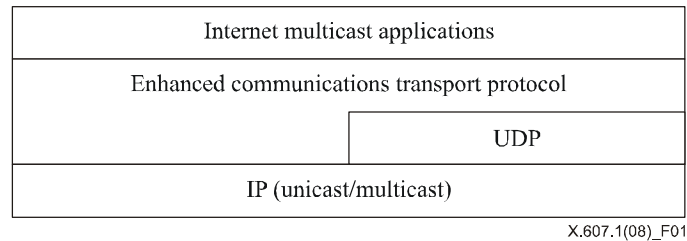
ISO/IEC 14476-4 was prepared by ITU-T (as ITU-T Rec. X.607.1) and was adopted, under a special “fast-track procedure”, by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, in parallel with its approval by the national bodies of ISO and IEC. The identical text is published as ITU-T Rec. X.607.1 (11/2008).

ISO/IEC 14476 consists of the following parts, under the general title *Information technology — Enhanced communications transport protocol*:

- *Part 1: Specification of simplex multicast transport*
- *Part 2: Specification of QoS management for simplex multicast transport*
- *Part 3: Specification of duplex multicast transport*
- *Part 4: Specification of QoS management for duplex multicast transport*
- *Part 5: Specification of N-plex multicast transport*
- *Part 6: Specification of QoS management for N-plex multicast transport*

## Introduction

This Recommendation | International Standard specifies the Enhanced Communications Transport Protocol (ECTP), which is a transport protocol designed to support Internet multicast applications running over multicast-capable networks. ECTP operates over IPv4/IPv6 networks that have the IP multicast forwarding capability with the help of IGMP and IP multicast routing protocols, as shown in Figure 1. ECTP could possibly be provisioned over UDP.



**Figure 1 – ECTP Model**

ECTP is designed to support tightly controlled multicast connections in simplex, duplex and N-plex applications. ECTP part 4 QoS management (this Recommendation | International Standard) specifies the quality of service (QoS) management functionality for stable management in the duplex multicast connection. The QoS management functionality consists of QoS negotiation, QoS monitoring and QoS maintenance operations. The procedures of reliability control in duplex connection have been defined in ECTP part 3 (Recommendation ITU-T X.607 | ISO/IEC 14476-3).

In ECTP-3 duplex multicast connection, the participants are classified into one Transport Connection Owner (TC-Owner) and many Transport Services users (TS-users). TC-Owner will be designated among the TS-users before the connection begins. In the duplex multicast connection, the two types of data transports are supported: multicast data transport from TC-Owner to all the other TS-users and unicast data transport from TS-users to TC-Owner. After the connection is created, TC-Owner can transmit multicast data to the group, whereas each TS-user is allowed to send unicast data to TC-Owner just after it gets a token from the TC-Owner.

For QoS management in the duplex multicast connection, the TC-Owner triggers the connection creation process. Some or all of the enrolled TS-users will participate in the connection and become the designated "active TS-users". The TS-users who are active at this stage are able to participate in negotiating the desired QoS level for the session. In the duplex multicast connection, TS-users can send the data to TC-Owner, which each TS-user negotiates with TC-Owner for a QoS parameter for backward unicast data channel. TC-Owner proposes the target value of QoS parameter for forward multicast data channel and backward unicast data channel. If QoS negotiation is enabled, each TS-user can propose modified values of QoS parameters for forward multicast data channel and backward unicast data channel. TC-Owner arbitrates these modified values of QoS parameters for two types of data transport. These arbitrated values are delivered to TS-users via subsequent Heartbeat (HB) or Join Confirm (JC) packets, and will be used for QoS monitoring and maintenance. Any enrolled TS-user that is not active at this stage may participate in the connection as a late-joiner, but will have to accept the established QoS level.

After the connection is created, TC-Owner begins to transmit multicast data and some of TS-users who get a token from TC-Owner can send unicast data to TC-Owner. While the connection is active, TC-Owner monitors the status of the session via feedback control packets from the active TS-users.

TC-Owner may take a range of actions if network problems (such as severe congestion) are indicated by the feedback received from active TS-users. These actions include adjusting the data transmission rate, suspending multicast data transmission temporarily, or in the last resort, terminating the connection.

ECTP part 4 QoS management Specification can be used by the multicast applications that require supporting various QoS requirements and the corresponding billing/charging models.

**INTERNATIONAL STANDARD  
RECOMMENDATION ITU-T****Information technology – Enhanced communications transport  
protocol: Specification of QoS management  
for duplex multicast transport****1 Scope**

This Recommendation | International Standard provides a specification of QoS management for accomplishing desirable QoS for a duplex multicast transport connection. For this purpose, this Specification describes the QoS management operations in duplex multicast transport connection such as QoS negotiation, QoS monitoring and QoS maintenance. This Recommendation | International Standard is an integral part of ECTP-3 (Rec. ITU-T X.607 | ISO/IEC 14476-3). All of the protocol components, including packet formats and protocol procedures specified in Rec. ITU-T X.607 | ISO/IEC 14476-3, are also valid in this Recommendation | International Standard.

**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.

- Recommendation ITU-T X.601 (2000), *Multi-peer communications framework*.
- Recommendation ITU-T X.602 (2004) | ISO/IEC 16513:2005, *Information technology – Group management protocol*.
- Recommendation ITU-T X.605 (1998) | ISO/IEC 13252:1999, *Information technology – Enhanced Communications Transport Service Definition*.
- Recommendation ITU-T X.606 (2001) | ISO/IEC 14476-1:2002, *Information technology – Enhanced Communications Transport Protocol: Specification of simplex multicast transport*.
- Recommendation ITU-T X.606.1 (2003) | ISO/IEC 14476-2:2003, *Information technology – Enhanced Communications Transport Protocol: Specification of QoS management for simplex multicast transport*.
- Recommendation ITU-T X.607 (2007) | ISO/IEC 14476-3:2008, *Information technology – Enhanced communications transport protocol: Specification of duplex multicast transport*.
- Recommendation ITU-T X.608 (2007) | ISO/IEC 14476-5:2008, *Information technology – Enhanced communications transport protocol: Specification of N-plex multicast transport*.