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

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

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Foreword

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ISO/IEC 14476-3 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.607 (02/2007).

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 5: Specification of 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. ECTP could possibly be provisioned over UDP.

ECTP is designed to support tightly controlled multicast connections in simplex, duplex and N-plex applications. This third part of ECTP (ITU-T Rec. X.607 | ISO/IEC 14476-3) specifies the protocol mechanisms for reliability control in the duplex case. ECTP also provides QoS management functions for stable management of the QoS of the connection users. The procedures for QoS management of the duplex case will be defined in the duplex QoS management specification (ITU-T Rec. X.607.1 | ISO/IEC 14476-4).

In the duplex multicast connection, the participants are classified into one TC-Owner and many 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.

In ECTP, TC-Owner is at the heart of multicast group communications. It is responsible for overall connection management by governing the connection creation and termination, connection pause and resumption and the late join and leave operations.

The duplex multicast connection specified in ECTP-3 is targeted to the multicast applications in which the TC-Owner (a single multicast sender) transmits the data information to all the other TS-users, and some of the TS-users respond to the multicast sender with the unicast feedback data. Basically, the duplex multicast transport will be well suited to the one-to-many multicast applications that need the unicast feedback channels from some TS-users (e.g., remote education, Internet broadcasting, etc). For example, in a remote education application, the multicast sender (lecturer) transmits the data such as voice, text and image to the student group, whereas some of the students may respond to the lecturer with the unicast data like questions for confirmation.

It is noted that this duplex multicast connection can also be used for the 'some-to-many' multicast applications (e.g., a panel conferencing) in which a few of TS-users want to send multicast data to the group. In this scenario, the multicast data from the TS-users may first be delivered to the TC-Owner by unicast, and then TC-Owner will transmit the received unicast data to the group by multicast. For example, in the panel conferencing, some of the TS-users may act as a panel and transmit multicast data via TC-Owner (the conference convener) to the listener group. The detailed use of the duplex multicast connection depends on the applications of this duplex multicast transport protocol.

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

1 Scope

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

This Recommendation | International Standard specifies the ECTP part 3 (ECTP-3) for the duplex multicast transport connection in which the participants are classified into one TC-Owner and many TS-users. The duplex multicast transport connection supports two kinds of data transport: the multicast data transport from TC-owner to all the other TS-users and the unicast data transport from TS-users to TC-Owner. A TS-user is allowed to send unicast data to TC-Owner, only if it gets a token from TC-Owner.

This Specification describes the protocol for supporting the duplex multicast transport, which includes the connection management (establishment, termination, pause, resumption, user join and leave) and the reliability control mechanisms for the multicast and unicast data transport. In particular, the protocol operations for the multicast data transport from TC-Owner to the TS-users will be designed with the congruency of the simplex multicast transport protocol (ECTP-1), as specified in ITU-T Rec. X.606 | ISO/IEC 14476-1.

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.

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

–   ITU-T Recomendation X.602 (2004) | ISO/IEC 16513:2005, *Information technology – Group management protocol.*

–   ITU-T Recommendation X.605 (1998) | ISO/IEC 13252:1999, *Information technology – Enhanced communications transport service definition.*

–   ITU-T Recommendation X.606 (2001) | ISO/IEC 14476-1:2002, *Information technology – Enhanced communications transport protocol: Specification of simplex multicast transport.*

–   ITU-T Recommendation X.606.1 (2003) | ISO/IEC 14476-2:2003, *Information technology – Enhanced communications transport protocol: Specification of QoS management for simplex multicast transport.*

3 Definitions

This Recommendation | International Standard is based on the following definitions, which were specified in Enhanced Communications Transport Service (ITU-T Rec. X.605 | ISO/IEC 13252).

a)   Transport connection: Simplex, duplex and N-plex;

b)   TC-Owner and TS-users.

This Recommendation | International Standard uses the following terminologies specified in Enhanced Communications Transport Protocol: part 1 (ITU-T Rec. X.606 | ISO/IEC 14476-1).

a)   control tree;

b)   parent and children;