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**Information technology — Text and office
systems — Referenced Data Transfer —**

Part 2:
Protocol specification

*Technologies de l'information — Bureautique — Transfert de données
référéncées*

Partie 2: Spécification du protocole



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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 10740-2 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Sub-Committee SC 18, *Document processing and related communication*.

ISO/IEC 10740 consists of the following parts, under the general title *Information technology – Text and office systems – Referenced Data Transfer*:

- *Part 1: Abstract service definition*
- *Part 2: Protocol specification.*

Annex A of this part of ISO/IEC is for information only.

Introduction

This International Standard is one of a set of standards for distributed-office-applications which define abstract services and specify access protocols in accordance with the Application Layer of the Open Systems Interconnection (OSI) Reference Model (ISO 7498).

Distributed-office-applications are used by an integrated distributed office system, consisting of user nodes and server nodes linked by a network. The user nodes access the server nodes via the network, using access protocols.

In such an environment, data processing applications that within a single host act as a single piece, have been split among the different intelligent components of the system. This splitting has led to the need for standardization of inter-relationships between the different parts of an application.

In this environment the distributed-office-applications should satisfy the following objectives:

- Make easier the implementation of application-processes developed for a distributed environment based on micro-processors and large or medium sized mainframes interconnected through local area network or wide area network means;
- Reduce the processing delay time for document related activities such as document filing and retrieval, document distribution, printing, etc.;
- Allow concurrent processing of different tasks within the distributed office system;
- Reduce the overall size of an office system and facilitate its modular extension.

Within distributed-office-applications, there will be applications that will act as Accessees or Accessors of objects whose values are of comparatively large size, for example files, documents or body parts. ISO/IEC 10031-1 the Distributed-office-applications model, contains a functional model for these cases named Referenced Object Access (ROA). According to this model, the transfer of data-object-values conceptually involves three parties: an Initiator which requests the transfer, an Accessee which produces the data-object-value and an Accessor which consumes the data-object-value. To achieve economies in the use of transmission facilities and hence more efficient use of system resources, a mechanism is required whereby an Accessee can provide an Initiator with a reference to a data-object-value. This reference can then be given by the Initiator to the Accessor which can then contact the Accessee directly for example to obtain the data-object-value. This mechanism is known as the ROA. It provides a way to perform ROA-operations between an open-ended list of parties.

This Part of ISO/IEC 10740 describes the RDT protocol, a realization of the RDT abstract service as defined in ISO/IEC 10740-1. The RDT protocol realization takes the form of an RDT Application Service Element (ASE) and two RDT Application Contexts (ACs), together with conformance requirements for implementations.

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Part 2: Protocol specification

1 Scope

This Part of ISO/IEC 10740 describes the application-service-element (ASE) and the application-contexts (ACs) for the Referenced Data Transfer within distributed-office-applications. Its content covers four major areas:

- An introductory part in which references, definitions and abbreviations are collected together.
- Specification of the RDT Application Service Element (RDTSE).
- Specification of two RDT Application Contexts containing the RDTSE.
- Conformance requirements for the RDT Application Contexts.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC 10740. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO/IEC 10740 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 7498:1984, *Information processing systems – Open Systems Interconnection – Basic Reference Model.*

ISO 7498-2:1989, *Information processing systems – Open Systems Interconnection – Basic Reference Model – Part 2: Security Architecture.*

ISO 8649:1988, *Information processing systems – Open Systems Interconnection – Service definition for the Association Control Service Element.*

ISO 8822:1988, *Information processing systems – Open Systems Interconnection – Connection oriented presentation service definition.*

ISO/IEC 8824:1990, *Information technology – Open Systems Interconnection – Specification of Abstract Syntax Notation One (ASN.1).*

ISO/IEC 8825:1990, *Information processing systems – Open Systems Interconnection – Specification of basic encoding rules for Abstract Syntax Notation One (ASN.1).*

ISO/IEC 9066-1:1989, *Information processing systems – Text communication – Reliable Transfer – Part 1: Model and service definition.*

ISO/IEC 9066-2:1989, *Information processing systems – Text communication – Reliable Transfer – Part 2: Protocol specification.*

ISO/IEC 9072-1:1989, *Information processing systems – Text communication – Remote Operations – Part 1: Model, notation and service definition.*

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ISO/IEC 9072-2:1989, *Information processing systems – Text communication – Remote Operations – Part 2: Protocol specification.*

ISO/IEC 10031-1:1991, *Information technology – Text and office systems – Distributed-office-applications model – Part 1: General model.*

ISO/IEC 10031-2:1991, *Information technology – Text and office systems – Distributed-office-applications model – Part 2: Distinguished-object-reference and associated procedures.*

ISO/IEC 10740-1:1993, *Information technology – Text and office systems – Referenced Data Transfer – Part 1: Abstract service definition.*

3 Definitions

3.1 OSI basic reference model definitions

This Part of ISO/IEC 10740 makes use of the following terms defined in ISO 7498:

- a) Application Layer;
- b) application-context;
- c) application-process;
- d) application-service-element;
- e) protocol;
- f) transfer syntax.

3.2 Distributed-office-application model - Distinguished-object-reference and associated procedures definitions

This Part of ISO/IEC 10740 makes use of the following terms defined in ISO/IEC 10031-2:

- a) authentication;
- b) credentials.

3.3 Association control service element (ACSE) definition

This Part of ISO/IEC 10740 makes use of the following term defined in ISO 8649:

- a) application context.

3.4 Presentation service definitions

This Part of ISO/IEC 10740 makes use of the following terms defined in ISO 8822:

- a) abstract syntax,
- b) transfer syntax name.

3.5 Abstract syntax notation definitions

This Part of ISO/IEC 10740 makes use of the following terms defined in ISO/IEC 8824:

- a) ASN.1;
- b) object identifier.

3.6 Remote operations service element (ROSE) definitions

This Part of ISO/IEC 10740 makes use of the following terms defined in ISO/IEC 9072-1:

- a) Remote Operations: bind-operation, unbind-operation, operation;
- b) RO-notation;
- c) Remote Operations Service Element

3.7 Distributed-office-application model - General model definitions

This Part of ISO/IEC 10740 makes use of the following terms defined in ISO/IEC 10031-1:

- a) accessee;
- b) accessor;
- c) data-object-value;
- d) distinguished-object-reference;
- e) distributed-office-application;
- f) referenced-object-access;
- g) ROA-operation.

3.8 Referenced-data-transfer definitions

This Part of ISO/IEC 10740 makes use of the following term defined in ISO/IEC 10740-2:
referenced-data-transfer.

4 Abbreviations

AC	application-context
APDU	application-protocol-data-unit
ASE	application-service-element
ASN.1	Abstract Syntax Notation One
DOR	Distinguished Object Reference
QoS	Quality of Service
RDT	Referenced Data Transfer
RDTSSE	Referenced Data Transfer Service Element
ROA	Referenced Object Access
ROSE	Remote Operations Service Element
RTSE	Reliable Transfer Service Element

5 Conventions

This Part of ISO/IEC 10740 uses the descriptive conventions listed below.

ASN.1 to specify the abstract syntax of information objects.

6 RDT Application Service Element and Abstract Syntax

This clause formally defines the RDT Application Service Element (RDTSE) and RDT Abstract Syntax. This description conforms to ISO/IEC 8824 and ISO/IEC 9072-1.

RDT-application-service-element {joint-iso-ccitt rdt (12) modules (0) application-service-element (1)}

DEFINITIONS:: =
BEGIN

EXPORTS

access-denied, extend, extend-rejected, invalid-reference, rdt-as0, rdtSE, transfer,
value-not-available;

IMPORTS

APPLICATION-SERVICE-ELEMENT

FROM Remote-Operations-Notation-extension {joint-iso-ccitt remote-operations (4)
notation-extension (2) }

Access-denied, Extend, Extend-rejected, Invalid-reference, rdtX, Transfer, Value-not-available
FROM RDT-abstract-service-definition {joint-iso-ccitt rdt (12) modules (0)
abstract-service-definition (0) };

-- Object Identifier

rdt-as0 OBJECT IDENTIFIER ::= {rdtx abstract-syntax (2) apdus0 (0) version1 (1)}

-- this abstract syntax includes the apdus defined in module --

-- Remote-Operation-APDUs {joint-iso-ccitt remote-operations (4) apdus (1)} in ISO/IEC 9072-2 and --

-- the apdus defined in this module. This abstract syntax shall be used, if the RDTSE is included in --

-- application contexts not defined in this Standard. --

-- RDT Application Service Element

RDTSE APPLICATION-SERVICE-ELEMENT

OPERATIONS { extend, transfer }

:: = {rdtx service-elements (3) rdtASE (0) }

-- Remote Operations

extend Extend ::= 1

transfer Transfer ::= 2

-- Remote Errors

access-denied	Access-denied	:: = 1
extend-rejected	Extend-rejected	:: = 2
invalid-reference	Invalid-reference	:: = 3
value-not-available	Value-not-available	:: = 4

END -- of RDT-application-service-element

7 RDT Application Contexts and Protocol

7.1 Overview

This subclause specifies the application-contexts (ACs) that shall be employed in the construction of Referenced Data Transfer. It uses the notation specified in ISO/IEC 9072-1.

This subclause covers the following topics:

- a) RDT Application Contexts (7.2)
- b) Bind and Unbind operations (7.3)
- c) Use of ROSE (7.4)

Two Referenced Data Transfer ACs are defined in 7.2.

NOTE – An RDTSE may also be included into an AC of a specific application.

7.2 RDT Application Contexts

This is the formal definition of two application-contexts for RDT. The description conforms to ISO/IEC 8824 and ISO/IEC 9072-1.

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RDT-application-context-definition { joint-iso-ccitt rdt (12) modules (0) ac-definition (3) }

DEFINITIONS:: =
BEGIN

EXPORTS

aCSE-as, rdt-as1, rdt-as-2, rdt-ac-1, rdt-ac-2, RDTBind, RDTUnbind;

IMPORTS

BIND, UNBIND

FROM Remote-Operations-Notation { joint-iso-ccitt remote-operations (4) notation (0) }

APPLICATION-CONTEXT, aCSE

FROM Remote-Operations-Notation-extension { joint-iso-ccitt remote-operations (4) notation-extension (2) }

rOSE

FROM Remote-Operations-APDUs { joint-iso-ccitt remote-operations (4) apdus (1) }

rTSE

FROM Reliable-Transfer-APDUs { joint-iso-ccitt reliable-transfer (3) apdus (1) }

Name

FROM InformationFramework { joint-iso-ccitt ds (5) modules (1) informationFramework (1) }

rdtx

FROM RDT-abstract-service-definition { joint-iso-ccitt rdt (12) modules (0) abstract-service-definition (1) }

rDTSE, rdt-as0

FROM RDT-application-service-element { joint-iso-ccitt rdt (12) modules (0) application-service-element (1) };

-- Object Identifiers

aCSE-as OBJECT IDENTIFIER ::= { joint-iso-ccitt association-control (2) abstractSyntax (1) apdus (0) version1 (1) } -- as defined in ISO 8650

rdt-as1 OBJECT IDENTIFIER ::= { rdtx abstract-syntax (2) apdus1 (1) version1 (1) }
-- this abstractSyntax includes the APDUs defined in this module --
-- (Bind and Unbind) --

rdt-as2 OBJECT IDENTIFIER ::= { rdtx abstract-syntax (2) apdus2 (2) version1 (1) }
-- this abstract Syntax includes the APDUs defined for rdt-as1 and --
-- the APDUs defined in module Reliable-Transfer-APDUs --
-- { joint-iso-ccitt reliable-transfer (3) apdus (0) } --

-- Application Contexts

rdt-ac-1 APPLICATION-CONTEXT -- *excluding RTSE* --
 APPLICATION SERVICE ELEMENTS {aCSE}
 BIND RDTBind
 UNBIND RDTUnbind
 REMOTE OPERATIONS {rOSE}
 OPERATIONS OF {rDTSE}
 ABSTRACT SYNTAXES {aCSE-as, rdt-as0, rdt-as1}
 ::= {rdtx application-contexts-2 (4) context1 (1) }

rdt-ac-2 APPLICATION-CONTEXT -- *including RTSE* --
 APPLICATION SERVICE ELEMENTS {aCSE, rTSE}
 BIND RDTBind
 UNBIND RDTUnbind
 REMOTE OPERATIONS {rOSE}
 OPERATIONS OF {rDTSE}
 ABSTRACT SYNTAXES {aCSE-as, rdt-as0, rdt-as2}
 ::= {rdtx application-contexts-2 (4) context2 (2) }

-- Bind

RDTBind ::= BIND
 ARGUMENT RDTBindArgument
 RESULT RDTBindResult
 BIND-ERROR RDTBindError

RDTBindArgument ::= SET{
 credentials [0] CHOICE{
 unprotected-Credentials [0] IMPLICIT Simple-Credentials,
 external-Credentials [1] EXTERNAL} OPTIONAL }

Simple-Credentials ::= SEQUENCE{
 user-Name Name,
 user-Password OCTET STRING}

RDTBindResult ::= RDTBindArgument

RDTBindError ::= SET{
 refuseReason [0] IMPLICIT INTEGER {busy (0), security-failure (1) } }

-- Unbind

RDTUnbind ::= UNBIND

-- NOTE - The transfer syntax name {joint-iso-ccitt asn1 (1) basic-encoding (1)} can be used for --
 -- abstract syntaxes listed in this module --

END -- of RDT-application-context-definition

7.3 Bind-operation and Unbind-operations

The RDTBind and RDTUnbind Remote Operations are used by the association-initiator and association-responder at the beginning and end of a particular period of association. The binding process may include the exchange of simple authentication information whereby the association-initiator and association-responder can authenticate each other (see 7.2). There is also the possibility of using other authentication mechanisms when these are standardized.

The RDT system that issued the RDTBind Operation shall always issue the RDTUnbind Operation as well.

7.4 Use of ROSE

7.4.1 General rules for the use of ROSE

The RDTSE protocol is a symmetric protocol, meaning that both RDT entities can invoke and perform all operations. The RDTSE uses ROSE in an asynchronous manner, meaning that new operations can be invoked without waiting for the result of a previously invoked operation. The results can be returned in a different order from that of the corresponding invocations. For further details, refer to ISO/IEC 9072.

7.4.2 Remote Operational Priorities

The ROSE provides for assignment of relative priorities to the APDUs that may be exchanged over an association, and to the association's release.

The first column of Table 1 lists the priorities that shall be used for Referenced Data Transfer. (The lower the value the higher the priority).

The second column gives the particular services that shall be assigned those priorities in the context of the RDTSE.

Table 1 Remote Operational Priorities

Priority	Service
0	Association release
1	RO-REJECT-U RO-ERROR
2	RO-RESULT
3	RO-INVOKE

NOTE – These priorities are only relevant for application contexts containing the Reliable Transfer Service Element (RTSE). See ISO/IEC 9066.