TECHNICAL REPORT

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Information technology — Framework and taxonomy of International Standardized Profiles —

Part 2:
Principles and Taxonomy for OSI Profiles

Technologies de l'information — Cadre et taxinomie des profils normalisés internationaux —

Partie 2: Principes et taxinomie pour profils OSI

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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.

The main task of technical committees is to prepare International Standards, but in exceptional circumstances a technical committee may propose the publication of a Technical Report of one of the following types:

— type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;

— type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;

— type 3, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

ISO/IEC TR 10000-2, which is a Technical Report of type 3, was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*.

This fifth edition cancels and replaces the fourth edition (ISO/IEC TR 10000-2:1995), which has been technically revised.

ISO/IEC TR 10000 consists of the following parts, under the general title *Information technology - Framework and taxonomy of International Standardized Profiles*:

— *Part 1: General principles and documentation framework*
— *Part 2: Principles and Taxonomy for OSI Profiles*
— *Part 3: Principles and Taxonomy for Open System Environment Profiles*

Other parts to be defined as necessary.

Introduction

The context of Functional Standardization is one part of the overall field of Information Technology standardization activities covering

- Base standards, which define fundamentals and generalized procedures. They provide an infrastructure that can be used by a variety of applications, each of which can make its own selection from the options offered by them.

- Profiles, which define conforming subsets or combinations of base standards used to provide specific functions. Profiles identify the use of particular options available in the base standards, and provide a basis for the development of uniform, internationally recognized, conformance tests.

- Registration mechanisms, which provide the means to specify detailed parameterization within the framework of the base standards or profiles.

Within ISO/IEC JTC 1, the process of Functional Standardization is concerned with the methodology of defining profiles, and their publication in documents called "International Standardized Profiles" (ISPs) in accordance with procedures contained in the Directives of JTC 1. The scope of Information Technology standardization to which this process is being applied is that which corresponds to the generally understood, but loosely defined, concept of "Open Systems". The objective is to facilitate the specification of IT systems characterized by a high degree of interoperability and portability of their components.

In addition to ISO/IEC TR 10000, the secretariat of the Special Group on Functional Standardization maintains a standing document (SD-4) entitled "Directory of ISPs and Profiles contained therein". This is a factual record of which ISPs exist, or are in preparation, together with an executive summary of each profile. It is subject to regular updating by the Secretariat of ISO/IEC JTC 1/SGFS.

Information technology — Framework and taxonomy of International Standardized Profiles —

Part 2:
Principles and Taxonomy for OSI Profiles

1 Scope

The purpose of this part of ISO/IEC TR 10000 is to provide principles and a classification scheme for OSI profiles which may be or have been submitted for ratification as International Standardized Profiles (ISPs).[1]

ISO/IEC TR 10000-1 defines the concept of profiles which are documented in ISPs. OSI profiles are a subset of OSE profiles. ISO/IEC TR 10000-3 defines the concept of OSE profiles and, along with ISO/IEC TR 10000-1, gives guidance to organizations making proposals for Draft ISPs, on the nature and content of the documents they are producing.

The existence of a profile classification in this part of ISO/IEC TR 10000 does not reflect a judgment by ISO/IEC JTC 1/SGFS that a profile is required for such capability. It merely provides a capability to identify uniquely such a function and to enable evaluation of PDISPs.

Since profiles will be proposed according to needs identified to SGFS and according to the progress of international base standardization, the Taxonomy will be periodically updated or have new parts added in order to reflect the progress reached. It is also recognized that there will be proposals for the extension of the Taxonomy to cover functions which were not identified during preparation of this edition of ISO/IEC TR 10000. These extensions may be identified by a variety of proposers and involve simple extensions to the existing Taxonomy or the addition of new functional areas not currently covered by ISO/IEC TR 10000. The inclusion of such extensions is administered following the procedures elaborated by SGFS.

A distinction has been made between a profile and an ISP documenting one or more profiles. The Taxonomy is only concerned with profiles, but further information is given in the "Directory of ISPs and Profiles contained therein" as to which ISP contains the documentation of a profile.

This *Directory* is maintained as an SGFS standing document SD-4 (see Annex A). For each draft profile submitted to SGFS, it will also provide additional information, including the status of the identified profiles.

2 References

ISO/IEC 9646-6:1994, *Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 6: Protocol profile test specification.* {ITU-T Rec. X.295 (1995)}

ISO/IEC 9646-7:1995, *Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 7: Implementation Conformance Statements.* {ITU-T Rec. X.296 (1995)}

ISO/IEC TR 10000-1:1998, *Information technology - Framework and taxonomy of International Standardized Profiles - Part 1: General principles and documentation framework.*

ISO/IEC TR 10000-3:1998, *Information technology - Framework and taxonomy of International Standardized Profiles - Part 3: Principles and Taxonomy for Open System Environment Profiles.*

A number of other ISO, IEC, and ISO/IEC JTC 1 Standards and ITU-T Recommendations are quoted in examples which do not constitute provisions of this part of ISO/IEC TR 10000.

3 Definition

For the purposes of this part of ISO/IEC TR 10000, the following definition applies.

3.1 Group: A set of OSI profiles that are compatible, in the sense that an IT implementing one profile from a Group can interwork, according to OSI, with another IT system implementing a different profile from the same Group, in terms of the operation of the protocols specified within these profiles.

1 This part of ISO/IEC TR 10000 defines only a taxonomy for OSI based communication profiles; the issue of the placement of other communication profiles is not addressed.

4 Abbreviations

4.1 General abbreviations

CGM	Computer Graphics Metafile
CL	Connectionless-mode
CLNS	Connectionless-mode Network Service
CLTS	Connectionless-mode Transport Service
CO	Connection-mode
CONS	Connection-mode Network Service
COTS	Connection-mode Transport Service
CSDN	Circuit Switched Data Network
CSI	Communication Services Interface
CSMA/CD	Carrier Sense, Multiple Access / Collision Detection
CULR	Common Upper Layer Requirements100
DFR	Document Filing and Retrieval
DSA	Directory Service Agent
DTAM-DM	Document Transfer and Manipulation - Document Manipulation
DTE	Data Terminal Equipment
DUA	Directory User Agent
EDI	Electronic Data Interchange
EDIMG	EDI Messaging
FDDI	Fibre Distributed Data Interface
FR PVC	Frame Relay Permanent Virtual Circuit
FR SVC	Frame Relay Switched Virtual Call
FRBS	Frame Relay Bearer Service
FRDN	Frame Relay Data Network
FRDTS	Frame Relay Data Transmission Service
IIF	Image Interchange Facility
IPI	Image Processing and Interchange
IPM	Interpersonal Message
ISDN	Integrated Services Digital Network
ISP	International Standardized Profile
LAN	Local Area Network
MAC	Media Access Control
MMS	Manufacturing Message Specification
MOTIS	Message Oriented Text Interchange System
MS	Message Store
MTA	Message Transfer Agent
MTS	Message Transfer System
ODA	Open Document Architecture
P1	Message Transfer Protocol
P2	Interpersonal Messaging Protocol
P3	MTS Access Protocol
P7	MS Access Protocol
PSDN	Packet Switched Data Network
PSTN	Public Switched Telephone Network
PVC	X.25 Permanent Virtual Circuit
QOS	Quality of Service
SGFS	ISO/IEC JTC 1/Special Group on Functional Standardization
SGML	Standardized General Markup Language
TP	Transaction Processing
TPSU	TP Service User
UA	User Agent
VC	X.25 Virtual Call
VT	Virtual Terminal

4.2 Abbreviations used in Profile identifiers

<u>Abbr.</u>	<u>Profile sub-class (Applications)</u>
ADF	Document Filing and Retrieval
ADI	Directory (1988) [2]
ADY	Directory (1993) [2]
AFT	File Transfer, Access and Management
ALD	Library, Documentation
AMH	Message Handling
AMM	Manufacturing Messaging
AOD	Interactive Manipulation of ODA Documents
ARD	Remote Database Access
ATP	Transaction Processing
AVT	Virtual Terminal

<u>Abbr.</u>	<u>Profile sub-class (Formats)</u>
FCG	Computer Graphics Metafile Interchange Format
FCS	Character Sets
FDI	Directory Data Definitions (1988) [2]
FDY	Directory Data Definitions (1993) [2]
FOD	Open Document Format
FSG	SGML Interchange Format
FVT	Virtual Terminal Registered Objects

<u>Abbr.</u>	<u>Profile sub-class (Lower Layers)</u>
TA	COTS over CLNS
TB	COTS over CONS
TC	COTS over CONS
TD	COTS over CONS
TE	COTS over CONS
UA	CLTS over CLNS
UB	CLTS over CONS
RA	Relaying the CLNS
RB	Relaying the CONS
RC	X.25 Protocol Relaying
RD	Relaying the MAC Service using transparent bridging
RE	Relaying the MAC Service using source routing
RZ	Relaying between CLNS and CONS

5 The OSI Taxonomy: Principles

5.1 General

OSI profiles are primarily arranged into classes, each class representing a category of functionality of reasonable independence from other classes. The different classes of profile correspond to the major divisions of the taxonomy.

Within each class, a class-specific subdivision will be used.

2 The taxonomy substructure for the 1988 edition of the Directory specifications differs from the taxonomy substructure developed for the 1993 edition.

OSI profile identifiers are structured in accordance with the general OSE taxonomy defined in ISO/IEC TR 10000-3. Thus, an OSI profile identifier comprises:

- the suffix "-C" (for a CSI profile);
- a root mnenomic which is a character string commencing with one letter that indicates the primary class of the profile;
- an alphanumeric string that is as long as necessary to reflect the position of the profile within the hierarchic structure.

The syntax of all but the first letter is subject to individual definitions (see below).

NOTE - In the context of the general OSE taxonomy defined in ISO/IEC TR 10000-3, OSI profiles are identified as Communication Services Interface profiles by the suffix "-C". This suffix is omitted in the description of the OSI taxonomy in this part of ISO/IEC TR 10000.

5.2 The Class concept for OSI Profiles

In order to decouple representation of information or objects from communication protocols, and application-related protocol from subnetwork types, OSI and OSI-related profiles are divided into the following classes:

T - Transport profiles providing connection-mode Transport Service

U - Transport profiles providing connectionless-mode Transport Service

R - Relay profiles

A - Application profiles requiring connection-mode Transport Service

B - Application profiles requiring connectionless-mode Transport Service

F - Interchange format and representation profiles

Other classes may be required.

Transport profiles of classes T and U specify how the two modes of OSI Transport Service are provided over the two modes of OSI Network Service, and over specific subnetwork types, such as individual types of LANs, PSDNs, etc. In this way they isolate the A/B-profiles and F-profiles from network technology.

T- and U-profiles are further subdivided into Groups.
See "5.4 The Group concept for OSI Lower Layer Profiles" for details.

Application profiles of classes A and B specify communications protocol support for particular application types over the two modes of OSI Transport Service, respectively.

F-profiles specify the characteristics and representation of various types of information interchanged by A- and B-profiles.

R-profiles specify Relay functionality needed to enable IT systems using different T- or U-profiles to interwork. Interworking between T- and U-profiles is not contemplated in any JTC 1 work.

Within each of these classes, sub-classes of profiles are identified which, again, may require further subdivision such that the granularity of the Taxonomy meets the requirements outlined in ISO/IEC TR 10000-1. This leads to a hierarchical structure of profile (sub-)classes which is given in full in clause "6 Taxonomy of Profiles".

For the identification of sub-classes and a further subdivision within a given class, a class-dependent methodology is applied. This is explained in the subsequent class-individual sections.

5.3 Relationship between OSI Profiles

The schematic illustration in Figure 1 brings together examples of the relationships which exist between OSI profiles, particularly the three main subdivisions of the Taxonomy, and the combinations which can be made between profiles from different classes.

5.3.1 A/T and B/U Boundaries

Actual use of an A- or B-profile requires that an IT system operate it in combination with a T- or U-profile, in order to provide a particular application protocol over a particular subnetwork type. The separation of A- and B-profiles from T- and U-profiles is represented by an A/T or B/U boundary. This relationship is illustrated vertically in Figure 1. The location of a set of A-profiles above a set of T-profiles, separated by a common A/T boundary, represents the possibility of combining any pair of A- and T-profiles, one from each of the two classes.

A similar situation exists for the B- and U-profiles. The A/T boundaries correspond to the OSI Connection-mode Transport Service, and the B/U-boundaries to the OSI Connectionless-mode Transport Service. The possibility of making the combination arises from the fact that a T- or U-profile is specified to provide the OSI Transport Service and an A- or B-profile is specified to use the OSI Transport Service.

5.3.2 A/F and B/F Boundaries

The combination of an A- or B-profile with one or more F-profiles will be selected by the user to meet the functional requirements in each case. The various general possibilities are illustrated by the vertical relationships in Figure 1. The location of one or more F-profiles above one or more A-/B-profiles, represents the possibility of combining profiles from each class.

Unlike the A/T and B/U boundaries, the A/F and B/F boundaries are not characterized by a single service definition.

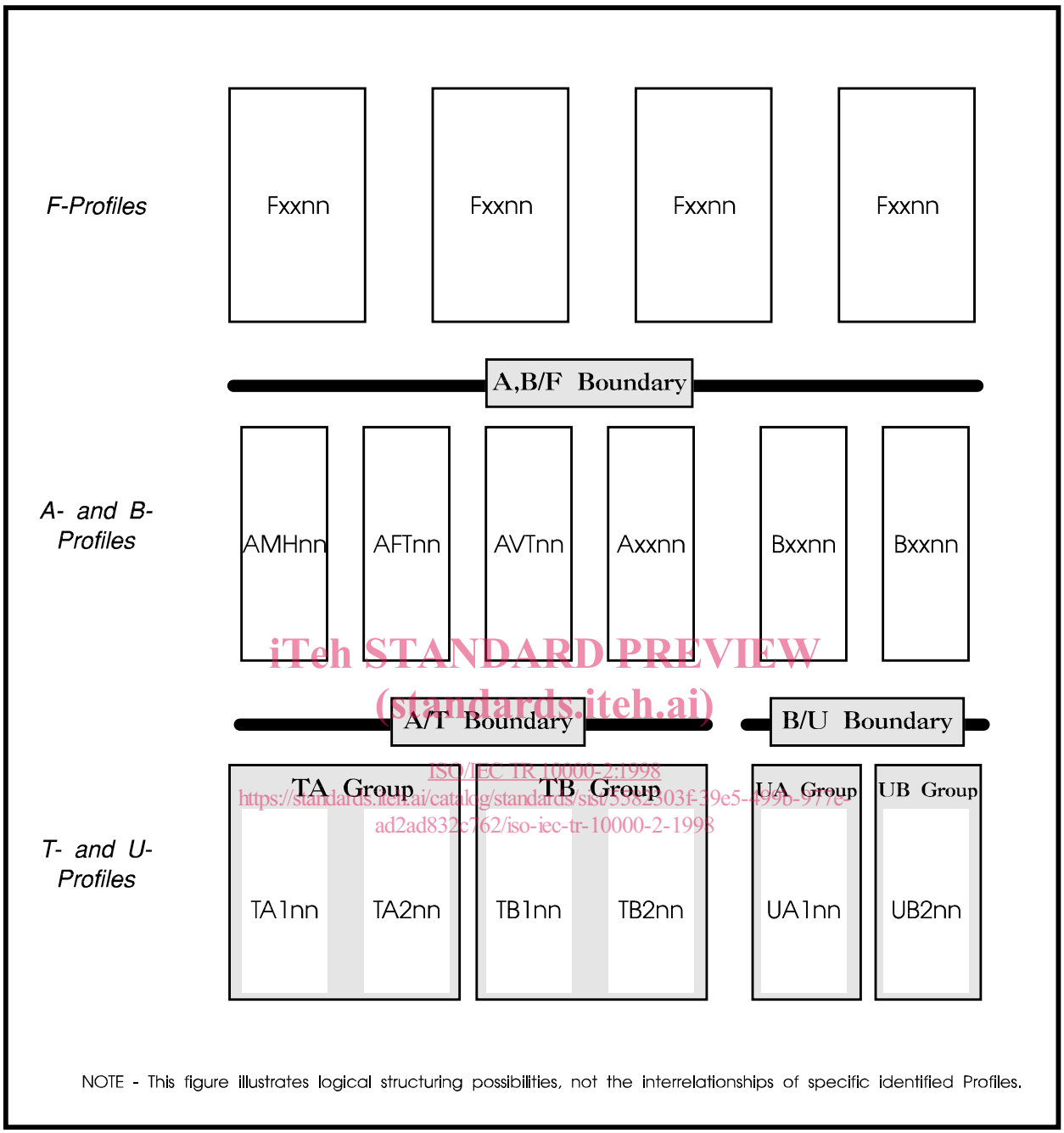

Figure 1: Examples of relationships between Profiles in the OSI Taxonomy

The Application Layer base standards require, implicitly or explicitly, the structure of information carried or referenced by them to be specified for each instance of communication. The combination of A-/B-profiles with one or more F-profiles will be selected by the user to meet the functional requirements in each case. However, the choice may be subject to constraints which can be expressed within either A-/B-profiles, F-profiles, or both.

In other A-/B-profiles, the Application Layer base standards themselves constrain the choice of presentation context.

Constraints may also exist within an F-profile, arising either from its base standard, or as a result of profile creation. These constraints will limit the A-/B-profiles which can be used to transfer the information.

In summary, therefore, there are three forms of constraints affecting the combination of A-/B- and F-profiles:

a) the choice of information to be transferred may be constrained by the Application Layer base standards, and possibly further constrained by the A-/B-profile;

b) some interchange and representation base standards may limit transfer to particular Application base standards; this choice may be further constrained by the F-profiles;

c) the combinations are not constrained by base standards, but may be constrained by either A-/B- or F-profiles to achieve some general function.

Note that, as always, in making his choice of combination, a user must in practice take account not only of the constraints derived from profiles, but also the capabilities implemented in the end systems involved in each instance of communication, to support the various profiles.

5.4 The Group concept for OSI Lower Layer Profiles

The Group concept is used in the Taxonomy as follows:

A Group is a set of T- or U-profiles that are compatible in the sense that an IT system implementing one profile from the Group and another IT system implementing a profile from the same Group can be expected to interwork, according to OSI, to some minimum level which is determined by the mandatory features of the profiles in the Group.

Interworking according to OSI means end-to-end operation across a single subnetwork, or across multiple subnetworks linked by means of Network (or lower) Layer relays.

An example of a Group is the set of T-profiles that provide the Connection-mode Transport Service, using Class 4 Transport Protocol over the Connectionless-mode Network Service, provided by ITU-T Rec. X.233 | ISO/IEC 8473-1. This Group has members which correspond to different subnetwork technologies but inter-working between IT systems conforming to them is made possible by LAN bridges and/or Network Layer relays.

A Group is identified by labels of the form YXnnn, where Y is the class identifier and X is a letter identifying the Group.

5.5 Profile classes

5.5.1 Transport Profiles

5.5.1.1 Principles

Transport profiles define the use of protocol standards from OSI layers 1 to 4, to provide the OSI Transport Service.

A primary distinction is made between Transport profiles, based on the mode of Transport Service offered:

— Connection-mode Transport Service:
profile class T

— Connectionless-mode Transport Service:
profile class U

For the Transport profile classification within each class, the following methodology is applied:

a) As a first level distinction the Group concept (see “5.4 The Group concept for OSI Lower Layer Profiles”) is used in the following way:

A lower layer Group is a collection of profiles which:

- support the same combination of modes of Transport and Network Service;
- support the same Transport Protocol Class(es);

The notion of a Group is incorporated in the classification.

b) The second level distinction between profiles, i.e. within a Group, is made according to the subnetwork type supported
(see “6.1.1 Taxonomy of Subnetworks“ for examples of subnetwork types).

c) Further subdivisions are made according to the characteristics of a particular subnetwork, e.g., switched versus leased line
(see 6.1.1 for examples of such characteristics).

5.5.1.2 Transport Profile Identifier

The identifier for a profile in the lower layers is of the form:

YXabcde

where:

Y = class designator, indicating the Transport Service mode:

T for Connection-mode
U for Connectionless-mode

X = one letter indicating the lower-layer Group within the class, as defined in “5.5.1.3 Connection-mode Transport Service: profile class T“ and “5.5.1.4 Connectionless-mode Transport Service: Profile class U“ below.

abcde = the structured numerical identifier indicating the subnetwork type supported in this profile. It is possible that a further level of identifier may become necessary. In general, when referencing a profile, only that level of identifier which is necessary for uniqueness needs to be used.

The identifier structure is not meant to capture the variety of details and options of OSI layer 1 such as attachment speeds and connectors. However, it is recognized that this issue must be covered by the appropriate profile specification.

5.5.1.3 Connection-mode Transport Service: profile class T

Based on functional standardization already under way in organizations represented in SGFS and on standards already developed, the following lower layer Groups are identified as being of value. They are characterized as follows:

a) Connection-mode Transport Service over Connectionless-mode Network Service:

Group TA

The Connection-mode Transport Service (COTS) is provided over the Connectionless-mode Network Service (CLNS) by requiring the use of the Class 4 Transport Protocol as defined in ITU-T Rec. X.224 | ISO/IEC 8073.

NOTE - An IT system implementing a profile from Group TA and claiming conformance to ITU-T Rec. X.224 | ISO/IEC 8073 also has to implement the mandatory transport protocol classes for operation over CONS as required by ITU-T Rec. X.224 | ISO/IEC 8073.

b) Connection-mode Transport Service over Connection-mode Network Service

The Connection-mode Transport Service (COTS) is provided over the Connection-mode Network Service (CONS).

Profiles of this characteristic are further grouped according to their required support of Transport Protocol class(es):

mandatory (see note 1)
transport protocol classes

Group TB:	0 and 2 and 4 (see note 2)
Group TC:	0 and 2 (see note 2)
Group TD:	0
Group TE:	2 (see note 3)

NOTES

1 'Mandatory' means those Transport Protocol classes made mandatory by the base standard, ISO/IEC 8073, plus any class required for Group membership.

2 The class negotiation rules to be employed are those in ITU-T Recommendation X.224.

3 An IT system implementing a profile from Group TE and claiming conformance to ITU-T Recommendation X.224 also has to implement transport protocol class 0.

5.5.1.4 Connectionless-mode Transport Service: Profile class U

a) Connectionless-mode Transport Service over Connectionless-mode Network Service:

Group UA

The Connectionless-mode Transport Service (CLTS) is provided using the ITU-T Rec. X.234 | ISO/IEC 8602 Connectionless-mode Transport Protocol. This Group supports the mandatory operation of the ITU-T Rec. X.234 | ISO/IEC 8602, over Connectionless-mode Network Service.

b) Connectionless-mode Transport Service over Connection-mode Network Service:

Group UB

The Connectionless-mode Transport Service (CLTS) is provided using the ITU-T Rec. X.234 | ISO/IEC 8602 Connectionless-mode Transport Protocol. This Group supports the option of the ITU-T Rec. X.234 | ISO/IEC 8602 that operates over Connection-mode Network Service.

NOTE - An IT system implementing a profile from Group UB and claiming conformance to the ITU-T Rec. X.234 | ISO/IEC 8602 also has to implement the mandatory operation over CLNS as required by the ITU-T Rec. X.234 | ISO/IEC 8602.

5.5.1.5 Interworking between Transport Profile Groups

The following tables 1 and 2 show the interworking capabilities between profiles. Table 1 shows the interworking between profiles in profile class T, and table 2 shows the interworking among profiles in profile class U. Successful establishment of a Transport Connection is dependent upon successful negotiation of parameters, some of which are not considered in the following tables.

No interworking is possible between Groups in class T and U because of the different mode of Transport Service provided.