INTERNATIONAL STANDARD

ISO/IEC 13235-3

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Information technology — Open Distributed Processing — Trading Function —

Part 3:
Provision of Trading Function using OSI Directory service

Technologies de l'information — Traitement distribué ouvert — Fonction commerciale —

Partie 3: Fourniture de fonction commerciale utilisant le service d'annuaire OSI

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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 13235-3 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.952.

ISO/IEC 13235-3 consists of the following parts, under the general title *Information technology — Open Distributed Processing — Trading Function:*

— *Part 1: Specification*

— *Part 2: (TBD)*

— *Part 3: Provision of Trading Function using OSI Directory service*

Annex A forms an integral part of this part of ISO/IEC 13235. Annex B is for information only.

Introduction

The ODP Trading Function (see ITU-T Rec. X.950-Series | ISO/IEC 13235) provides the means to offer a service and the means to discover services that have been offered. ITU-T Rec. X.950 | ISO/IEC 13235-1 defines an enterprise Specification, an information Specification and a computational Specification of this Trading Function. No engineering Specification is defined in ITU-T Rec. X.950 | ISO/IEC 13235-1. This Recommendation | International Standard describes how the Specifications of the Trading Function in ITU-T Rec. X.950 | ISO/IEC 13235-1 can be engineered using OSI Directory Service (see ITU-T Rec. X.500 | ISO/IEC 9594-1) to store information and to provide support mechanisms. This Specification does not prescribe that a trader must be engineered by using OSI Directory. But if OSI Directory is used, this Specification defines standardised templates for information entries (e.g. service offer and link information objects) in the Directory DIT.

Clause 5 gives an overview of how the Trading Function is implemented as a combination of X.500 DUA and DSA. The X.500 DSA is used to store the Trader Information Object and a Trader DUA (T-DUA) implements the functionality required by a Trader, which is difficult, or impossible, to implement using OSI Directory services.

Clause 6 defines the standardised templates for information entries of the Trader Information Object, the information known to a particular Trader.

Clause 7 describes mapping of Trading Function operations to appropriate Directory operations.

Clause 8 specifies a minimal Type Repository Function necessary to enable the correct functioning of the X.500 Directory for Trading.

Clause 9 describes the mechanisms used to enable the handling of dynamic properties of a Trader's service offers.

This Specification contains two annexes.

Annex A is a normative schema definition of Trader definitions.

Annex B is an informative schema definition of a sample service description.

INTERNATIONAL STANDARD

ITU-T RECOMMENDATION

INFORMATION TECHNOLOGY – OPEN DISTRIBUTED PROCESSING – TRADING FUNCTION: PROVISION OF TRADING FUNCTION USING OSI DIRECTORY SERVICE

1 Scope and field of application

This Specification describes how the ODP Trading Function can be realised using information entries and support mechanisms of the OSI Directory. This Specification is to be used in conjunction with the ODP Trading Function Standard (ITU-T Rec. X.950 | ISO/IEC 13235-1). If there are any discrepancies between the prescriptive statements in ITU-T Rec. X.950 | ISO/IEC 13235-1 and those in this Specification, the prescriptive statements in ITU-T Rec. X.950 | ISO/IEC 13235-1 take precedence.

The scope of this Specification is:

- standardised templates for Trading Function information objects in the DIT;
- descriptions of mapping of Trading Function operations to appropriate Directory operations;
- description of use of other Directory features to provide the support mechanisms for implementing the ODP Trading Function.

This Specification does not prescribe that a trader must be engineered by using OSI Directory. But if OSI Directory is used, this Specification defines standardised templates for information entries (e.g. service offer and link information objects) in the Directory DIT. This Specification does not put any restrictions on where these entries are placed in the Directory DIT. That is, this Specification does not standardise any structure rules. This Specification does describe a mechanism to provide the Trading Function using OSI Directory.

The field of application of this Specification is for the construction of the ODP Trading Function using the OSI Directory, when required.

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 posibility of applying the most recent edition of the Recommendations and Standards listed below. Members of IEC and ISO maintain registers of currently valid Internationa 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.500 (1993) | ISO/IEC 9594-1:1995, *Information technology – Open Systems Interconnection – The Directory: Overview of concepts, models and services.*
- ITU-T Recommendation X.501 (1993) | ISO/IEC 9594-2:1995, *Information technology – Open Systems Interconnection – The Directory: Models.*
- ITU-T Recommendation X.509 (1993) | ISO/IEC 9594-8:1995, *Information technology – Open Systems Interconnection – The Directory: Authentication framework.*
- ITU-T Recommendation X.511 (1993) | ISO/IEC 9594-3:1995, *Information technology – Open Systems Interconnection – The Directory: Abstract service definition.*
- ITU-T Recommendation X.519 (1993) | ISO/IEC 9594-5:1995, *Information technology – Open Systems Interconnection – The Directory: Protocol specifications.*

- ITU-T Recommendation X.520 (1993) | ISO/IEC 9594-6:1995, *Information technology – Open Systems Interconnection – The Directory: Selected attribute types.*
- ITU-T Recommendation X.521 (1993) | ISO/IEC 9594-7:1995, *Information technology – Open Systems Interconnection – The Directory: Selected object classes.*
- ITU-T Recommendation X.680 (1994) | ISO/IEC 8824-1:1995, *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation.*
- ITU-T Recommendation X.681 (1994) | ISO/IEC 8824-2:1995, *Information technology – Abstract Syntax Notation One (ASN.1): Information object specification.*
- ITU-T Recommendation X.682 (1994) | ISO/IEC 8824-3:1995, *Information technology – Abstract Syntax Notation One (ASN.1): Constraint specification.*
- ITU-T Recommendation X.683 (1994) | ISO/IEC 8824-4:1995, *Information technology – Abstract Syntax Notation One (ASN.1): Parameterization of ASN.1 specifications.*
- ITU-T Recommendation X.902 (1995) | ISO/IEC 10746-2:1996, *Information technology – Open distributed processing – Reference Model: Foundations.*
- ITU-T Recommendation X.903 (1995) | ISO/IEC 10746-3:1996, *Information technology – Open distributed processing – Reference Model: Architecture.*
- ITU-T Recommendation X.950 (1997) | ISO/IEC 13235-1[1)], *Information technology – Open distributed processing – Trading function: Specification.*

3 Definitions

This Recommendation | International Standard makes use of the following terms defined in ITU-T Rec. X.902 | ISO/IEC 10746-2:

- activity;
- behaviour;
- client object;
- failure;
- identifier;
- instance;
- interaction;
- interface;
- interface signature;
- name;
- object;
- obligation;
- ODP system;
- policy;
- server object;
- subtype;
- <X> template;
- trading;
- type;
- viewpoint.

1) To be published.

This Recommendation | International Standard makes use of the following terms defined in ITU-T Rec. X.903 | ISO/IEC 10746-3:

- administrator;
- community;
- computational viewpoint;
- engineering interface reference;
- engineering viewpoint;
- enterprise viewpoint;
- exporter;
- importer;
- information viewpoint;
- service export;
- service import;
- service offer;
- technology viewpoint;
- Trading Function;
- Type Repository Function.

This Recommendation | International Standard makes use of the following terms defined in ITU-T Rec. X.950 | ISO/IEC 13235-1:

- federated traders;
- iterator;
- link;
- proxy offer;
- service type;
- service property;
- trader;
- trader attribute;
- trading graph.

This Recommendation | International Standard makes use of the following terms defined in ITU-T Rec. X.500 | ISO/IEC 9594-1:

- Directory;
- Directory Information Base;
- (Directory) User.

This Recommendation | International Standard makes use of the following terms defined in ITU-T Rec. X.501 | ISO/IEC 9594-2:

- attribute;
- attribute type;
- attribute value;
- Directory Information Tree;
- Directory System Agent;
- Directory User Agent;
- distinguished name;
- (Directory) entry;
- filter;

- matching rule;
- (Directory) name;
- name form;
- object;
- object class;
- object entry;
- relative distinguished name;
- structure rule;
- subclass;
- subordinate;
- superclass.

This Recommendation | International Standard makes use of the following operations defined in ITU-T Rec. X.511 | ISO/IEC 9594-3:

- addEntry;
- modifyEntry;
- read;
- removeEntry;
- search.

This Recommendation | International Standard makes use of the following terms defined in ITU-T Rec. X.509 | ISO/IEC 9594-8:

- authentication;
- password.

4 Abbreviations

For the purposes of this Recommendation | International Standard, the following abbreviations apply:

DIB	Directory Information Base
DIT	Directory Information Tree
DN	Distinguished Name
DSA	Directory System Agent
DUA	Directory User Agent
ODP	Open Distributed Processing
OID	Object Identifier
RDN	Relative Distinguished Name
T-DUA	Trader Directory User Agent

5 Overview

In this Specification, the Trading Function is implemented as a combination of X.500 DUA and DSA. As far as possible, the features of X.500 are used to directly implement the Trading Function, but not all Trader features can be directly supported by X.500. For this reason, the Trader (the object that provides the Trading Function) is composed of two components: an X.500 Directory which stores the Trader Information and a Trader DUA (T-DUA) which implements the functionality required by a Trader which is difficult, or impossible, to implement in X.500. The X.500 Directory is used to store the Trader Information Object. Requests from trader clients (importers and exporters) are mapped into operations on the X.500 database. Figure 1 shows the components of a Trader and its interactions with its clients.

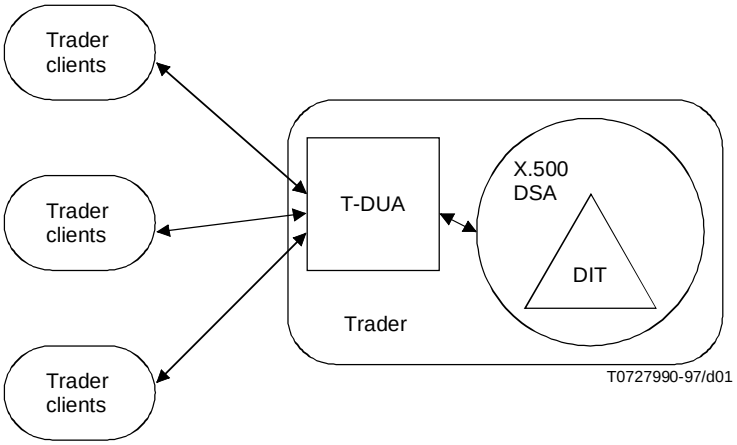

Figure 1 – The trader with its components and clients

The T-DUA and the trader clients (importers and exporters) communicate using a Trader protocol. The Trader protocol is not defined in this Specification. It may be any protocol which implements the functionality specified by ITU-T Rec. X.950 | ISO/IEC 13235-1. The purpose of this Specification is to specify how the T-DUA uses an X.500 Directory to support the functionality specified by ITU-T Rec. X.950 | ISO/IEC 13235-1.

The information stored by the X.500 Directory comprises:

- The Trader Attributes (i.e. information about the Trader itself).
- The Trader Enterprise policies (i.e. rules to determine and guide Trader behaviour).
- The set of Service Offers (i.e. information used by Trader when acting as a server).
- The set of Trader Links (i.e. information used by Trader when acting as a client).
- The set of Proxy Offers (i.e. information used by Trader when acting as a server for Proxy Offers).

X.500 is used to store this information for several reasons:

- The information model required by the ODP Trader is very similar to that provided by X.500.
- X.500 provides significant flexibility in allowing the definition of new X.500 attributes at runtime.
- It makes sense to use the existing investment in X.500 rather than to attempt to create a completely new infrastructure.
- It allows the Trader to use the general X.500 infrastructure to look up presentation addresses of linked Traders and Clients, and to use the security features of X.500 to authenticate users.

  NOTE – Details of how to provide the X.500 infrastructure and the security features of X.500 for the Trading Function are outside the scope of this Specification.

It is not possible to implement an ODP Trader completely using X.500 because of the significant differences in the operational model used by the ODP Trader. These include:

- The Trader operations that do not directly map to X.500 operations.
- Distributed operations that are implemented using information stored in Trader Links and Trader Attributes whose meaning differ from the distribution implemented in X.500.

6 Schema

This X.500 schema describes the portion of an X.500 DIT used to store the information known to one Trader. The schema is based on the X.500 Directory model and is given in Annex A.

6.1 General

The information known to a particular Trader (the Trader Information Object) is kept in a subtree of the X.500 DIT. This subtree can be attached anywhere in the global DIT and no Structure Rules are defined for controlling its position. It is expected that the Trader subtree would be commonly attached beneath organisational and organisational unit entries (representing, respectively, the information known to organisational and organisational unit Traders). The information known to each trader is kept separately in the DIT and no attempt is made to map the distribution model used in X.500 to the very different distribution model of federated Traders.

Trader Information is stored in the X.500 DIT as self contained parcels. Each parcel contains the information known to one Trader. In the example shown in Figure 2, there are two Traders: one for the organisation as a whole and a second for a unit within the organisation. Linkages between these two Traders is via the Trader protocol, not via X.500 protocol.

The Trader Information Object (see Figure 3) is composed of five types of entries:

- The Trader Entry contains details about the Trader itself.
- The Trader Policy Entry contains details about the Trader enterprise policies.
- The Service Offer Entries contain details about the Service Offers known to the Trader.
- The Trader Link Entries contain details about the Links with other Traders.
- The Proxy Offer Entries contain details about the Proxy Offers known to the Trader.

NOTE 1 – The structuring of the Service Offers, Links, and Proxy Offers shown in Figure 3 is only one example of possible information structure.

NOTE 2 – In addition to the X.500 attributes listed in each entry, the presence of other attributes in an entry is not a violation of this Specification. Other X.500 attributes may be required for the following reasons:

- if a particular trader application requires specific additional X.500 attributes, they can be defined in that trader application Specification;
- if a particular trader implementation requires specific additional X.500 attributes, they can be defined in the documentation for that implementation.

Additional attributes can be included as Auxiliary Object Classes.

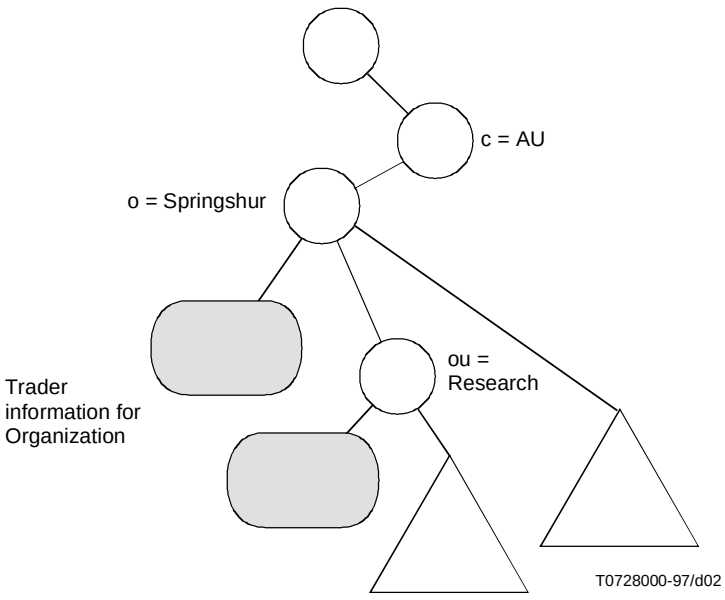

Figure 2 – An example of two traders stored in the X.500 DIT

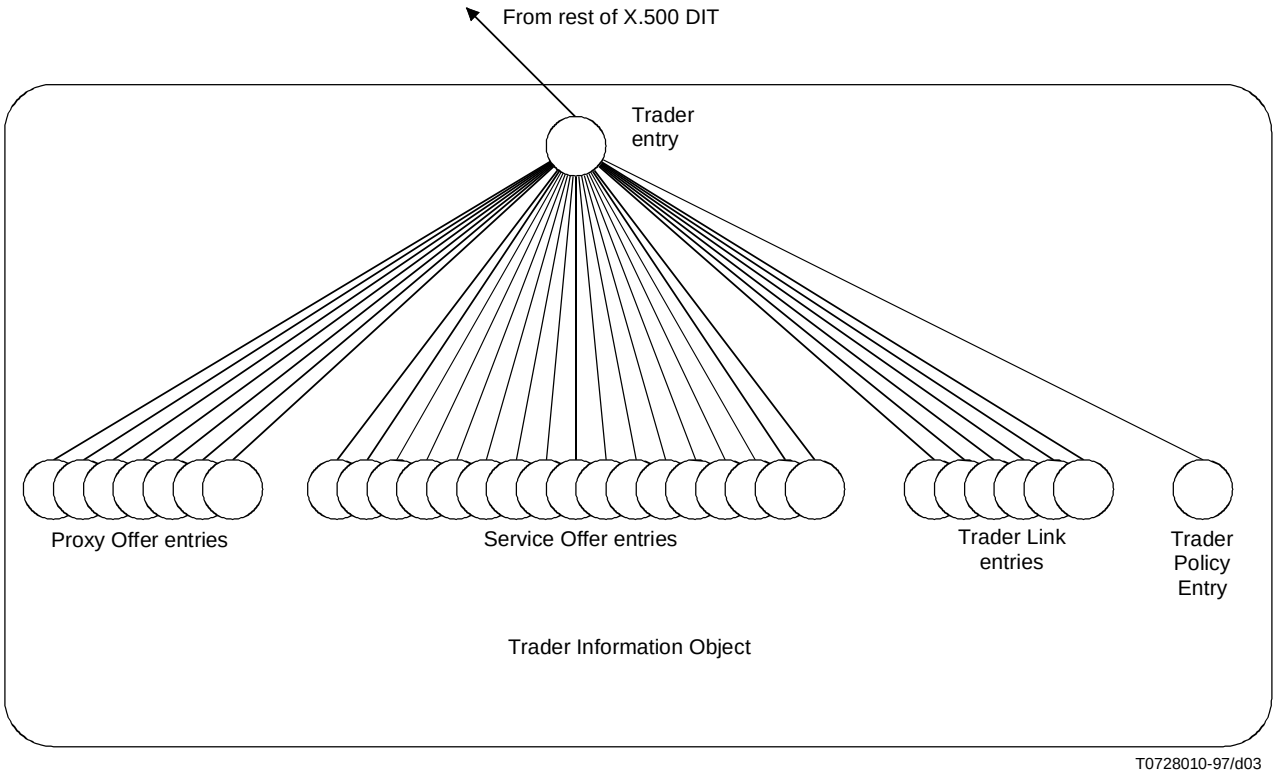

Figure 3 – An example of a Trader Information Object with five types of X.500 entry

6.2 Trader Entry

The root of the Trader subtree is the Trader Entry. This entry contains information about the Trader itself (the Trader Attributes – standardised Trader characteristics and trading policies) and is used as configuration information by the Trader (T-DUA) when it boots. The information is expressed as a set of X.500 attributes which represent Trader Attributes.

```
traderEntry OBJECT-CLASS ::= {

        SUBCLASS OF                {top}

        MUST CONTAIN               {commonName | traderInterface | dsaName | typeRepos |
                                   defSearchCard | maxSearchCard | defMatchCard |
                                   maxMatchCard | defReturnCard | maxReturnCard |
                                   defHopCount | maxHopCount | defFollowPolicy |
                                   maxFollowPolicy | maxLinkFollowPolicy |
                                   supportsModifiableProperties| supportsDynamicProperties |
                                   supportsProxyOffers | maxList | requestIdStem}

        MAY CONTAIN                {description | userPassword}

        ID                         id-trader-oc-traderEntry}
```

6.2.1 commonName

The name of this Trader. The commonName attribute forms the RDN of the Trader Entry. The full name of a Trader is the Distinguished Name of this entry (i.e. the full 'pathname' of the Trader Entry in the global X.500 DIT). The full Distinguished Name uniquely identifies this Trader amongst all other Traders in the X.500 Directory. This is a standard X.500 attribute defined in ITU-T Rec. X.520 | ISO/IEC 9594-6.

6.2.2 traderInterface

The address of the trader. The 'Address' is the Presentation Address at which this Trader can be contacted. This X.500 attribute is used by the Trader when booting as part of its configuration information and also by other Traders when they wish to distribute a Trader import amongst federated Traders.

```
traderInterface ATTRIBUTE ::= {
        SUBTYPE OF                presentationAddress
        SINGLE VALUE              TRUE
        ID                        id-trader-at-traderInterface}
```

6.2.3 dsaName

The name for the DSA associated with the Trader object.

```
dsaName ATTRIBUTE ::= {
        SUBTYPE OF                distinguishedName
        SINGLE VALUE              TRUE
        ID                        id-trader-at-dsaName}
```

6.2.4 typeRepos

The name of the Type Repository used by the Trader for the repository of definitions of Service Types, Interface Types and Service Properties Types.


```
typeRepos ATTRIBUTE ::= {
        SUBTYPE OF                distinguishedName
        SINGLE VALUE              TRUE
        ID                        id-trader-at-typeRepos}
```


6.2.5 defSearchCard

The default upper bound of service offers to be considered before terminating a search. This value is used if none is specified by an importer. It must not exceed the value of maxSearchCard.

```
defSearchCard ATTRIBUTE ::= {
        WITH SYNTAX               INTEGER
        EQUALITY MATCHING RULE    integerMatch
        SINGLE VALUE              TRUE
        ID                        id-trader-at-defSearchCard }
```

6.2.6 maxSearchCard

The maximum upper bound of service offers a Trader considers before terminating any search.

```
maxSearchCard ATTRIBUTE ::= {
        WITH SYNTAX               INTEGER
        EQUALITY MATCHING RULE    integerMatch
        SINGLE VALUE              TRUE
        ID                        id-trader-at-maxSearchCard}
```

6.2.7 defMatchCard

The default upper bound of matched offers found before a Trader terminates a search. This value is used if none is specified by an importer. It must not exceed the value of maxMatchCard.

```
defMatchCard ATTRIBUTE ::= {
        WITH SYNTAX               INTEGER
        EQUALITY MATCHING RULE    integerMatch
        SINGLE VALUE              TRUE
        ID                        id-trader-at-defMatchCard}
```

6.2.8 maxMatchCard

The maximum upper bound of matched offers found before a Trader terminates any search.

```
maxMatchCard ATTRIBUTE ::= {
        WITH SYNTAX               INTEGER
        EQUALITY MATCHING RULE    integerMatch
        SINGLE VALUE              TRUE
        ID                        id-trader-at-maxMatchCard}
```


6.2.9 defReturnCard

The default upper bound of service offers returned to an importer. This value is used if none is specified by an importer. It must not exceed the value of maxReturnCard.

```
defReturnCard ATTRIBUTE ::= {
        WITH SYNTAX               INTEGER
        EQUALITY MATCHING RULE    integerMatch
        SINGLE VALUE              TRUE
        ID                        id-trader-at-defReturnCard}
```

6.2.10 maxReturnCard

The maximum upper bound of service offers returned to an importer.

```
maxReturnCard ATTRIBUTE ::= {
        WITH SYNTAX               INTEGER
        EQUALITY MATCHING RULE    integerMatch
        SINGLE VALUE              TRUE
        ID                        id-trader-at-maxReturnCard}
```