INTERNATIONAL STANDARD

**ISO/IEC
14476-1**

First edition
2002-06-15

Information technology — Enhanced communications transport protocol: Specification of simplex multicast transport

Technologies de l'information — Protocole de transport de communication amélioré: Spécifications pour le transport «simplex multicast»

Reference number
ISO/IEC 14476-1:2002(E)

© ISO/IEC 2002

This is a preview - click here to buy the full publication

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

CONTENTS

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 3.

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.

Attention is drawn to the possibility that some of the elements of this part of ISO/IEC 14476 may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 14476-1 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 6, *Telecommunications and information exchange between systems*, in collaboration with ITU-T. The identical text is published as ITU-T Rec. X.606.

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*

Annexes A and B of this part of ISO/IEC 14476 are for information only.

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.
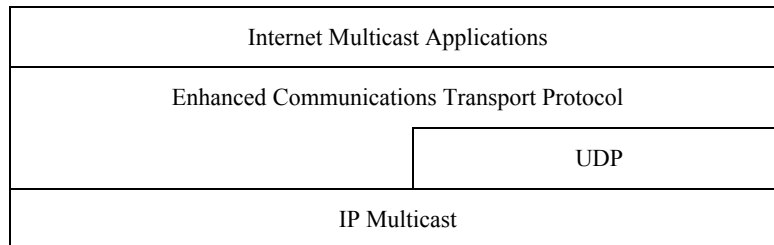
Internet Multicast Applications	
Enhanced Communications Transport Protocol	
	UDP
IP Multicast	

Figure 1 – ECTP Model

ECTP is designed to support tightly controlled multicast connections in simplex, duplex and N-plex applications. This Part of ECTP specifies the protocol mechanisms for reliability control in the simplex case. ECTP also provides QoS management functions for stable management of the QoS of the connection users. Such QoS management functionality can be achieved with QoS negotiation, monitoring and maintenance operations. The protocol procedures for QoS management of the simplex case will be defined in the simplex QoS management specification (ITU-T Rec. X.606.1 | ISO/IEC 14476-2), which forms an integral part of this Recommendation | International Standard. Further specifications will define control procedures and associated QoS management functions for the duplex case (ITU-T Rec. X.607 | ISO/IEC 14476-3 and ITU-T Rec. X.607.1 | ISO/IEC 14476-4) and for the N-plex case (ITU-T Rec. X.608 | ISO/IEC 14476-5 and ITU-T Rec. X.608.1 | ISO/IEC 14476-6).

In ECTP, all prospective members are enrolled into a multicast group, before a connection or session is created. Those members define an enrolled group. Each receiver in the enrolled group is referred to as an enrolled receiver. In the enrolment process, each member will be authenticated. The group information, including group key and IP multicast addresses and port numbers, will be distributed to the enrolled members during the enrolment process. An ECTP connection is created for these enrolled group members.

ECTP is targeted for tightly controlled multicast services. The sender is at the heart of multicast group communications. A single sender in the simplex multicast connection is assigned the role of the connection owner, designated as top owner (TO) in this Specification. The connection owner is responsible for overall connection management by governing connection creation and termination, connection pause and resumption, and join and leave operations.

The sender triggers the connection creation process. Some or all of the enrolled receivers will participate in the connection, becoming designated "active receivers". Any enrolled receiver that is not active may participate in the connection as a late-joiner. An active receiver can leave the connection. After the connection is created, the sender begins to transmit multicast data. If network problems (such as severe congestion) are indicated by the ECTP QoS management functions (defined in ECTP part 2), the sender suspends multicast data transmission temporarily, invoking the connection pause operation. After a pre-specified time, the sender resumes data transmission. If all of the multicast data have been transmitted, the sender terminates the connection.

ECTP provides the reliability control mechanisms for multicast data transport. ECTP mechanisms are designed to keep congruency with those being proposed in the IETF. To address reliability control with scalability, the IETF has proposed three approaches: Tree based ACK (TRACK), Forward Error Correction (FEC), and Negative ACK Oriented Reliable Multicast (NORM). Each approach has its own pros and cons, and each service provider may take a different approach toward implementing reliability control. ECTP adopts the TRACK approach, because it is more similar to the existing TCP mechanisms and more adaptive to the ECTP framework.

For tree-based reliability control, a hierarchical tree is configured during connection creation. The sender is the root of the control tree. The control tree can define a parent-child relationship between any pair of tree nodes. This tree-based structure can result in local owners (parents) occurring at lower levels in the tree hierarchy as the control structure extends. Each local owner created becomes the root of its own local control tree. The connection owner will then be the root of the overall control tree. Error control is performed for each local group defined by a control tree. Each parent retransmits lost data, in response to retransmission requests from its children.

INTERNATIONAL STANDARD ISO/IEC 14476-1
ITU-T RECOMMENDATION X.606

Information technology – Enhanced communications transport protocol: Specification of simplex multicast transport

1   Scope

This Recommendation | International Standard specifies the Enhanced Communications Transport Protocol (ECTP), which is a transport protocol designed to support Internet multicast applications over multicast-capable IP networks.

This Recommendation | International Standard specifies the ECTP for the simplex multicast transport connection that consists of one sender and many receivers. This Recommendation | International Standard specifies the protocol procedures for the following protocol operations:

a)   connection creation with tree creation;

b)   multicast data transmission;

c)   tree-based reliability control with error detection, retransmission request and retransmission;

d)   late join and leave;

e)   tree membership maintenance; and

f)   connection termination.

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 the currently valid ITU-T Recommendations.

–   ITU-T Recommendation X.601 (2000), *Multi-peer communications framework.*

–   ITU-T Recommendation X.605 (1998) | ISO/IEC 13252:1999, *Information technology – Enhanced Communications Transport Service Definition.*