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# Information and documentation — Open Systems Interconnection — Interlibrary Loan Application Service Definition

*Information et documentation — Interconnexion de systèmes ouverts (OSI) — Définition du service d'application pour les prêts entre bibliothèques*



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# Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword — Supplementary information.



The committee responsible for this document is ISO/TC 46, *Information and documentation*, Subcommittee SC 4, *Technical interoperability*.

This third edition cancels and replaces the second edition (ISO 10160:1997) of which it constitutes a minor revision.

It also incorporates the Amendment ISO 10160:1997/Amd 1:2002.

# Introduction

The purpose of the Interlibrary Loan (ILL) standard is to provide a set of Application Layer services which can be used by libraries to perform loan-related activities in an Open Systems Interconnection (OSI) environment, as defined by ISO 7498.

The goal of Opens Systems Interconnection is to allow, with a minimum of technical agreement outside the interconnection standards, the interconnection of information processing systems:

— from different manufacturers;

— under different managements;

— of different levels of complexity; and

— of different technologies.

The ILL service provides capabilities to request the loan of returnable bibliographic items, such as books, or to request non-returnable items, such as photocopies of journal articles. Related procedures, such as loan renewal, item recall, overdue notification, etc. are also supported by this service.

The purpose of the service definition is to define the communications aspects of ILL processing in terms of a set of services provided to a user by an application-service-element (ASE). Performing an ILL-transaction involves a user invoking the services in the prescribed order.

The focus of ILL activity is the bibliographic item, which may be a book, periodical, journal article, microform, etc. The ILL application is concerned with procedures relating to the loan of these items between libraries or to the interchange of copies thereof.



This service definition strives to satisfy a number of objectives, including:

— Control of ILL-transactions. The services must provide a means of controlling the ILL-transaction in terms of constraining allowable actions, exchanging information, tracking a borrowed item, and synchronizing the activity of the two or more sites involved in the ILL-transaction.

— Interworking of various systems. The ILL activity will continue to be performed using a combination of manual and automated systems. The ILL service and protocol must recognize this fact and allow systems with varying degrees of automation to be able to interwork, i.e. communicate with each other in a meaningful way.

— Minimizing the costs of ILL-transactions. The costs associated with an ILL-transaction include both operator costs and communications costs. An ILL protocol should attempt to minimize the costs incurred by implementations conforming to the protocol. This can be done by minimizing the operator intervention required by the protocol implementation, and by minimizing the number of messages sent between the sites involved in an ILL-transaction.

— Reflection of current ILL practices. The purpose of defining a protocol is not to introduce a new method for performing an ILL-transaction, but rather to formalize current practices in a way that allows existing systems to communicate with each other in a standardized way, as well as to allow newer automated systems to take full advantage of the protocol's potential. However, it is recognized that this International Standard may not be universally applicable to all existing ILL systems without some modification, due to the wide variation in their capabilities.

There is an inherent trade off in any attempt to reconcile these divergent objectives. For example, minimizing ILL-transaction costs may result in some loss of control over the ILL-transaction. Reducing the number of messages sent lowers the telecommunications cost and also lowers the operator costs as there is less need for the operator to initiate and control the communications operations. However, by reducing the total number of messages, some level of information regarding the ILL-transaction is lost as is the co-ordination between the requesting and responding libraries. By reducing the total number of stages through which an ILL-transaction must go (i.e. states), the operator interface of an automated system can be made simpler, with an associated reduction in requisite demands on the operator.

The approach taken in this International Standard is to set the mandatory requirements that all open systems must support in order to achieve an acceptable degree of coordination between automated parties to an ILL-transaction. Additional optional features are defined which allow implementors to achieve a greater degree of control if it is desired.

NOTE The mandatory requirements of this International Standard might however exceed the capabilities and/or needs of some existing manual or semi-automated ILL systems.

This International Standard is one of a number of related standards supporting the interconnection of library systems. These standards can be used by themselves or in a cooperative manner to support library applications requiring a mixture of communications services. For example, ISO 10163, which supports remote access to bibliographic databases, could be used in conjunction with the ILL protocol to obtain item identification information. The control and management of interactions among such bibliographic applications are outside the scope of this International Standard.

Security and accounting issues as they relate to ILL operations are for further study.

# Information and documentation — Open Systems Interconnection — Interlibrary Loan Application Service Definition

## 1 Scope

This International Standard is an Application Layer standard within the Open Systems Interconnection framework defined by ISO 7498.

This International Standard defines the services for Interlibrary Loan. These services are provided by the use of the ILL protocol in conjunction with the supporting telecommunications service which might be a store-and-forward messaging service, such as that provided by the MOTIS Standard, ISO/IEC 10021-4; or a direct connection-mode service using ISO 8822 and ISO 8649.

This International Standard does not specify individual implementations or products, nor does it constrain the implementation of entities and interfaces within a computer system. Computer systems might range from stand-alone workstations to mainframes.

This International Standard is intended for use by libraries, information utilities such as union catalogue centres, and any other system which processes bibliographic information. These systems might participate in an interlibrary loan transaction in the role of requester (i.e. an initiator of ILL requests), responder (i.e. a provider of bibliographic material or information) and/or intermediary (i.e. an agent that acts on behalf of a requester to find suitable responders).



Various interworking topologies are supported, ranging from simple two-party interactions to multi-party interactions.



There is no requirement for conformance to this International Standard. Conformance is required only for the ILL protocol specification.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 10026-1, *Information technology — Open Systems Interconnection — Distributed Transaction Processing — Part 1: OSI TP Model*

## 3 Terms and definitions

For the purposes of this document, the following definitions apply.

### 3.1 Reference model definitions[1)]

**3.1.1**
**application-entry**
aspects of an application-process pertinent to OSI

1) This International Standard is based on the concepts developed in ISO 7498 (all parts) and makes use of the following terms found in it. These terms are replicated here as a convenience to the reader.

**3.1.2**
**Application Layer**
seventh and highest layer in the Reference Model for Open Systems Interconnection (OSI), which serves as the window between correspondent application-processes which are using the OSI to exchange meaningful information

**3.1.3**
**application-protocol-data-unit**
unit of data specified in an application-protocol and consisting of application-protocol-information and possibly application-user-data

**3.1.4**
**application-service-element**
that part of an application-entity which provides an OSI environment capability, using underlying services when appropriate

**3.1.5**
**(N)-service**
capability of the (N)-layer and the layers beneath it, which is provided to (N+1)-entities at the boundary between the (N)-layer and the (N+1)-layer

Note 1 to entry: An application-service does not provide a capability to higher layer entities, but rather to application-processes.

**3.1.6**
**presentation-service**
capability of the Presentation Layer and the layers beneath it, which is provided to application-entities at the boundary between the Presentation and the *Application Layer* (3.1.2)



## 3.2 Application Layer structure definitions[2)]



**3.2.1**
**application-association**
cooperative relationship between two *application-entity-invocations* (3.2.4) for the purpose of communication of information and coordination of their joint operation. This relationship is formed by the exchange of application-protocol-control-information using the Presentation Service

**3.2.2**
**application-context**
set of rules shared in common by two *application-entity-invocations* (3.2.4) governing their behaviour in order to enable their cooperative operation

Note 1 to entry: An application-context is a shared conceptual schema for the universe of discourse for communication.

**3.2.3**
**application-context-definition**
description of an *application-context* (3.2.2)

**3.2.4**
**application-entity-invocation**
specific utilization of part or all of the capabilities of a given application-entity in support of the communications requirements of an *application-process-invocation* (3.2.5)

**3.2.5**
**application-process-invocation**
specific utilization of part or all of the capabilities of a given application-process in support of a specific occasion of information processing

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2) This International Standard makes use of the following terms defined in ISO/IEC 9545.

## 3.3 Service conventions definitions[3)]

**3.3.1**
**indication primitive**
representation of an interaction in which a *service-provider* (3.3.6) either

a) indicates that it has, on its own initiative, invoked some procedure, or

b) indicates that a procedure has been invoked by the *service-user* (3.3.7) at the peer service-access-point

**3.3.2**
**non-confirmed service**
distinct part of the total *(N)-service* (3.1.5) which does not result in an explicit confirmation from the *service-provider* (3.3.6) to the initiating *service-user* (3.3.7)

**3.3.3**
**provider-initiated service**
distinct part of the total *(N)-service* (3.1.5) which is initiated by the *service-provider* (3.3.6) rather than the *service-user* (3.3.7)

**3.3.4**
**request primitive**
representation of an interaction in which a *service-user* (3.3.7) invokes some procedure

**3.3.5**
**service primitive**
abstract, implementation-independent representation of an interaction between *service-user* (3.3.7) and the *service-provider* (3.3.6)



**3.3.6**
**service-provider**
abstract of the totality of those entities which provide a service to peer *service-users* (3.3.7)



**3.3.7**
**service-user**
entity in a single open system that makes use of a service

## 3.4 ILL definitions

**3.4.1**
**bibliographic item**
monograph, serial, microform, film, video recording, sound recording or other item of information held by a library or some organization

Note 1 to entry: A bibliographic item may assume different forms, e.g. a book may be printed on paper or represented electronically.

**3.4.2**
**chained ILL-transaction**
*ILL-transaction* (3.4.5) involving three or more parties, i.e. a *requester* (3.4.14), a *responder* (3.4.15) and one or more *intermediaries* (3.4.9), where each intermediary acts as a relay for all ILL messages

**3.4.3**
**electronic delivery**
delivery of an electronic representation of a requested item via a telecommunication-based service

3) This International Standard makes use of the following terms defined in ISO/IEC 10731.

**3.4.4**
**final-responder**
institution which supplies a requested item

Note 1 to entry: This term is used when it is necessary to distinguish between the responder of an ILL-transaction and the responder of an ILL-sub-transaction.

**3.4.5**
**ILL-transaction**
single, complete instance of the whole ILL cycle, including all of the actions, *service primitives* (3.3.5) and messages involved from the initial ILL-REQUEST until the cycle is concluded, as with the return of the requested material

**3.4.6**
**ILL-transaction group**
set of related *ILL-transactions* (3.4.5) initiated by the same *requester* (3.4.14)

**3.4.7**
**ILL-transaction state**
information describing the current processing status of an *ILL-transaction* (3.4.5), which is the combination of the requester state, the responder state and the states of all intermediaries involved in an ILL-transaction

**3.4.8**
**initial-requester**
person or institution which initiates an *ILL-transaction* (3.4.5)

Note 1 to entry: This term is used when it is necessary to distinguish between the requester of an ILL-transaction and the requester of an ILL-sub-transaction.



**3.4.9**
**intermediary**
*responder* (3.4.15) which either forwards a request to another library or institution for processing, or initiates chained or partitioned sub-transactions with other responders

**3.4.10**
**item**
monograph, serial, microform, film, video recording, sound recording or other item of information held by a library or some organization

**3.4.11**
**parameter**
functionally related group of one or more data elements

**3.4.12**
**partitioned ILL-transaction**
*ILL-transaction* (3.4.5) involving three parties, i.e. a *requester* (3.4.14), a *responder* (3.4.15) and an *intermediary* (3.4.9), where the intermediary acts as a relay of ILL messages during the *processing phase* (3.4.13), and where the requester and responder interact directly during the *tracking phase* (3.4.20)

**3.4.13**
**processing phase**
that phase of an *ILL-transaction* (3.4.5) up to and including shipment of a requested item

**3.4.14**
**requester**
party which has generated an ILL-REQUEST

**3.4.15**
**responder**
party which has received an ILL-REQUEST

**3.4.16**
**simple ILL-transaction**
*ILL-transaction* (3.4.5) involving only two active parties, a *requester* (3.4.14) and *responder* (3.4.15)

**3.4.17**
**sub-transaction**
part of an *ILL-transaction* (3.4.5) involving interactions between an *intermediary* (3.4.9) and a *responder* (3.4.15) or another intermediary

**3.4.18**
**supplier**
party that has supplied the requested item

Note 1 to entry: It need not be the same as the final-responder.

**3.4.19**
**terminal state**
state from which no transition to another state can be made

EXAMPLE When a photocopy is provided, SHIPPED is the terminal state for the responder, RECEIVED is the terminal state for the requester. CANCELLED is a terminal state for both the requester and responder.

**3.4.20**
**tracking phase**
phase of an *ILL-transaction* (3.4.5) after shipment and receipt of a returnable item, including renewals, overdues and item return

**3.4.21**
**user**
entity in a single open system that makes use of a service



## 4 Abbreviations

| | |
|---|---|
| ACID | Atomicity, Consistency, Isolation and Durability |
| ASE | Application Service Element |
| ASO | Application Service Object |
| ILL | Interlibrary Loan |
| MOTIS | Message Oriented Text Interchange System |
| OSI | Open Systems Interconnection |

## 5 Conventions

This International Standard uses the conventions defined in ISO/IEC 10731.

## 6 Service model

### 6.1 Service-user and service-provider

The ILL application is modelled as a distributed collection of application-processes, each of which is located in a separate real open system, e.g. a library system.

Within each application-process, there are two types of functions: local processing functions; and communications-related functions, i.e. OSI-related functions. The local processing functions deal with such activities as database manipulation, report generation, etc.; these are outside the scope of

this International Standard. Within each system, those aspects of the application-process which are pertinent to OSI are called the application-entity.

Each application-entity in turn includes one or more application-service-elements (ASEs), one of which is the ILL ASE. These ASEs provide communications-related services to the service-user. To do this they engage in protocol exchanges with peer application-entities in other systems and they take advantage of supporting services within the Application Layer and the layers below it. Relationships with other ASEs are defined as part of an application-context-definition. This is outside the scope of this International Standard.

The set of all ILL ASEs, supporting ASEs and the lower layer services across all systems together form the ILL service-provider.

### 6.1.1 Roles of the service-user

A service-user involved in ILL activity takes on one of three roles: requester, responder or intermediary.

The requester generates ILL requests.

The responder receives ILL requests and is the potential supplier of requested items.

The intermediary is a responder which does not itself satisfy an ILL request and which passes the request to another responder on behalf of the requester.

The actual supplier of requested items is normally a responder; however, the service model allows for institutions that do not receive ILL requests, as defined in this standard, to supply the requested items. For example, an institution that supports only postal and telephone ILL requests may have another institution that supports electronic ILL requests act as a responder on its behalf.



## 6.2 ILL-transaction

An ILL-transaction is a single, complete instance of the whole ILL cycle, including all of the actions, service primitives, and messages involved from the initial ILL-REQUEST until the cycle is concluded, as with the return of the requested material. The term “ILL-transaction” is used in this International Standard in its most general sense, and does not imply an atomic unit of work with the ACID properties of atomicity, consistency, isolation and durability, as applied to transactions in the OSI transaction processing model (ISO/IEC 10026-1).

ILL-transactions may overlap in time, i.e. multiple ILL-transactions may be processed concurrently by a given open system.

An ILL-transaction may be initiated only by a requester.

A sub-transaction refers to the set of communications activity involving an intermediary and a responder or another intermediary, and is related to an ILL-transaction initiated by a requester. A sub-transaction is not, in itself, an actual ILL-transaction.

A sub-transaction may be initiated only by an intermediary.

When an ILL-transaction involves three or more parties, the initial-requester is the party that generated the initial ILL-REQUEST. The final-responder is the last recipient of an ILL-REQUEST for that ILL-transaction.

Individual ILL-transactions may be related to each other, for example a succession of attempts by a requester to contact different responders directly. Such ILL-transactions form an ILL-transaction group. It is at the discretion of the initiator to determine whether such ILL-transactions are to be related explicitly through the ILL-transaction identifier; such grouping of ILL-transactions may be done for example to provide a historical record of the related steps associated with an interlibrary loan.

Each ILL-transaction has a unique ILL-transaction identifier that is used to identify the state and other descriptive information maintained by ILL-application-entities for that ILL-transaction. The ILL-transaction identifier has the following components:

— **initial-requester-id**: identification of the requester who initiated the ILL-transaction;

— **ILL-transaction-group-qualifier**: distinguishes a group of ILL-transactions from all other active ILL-transaction groups associated with the initial-requester;

— **ILL-transaction-qualifier**: distinguishes an ILL-transaction from all other ILL-transactions within an ILL-transaction group.

The ILL-transaction identifier of each sub-transaction has the following additional component, which is unique within, and only within, the scope of a single intermediary:

— **sub-transaction-qualifier**: distinguishes this sub-transaction from all other sub-transactions within an ILL-transaction initiated by the intermediary.

## 6.3 ILL-transaction types and topologies

There are three types of ILL-transactions: simple, chained and partitioned.

### 6.3.1 Simple ILL-transaction

A simple ILL-transaction involves two active parties: the requester and responder. In its most basic manifestation, the requester and responder interact in a point-to-point manner, as illustrated in Figure 1.



All ILL-transactions initiated by a requester begin as simple ILL-transactions. A requester may, however, indicate as part of the ILL request that the responder has permission to change the ILL-transaction-type to chained or partitioned. If the responder does change the type, this responder then becomes an intermediary.



When a responder is unable to respond successfully to a request, it may supply a list of potential responders to assist the requester.

### 6.3.2 Chained ILL-transaction

A chained ILL-transaction involves at least three parties: the requester, the responder and one or more intermediaries. An ILL request is passed from one intermediary (to another intermediary) to the responder in a chain, with each intermediary acting as a relay for all ILL messages. There is no direct interaction between the requester and responder.

The interactions between the requester and the first intermediary define the main ILL-transaction. The set of interactions between an intermediary and the responder constitute a sub-transaction, as do the interactions between each pair of intervening intermediaries. Figure 2 a) illustrates a chained ILL-transaction with two intermediaries (and hence two sub-transactions).

If a sub-transaction results in non-fulfillment of the ILL request, the intermediary may initiate a new sub-transaction to another responder. The intermediary may try several potential responders in turn. This leads to a star ILL-transaction topology with the intermediary as the hub, as illustrated in Figure 2 b).

The responder may supply a list of potential responders to the intermediary to assist it in making a selection.

The requested item could be delivered directly to the requester or client, or to one of the intermediaries who would then be responsible for delivering it to the requester or client.