BS ISO 10160:2015

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

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National foreword

This British Standard is the UK implementation of ISO 10160:2015. It supersedes BS ISO 10160:1997 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee IDT/2/7, Computer applications in Information and Documentation.

A list of organizations represented on this committee can be obtained on request to its secretary.

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INTERNATIONAL STANDARD

ISO 10160

Third edition
2015-05-01

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

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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.

INTERNATIONAL STANDARD ISO 10160:2015(E)

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

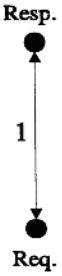
A chained ILL-transaction involves at least three parties: the requester, the responder and one or more intermediaries. An ILL request is passed from one intermediary (to another intermediary) to the responder in a chain, with each intermediary acting as a relay for all ILL messages. There is no direct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

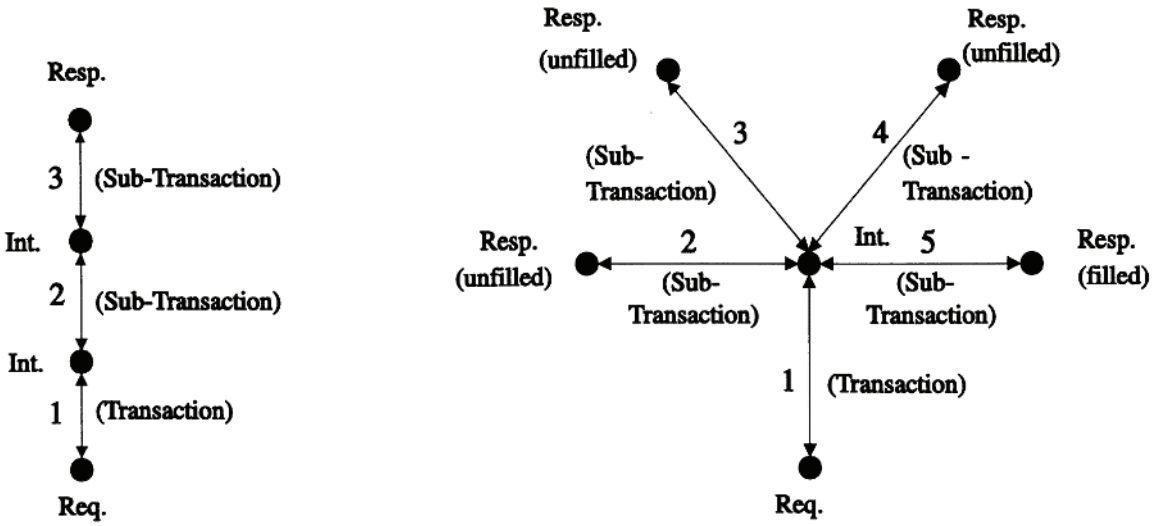
The requested item could be delivered directly to the requester or client, or to one of the intermediaries who would then be responsible for delivering it to the requester or client.



Key

Req.	requester	●	system
Resp.	responder	1,2,3...	order of interactions

Figure 1 — Simple transaction



a) Chained with two intermediaries **b) Star topology**

Key

Req.	requester	●	system
Resp.	responder	1,2,3...	order of interactions
Int.	intermediary		

Figure 2 — Chained transactions

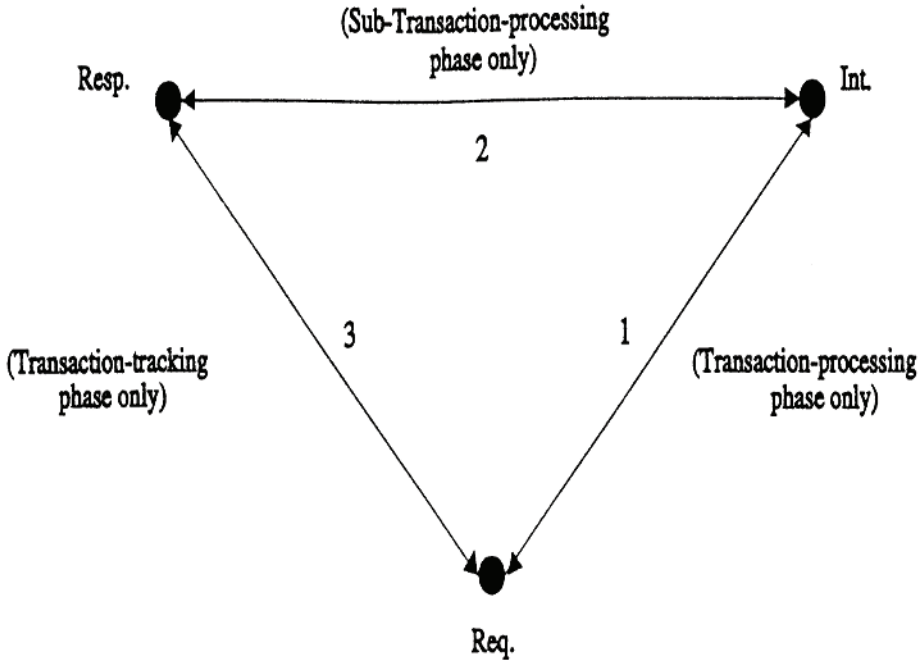
The requester can allow or prohibit chaining and can specify, if desired, a list of potential responders to which a request might be chained. It can also supply a list of responders which have already been tried, so that unnecessary duplication of ILL requests does not occur.

6.3.3 Partitioned ILL-transaction

A partitioned ILL-transaction involves at least three parties: the requester, the responder, and one or more intermediaries. An ILL request is passed from the intermediary to the responder who responds to the intermediary, who then responds to the requester. After the desired item has been shipped and the requester has received notification that it has been shipped, all further interactions take place directly between the requester and responder; the intermediary no longer participates in the ILL-transaction. Figure 3 illustrates a partitioned ILL-transaction.

Partitioned ILL-transactions are useful in situations where the intermediary acts as an agent of the requester to find a suitable responder but has no interest in participating any further in an ILL-transaction. This is typical of some union catalogue facilities.

A partitioned ILL-transaction is divided into two phases. The first phase, the "processing phase", consists of interactions between the requester and the responder via the intermediary or intermediaries. During this phase, the sets of interactions between intermediaries and between the intermediary and a responder constitute sub-transactions. The second phase of the main ILL-transaction, the "tracking phase", consists of the direct interactions between the requester and responder. It is used for monitoring the progress of the loaned item, including recalls, renewals, overdues, etc. ILL-transaction phases are described more fully in 6.4.5.



Key

Req.	requester	●	system
Resp.	responder	1,2,3…	order of interactions
Int.	intermediary		

Figure 3 — Partitioned transaction

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

The requester can allow or prohibit partitioning and can specify, if desired, a list of potential responders to which a request might be sent. It can also supply a list of responders which have already been tried, so that unnecessary duplication of ILL requests does not occur.

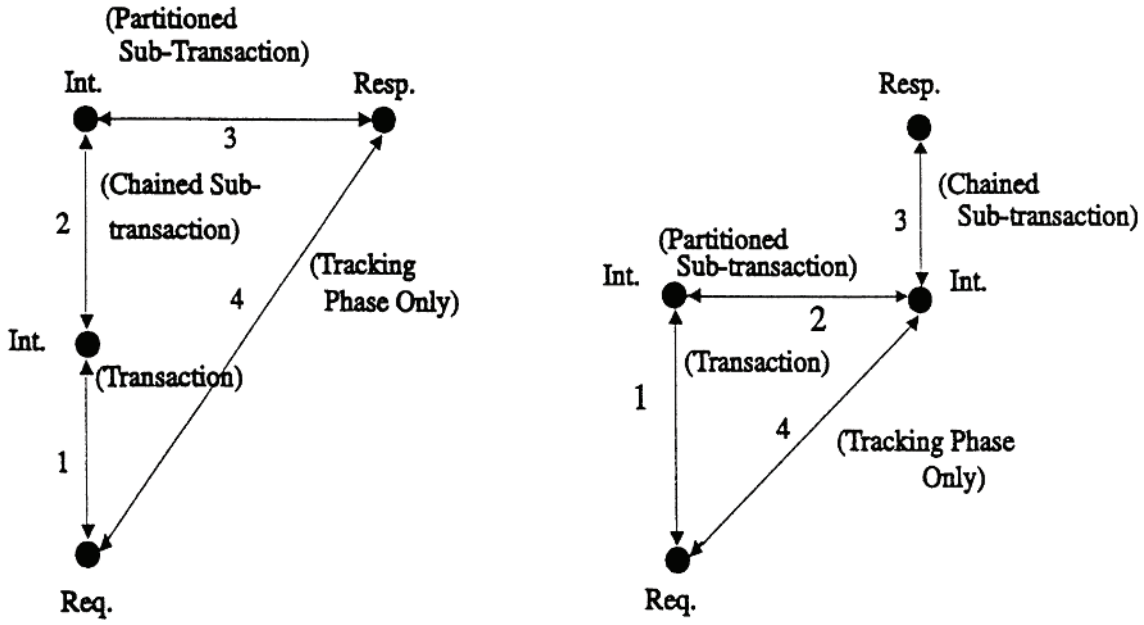
When a responder is unable to respond successfully to a request, it may supply a list of potential responders to assist the requester.

Partitioning and chaining may be mixed within the same ILL-transaction, as illustrated in Figure 4. Note that when partitioning occurs after chaining, as shown in Figure 4 a), it overrides chaining, the effect being the same as multiple instances of partitioning. However, if chaining follows partitioning, then the chaining effect is preserved.

6.3.4 Distinct ILL-transactions

The preceding descriptions of chained and partitioned ILL-transactions imply that the intermediary plays only a relay role during the tracking phase, i.e. it does not invoke any services such as OVERDUE on its own initiative.

The ILL service model also allows a potential intermediary to instead play an active role during the processing phase of ILL-transactions, and exert control over all phases of an ILL-transaction by establishing distinct ILL-transactions for its interactions with the requester and with the responder. A system which receives an ILL request may act as a final responder (from the viewpoint of the intial requester), and act as an initial requester in a second transaction which it initiates with the final responder. These distinct transactions are not required to share any common identification and need not proceed in a synchronized fashion. All linkage between events on one ILL-transaction and events on the other is at the discretion and under the control of the dual-role system. This permits the dual-role system, for example, to initiate an OVERDUE request without having received an OVERDUE indication from the responder.



a) Chained then partitioned **b) Partitioned then chained**

Key

Req.	requester	●	system
Resp.	responder	1,2,3…	order of interactions
Int.	intermediary		

Figure 4 — Mix of chaining and partitioning

The one constraint on the use of distinct ILL-transactions is that all items supplied by a final-responder must be shipped and returned via the dual-role system. This ensures that the dual-role system is able to track the progress of the two ILL-transactions and can reach terminal states.

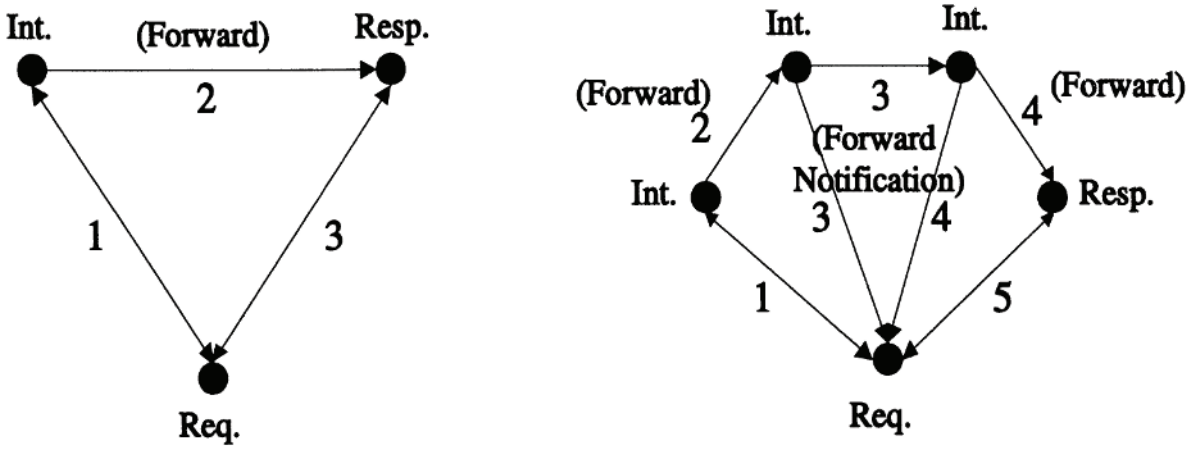
This style of operation, since it involves two distinct simple ILL-transactions, has no protocol implications, and is not described further in this International Standard.

6.3.5 Forwarding

A variation of the simple ILL-transaction involves an intermediary who forwards an ILL request to a responder and then ceases to participate actively in the ILL-transaction. The responder receiving the forwarded request responds directly to the requester. The intermediary notifies the requester when forwarding occurs. Figure 5 a) shows the simplest case of forwarding involving only one intermediary. Figure 5 b) shows the case where multiple instances of forwarding occur.

The requester can allow or prohibit forwarding and can specify, if desired, a list of potential responders to which a request might be forwarded. It can also supply a list of responders which have already been tried, so that unnecessary duplication of ILL requests does not occur.

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



a) One instance of forwarding **b) Multiple instances of forwarding**

Key

Req.	requester	●	system
Resp.	responder	1,2,3...	order of interactions
Int.	intermediary		

Figure 5 — Simple transaction with forwarding

Chaining and forwarding may be mixed within the same ILL-transaction, as illustrated in Figure 6 a) and Figure 6 b).

Partitioning and forwarding also may be mixed within the same ILL-transaction, as illustrated in Figure 7 a) and Figure 7 b).

6.3.6 Referrals

When an ILL request is unfilled, the requester may choose to refer the request to another responder, as illustrated in Figure 8. Each request referral is considered to be a separate ILL-transaction which is part of the same ILL-transaction group.

As an implementation consideration, this request referral could be performed manually or automatically.

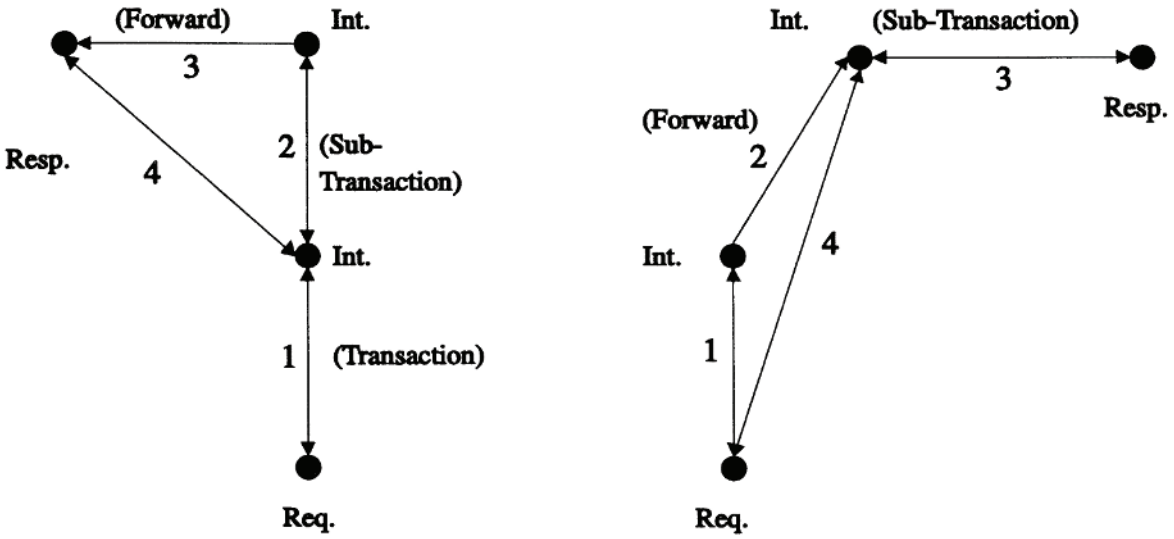
6.3.7 Retries

When an ILL request is unfilled with a reason such as RETRY, ESTIMATE or LOCATIONS-PROVIDED, the ILL-transaction or sub-transaction terminates. The requester or intermediary may choose to retry the

original request at an appropriate time or to look elsewhere. If the original request is repeated, it carries an indication that this is a retry. The retry is a new transaction or sub-transaction which should form part of the same ILL-transaction group as the original request.

For the initial requester a retry is a new ILL-transaction and so the ILL-transaction-qualifier must be different from that used in the original request but the ILL-transaction-group-qualifier must be the same (to enable the responder or intermediary to relate the retry to the previous ILL-transaction).

For an intermediary a retry is a new sub-transaction and so the sub-transaction-qualifier must be different from that used in the previous request, but both the ILL-transaction-group-qualifier and the ILL-transaction-qualifier must be the same (to enable the responder or next intermediary to relate the retry to the previous sub-transaction).

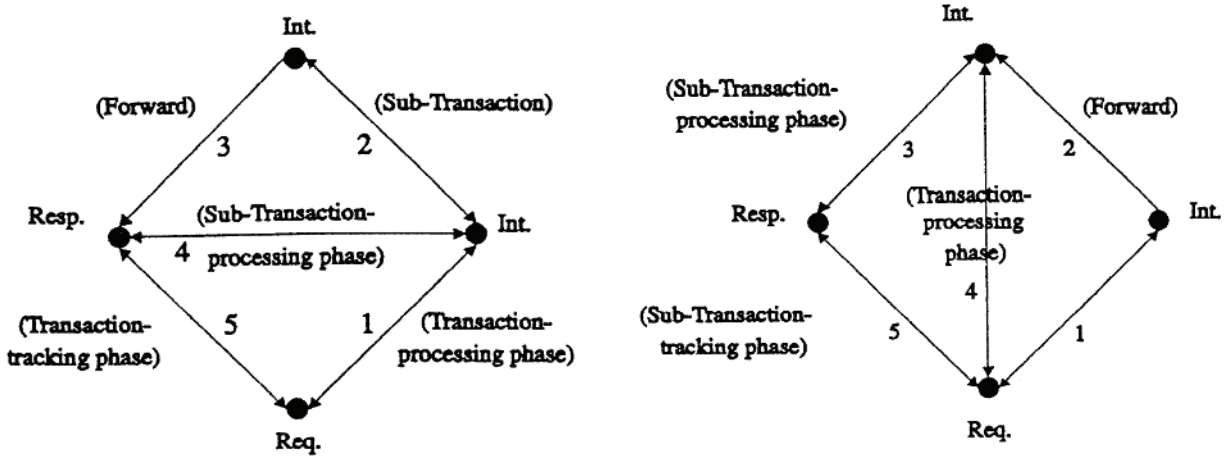


a) Chained then forwarded **b) Forwarded then chained**

Key

Req.	requester	●	system
Resp.	responder	1,2,3…	order of interactions
Int.	intermediary		

Figure 6 — Chained transaction with forwarding

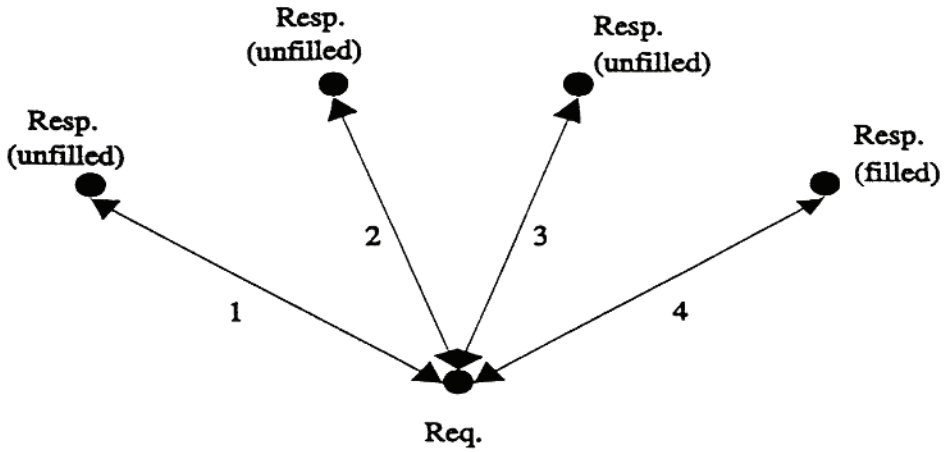


a) Partitioned then forwarded **b) Forwarded then partitioned**

Key

Req.	requester	●	system
Resp.	responder	1,2,3...	order of interactions
Int.	intermediary		

Figure 7 — Partitioned transaction with forwarding



Key

Req.	requester	●	system
Resp.	responder	1,2,3...	order of interactions

Figure 8 — Transaction referrals

6.4 ILL-transaction state

At any given time, the possible interactions that can occur between an ILL service-user and service-provider are governed by the state of the ILL-transaction.

The ILL-transaction state, i.e. the information which describes the status of processing of an ILL-transaction, is the combination of the requester state, the responder state and the states of all intermediaries involved

in the ILL-transaction, where the requester, responder and intermediary states correspond to the ILL-transaction representation held by the application-entities within these end-systems.

Due to a requirement to support systems with reduced functionality or where telecommunications costs must be minimized, the ILL protocol supports optional messages. This means that for certain interactions, i.e. SHIPPED request, RECEIVED request, RETURNED request and CHECKED-IN request, the sending of a message is optional and, therefore a service event in one system may not result in a corresponding event in the peer system.

The state of one application-entity in an ILL-transaction cannot necessarily be inferred from the state of the other application-entity. However, services are available (i.e. the STATUS-QUERY and STATUS-OR-ERROR-REPORT services) for obtaining the current state of the other application-entity. It is never necessary for one application-entity to know the state of the other application-entity in order to determine what action is allowable. In effect, the global ILL-transaction state plays no role in controlling the behaviour of an individual end-system; only the local representation of the ILL-transaction state is significant.

Note that although the sending of messages may be optional for some services, the services themselves are carried out because the local system makes the corresponding state change (for example, when an item is received, the local system enters the RECEIVED state). This is necessary in order to maintain and control a logical sequence of events for an ILL-transaction.

6.4.1 Requester-state

The requester state is the state of processing of an ILL-transaction at the requester. It may be one of the following:

IDLE	The ILL-transaction has not started.
PENDING	A request has been made and the item is expected from the responder; or a message has been received stating that the item will be supplied or has been placed on hold; or that the request has been forwarded to another institution.
NOT-SUPPLIED	The ILL-transaction has reached a stage where the request cannot be filled by the responder.
CONDITIONAL	The ILL-transaction has reached a stage where the request can only be filled if the requester agrees to meet specified conditions.
CANCEL-PENDING	The requester has initiated cancellation of the ILL-transaction but no response has been received from the responder.
CANCELLED	The ILL-transaction has been cancelled by the responder.
SHIPPED	The item has been shipped to the requester.
RECEIVED	The item has been received from the responder.
RENEW/PENDING	A request has been made for the renewal of the item.
RENEW/OVERDUE	A request has been made for the renewal of an item which is overdue.
OVERDUE	The requester has been notified that the item is overdue.
NOT RECEIVED/ OVERDUE	The responder has sent an overdue notification for an item that has not yet been received.
RECALL	The item has been recalled by the responder.
RETURNED	The item has been shipped back to the responder.
LOST	The item has been lost.

6.4.2 Responder state

The responder state is the state of processing of an ILL-transaction at the responder. It may be one of the following:

IDLE	The responder has not received a request.
IN-PROCESS	A request has been received and is being processed by the responder; the item has not been shipped.
FORWARD	The request has been forwarded to another institution.
NOT-SUPPLIED	The responder has responded to a request with an ILL-ANSWER of RETRY, UNFILLED, LOCATIONS-PROVIDED or ESTIMATE; or the ILL-transaction has expired.
CONDITIONAL	The request can only be filled if the requester agrees to meet specified conditions.
CANCEL-PENDING	The requester has initiated cancellation of the ILL-transaction but no response has been provided by the responder.
CANCELLED	The ILL-transaction has been cancelled by the responder.
SHIPPED	The item has been shipped to the requester.
RENEW/PENDING	A request has been made for the renewal of the item.
RENEW/OVERDUE	A request has been made for the renewal of an item which is overdue.
OVERDUE	The responder has informed the requester that the item is overdue.
RECALL	The item has been recalled by the responder.
CHECKED-IN	The item has been received back from the requester.
LOST	The item has been lost.

NOTE The states defined here are those which are meaningful in the OSI environment, i.e. are meaningful to more than one end system. Any implementation may have more information and states than are defined in this International Standard. For example, if a responder wished to differentiate between items which had not been renewed and items which had been renewed, then it could have the local states SHIPPED and RENEWED, which both would correspond to the service state SHIPPED. The remote site is not aware that the local implementation has expanded the single SHIPPED state into two local states for the purpose of enhanced local ILL-transaction control. Status reports only provide state values that are defined in this standard.

6.4.3 Terminal states

For the requester, responder and intermediary, there are certain states which, when reached, will not result in any further transitions for a given ILL-transaction. Such states are known as terminal states.

An ILL-transaction would normally be maintained in a terminal state for a certain length of time before the ILL-transaction information is made inaccessible to a peer or is deleted. This length of time is a local management decision, or subject to agreement by implementors. Note, however, that the requirement to respond to a Status-Query request, and the requirement of 6.4.4 to relay messages suggests that this length of time may have to be sufficient to allow the information to remain accessible for the maximum loan period plus renewal periods and delivery time. For non-returnable items this length of time may have to be sufficient to allow the requester to determine that an expected item will not be received and to invoke the Status-Query or Lost services.

The possible terminal states for the requester are:

— NOT-SUPPLIED

— CANCELLED

— RECEIVED (if a non-returnable item is received)

— RETURNED

— LOST

The possible terminal states for the responder are:

— NOT-SUPPLIED

— CANCELLED

— FORWARD

— SHIPPED (if a non-returnable item is shipped)

— CHECKED-IN

— LOST

The possible terminal states for the intermediary are:

— NOT-SUPPLIED

— FORWARD

— CANCELLED

— SHIPPED

The terminal state for a particular ILL-transaction will depend on its circumstances. For example, when a photocopy is provided, SHIPPED is the terminal state for the responder, while RECEIVED is the terminal state for the requester.

6.4.4 Intermediary states

An intermediary involved in a chained or partitioned ILL-transaction plays both the role of responder (in its interactions with the requester) and requester (in its interactions with the responder). It maintains separate state information for each of these sets of interactions.

In the role of requester, the terminal state for an intermediary is the SHIPPED state. In the role of responder, the terminal state is also the SHIPPED state. This state is terminal because of the possibility that no further messages will be received to cause any subsequent transitions.

In order to ensure that the SHIPPED state is reached within the intermediary, the SHIPPED message is mandatory for a chained or partitioned ILL-transaction.

In a chained ILL-transaction, once the intermediary is in a terminal state, it merely passes on to the requester messages received from the responder, and to the responder messages received from the requester.

6.4.5 ILL-transaction phases

An ILL-transaction can have two phases: processing and tracking. The processing phase is mandatory for all ILL-transactions while the tracking phase is applicable only to ILL-transactions where a returnable item, e.g. a monograph, is supplied.

The processing phase for the requester includes all events and actions up to and including the receipt of the requested item. This phase normally terminates in the RECEIVED state.

The processing phase for the responder includes all events and actions up to and including the shipping of the requested item. This phase normally terminates in the SHIPPED state.

For the intermediary requester, the processing phase includes all events and actions up to and including receipt of the SHIPPED indication; for the intermediary responder the processing phase includes all events up to and including issuing the SHIPPED request. For both the intermediary requester and responder, the processing phase normally terminates in the SHIPPED state.

The tracking phase includes all events and actions after shipping and receipt of a returnable item, including renewals, overdues and item return.

7 Definition of services

7.1 Service features

7.1.1 General

The interaction between application-entities participating in an ILL-transaction is modelled in terms of invocation of services provided by an ILL application-service-element (e.g. requesting an item, shipping an item).

This clause provides a brief description of the ILL services, in preparation for the formal definition of services in 7.3.

7.1.2 ILL Requests

This service permits a user to request an item from an institution. If the item cannot be provided, the responder may simply respond negatively, forward the request to another institution, or initiate a chained or partitioned sub-transaction to another responder. Chained or partitioned sub-transactions are initiated by invoking an ILL request with a transaction identifier derived from the original ILL-transaction identifier.

Information supplied by the requester includes item identification information, such as the author and title, when the item is needed and by whom, the destination, and whether the item itself or a photocopy is desired.

This service also permits the requester to request a cost estimate for providing the item, the locations of an item or that a hold be placed on an item if it is not immediately available.

The requester can also control the use of forwarding, chaining and partitioning, as well as provide lists of the potential responders to which a request might be sent and the responders which have already been contacted.

This service also permits the requester to request the delivery of the item by electronic means.

7.1.3 Request Forwarding

This service allows a responder to forward a request on to another institution selected by the responder or supplied by the requester.

This service is used instead of an ILL-ANSWER in response to a received ILL-REQUEST. Once forwarding has been accomplished, the responder does not participate any further in the ILL-transaction in the sense that it does not change state. However, certain services, i.e. Status Query, Status-or-Error Report and Message, may still be used.

The responder to which a request is forwarded may respond to the requester or forward the request to another institution, if allowed.

Normally a responder would forward a request because it is providing a service to the requester. For example, a local library sends in a request to a regional library; the regional library, if it cannot supply the item, determines the locations of the requested item, and then forwards the request on to the library holding the item. The intermediary (the regional library) then withdraws from the ILL-transaction and all messages are sent directly between the original requester (the local library) and the library to which the request was forwarded.

This service can be inhibited if the requester has so requested in its ILL-REQUEST.

7.1.4 Forwarding Notification

This service allows an intermediary to notify the requester that an ILL request has been forwarded and to which responder.

7.1.5 Shipment

This service optionally allows the responder to indicate that a requested item has been shipped. This service optionally allows the responder to indicate that an electronic version of the item has been shipped via the same or a different communications service.

7.1.6 ILL Answer

This service permits a responder to reply to a received ILL request.

The following responses to the request are possible:

— CONDITIONAL: the desired item is available but the request can only be satisfied if the requester agrees to certain lending, delivery or intellectual property conditions stated in the response.

— RETRY: the desired item is not currently available, but a date indicating when the item might become available is specified.

— UNFILLED: the desired item is unavailable or cannot be shipped via the delivery service and/or at the time required by the requester.

— LOCATIONS-PROVIDED: locations of libraries having the item are provided.

— WILL-SUPPLY: the requested item is available and will be shipped when possible. A delivery service and/or an approximate time when the item will be supplied is optionally specified.

— HOLD PLACED: the desired item is not immediately available, but has been put on hold for the requester, as per their instruction.

— ESTIMATE: the estimated cost of supplying the desired item is provided in response to an estimate request.

7.1.7 Conditional Reply

This service allows a requester to respond with an indication of acceptance or rejection of the imposed conditions when an ILL request is answered with a status of CONDITIONAL. If the requester's response is affirmative, the ILL request is processed further by the responder. If the response is negative, the item is not supplied and the ILL-transaction terminates.

7.1.8 Cancellation

This service allows a requester to initiate cancellation of an ILL-transaction.

7.1.9 Cancellation Reply

This service allows a responder to accept or refuse a request to cancel an ILL-transaction. If it is accepted, the ILL-transaction is terminated.

7.1.10 Receipt

This service allows a requester to indicate that a requested item has been received.

7.1.11 Recall

This service is used when a responder wishes to have an item returned immediately. A request to renew the item is not permitted.

7.1.12 Return

This service allows a requester to indicate that a loaned item has been returned to the responder.

7.1.13 Check-in

This service allows a responder to indicate that a loaned item has been received back from the requester.

7.1.14 Overdue

This service allows a responder to notify the requester that an item is overdue when the due date for that item is reached. This action may be triggered automatically by the responder's system, or it may be triggered manually by a person at the responder site. The requester is expected to return the borrowed item or request a renewal.

7.1.15 Renewal

This service allows a requester to request a renewal of a loan.

7.1.16 Renew Answer

This service allows a responder to accept or refuse a renew request. If it is accepted, the responder also specifies the new due date.

7.1.17 Lost Notification

This service is used if a borrowed item is lost, either by a requester (or one of its clients) or in transit. This service is intended to be invoked only if the item is truly lost. If the item is only suspected of being lost, then the MESSAGE service should be used to inform the other party.

7.1.18 Damaged Notification

This service is used if a borrowed item is damaged, either by a requester (or one of its clients) or in transit. The ILL-transaction participant discovering the damage should immediately inform the other participant.

7.1.19 Message

This general purpose service permits ILL users to send free-form text messages at any time for an existing ILL-transaction. Such messages may be used for a variety of purposes and would generally serve to exchange information not normally conveyed by other services.

7.1.20 Status Query

This service allows the user to determine the current status of an ILL-transaction. This is particularly helpful in situations where the ILL-transaction state within one system changes without any corresponding change in the peer system. This service permits the user to query the status of the remote system at any time and to take appropriate action as desired, (e.g. cancel or follow up on the ILL-transaction).

7.1.21 Status-or-Error Report

This service allows the user to supply status and/or error information to the peer user. Status information may be provided at any time or in response to a status query. The current state of the ILL-transaction, as well as other pertinent information, is included in the status report.

An error report may be initiated by the service-user or by the service-provider to reject a request when a problem has been detected.

7.1.22 Expiry

This service allows the service-provider to notify the service-users of ILL-transaction expiry.

7.2 Specification method and notation

This clause contains a definition of the ILL services using the service conventions of ISO/IEC 10731. The specification method provides an abstract, implementation-independent definition of the ILL services in terms of:

a) the primitive events of each service, called service primitives;

b) the parameter information associated with each service primitive; and

c) the relationship between, and the valid sequences of these events.

It should be stressed that this definition is in terms of a conceptual interface only. Therefore, the services are described only in an abstract way without any particular syntax.

The meaning of the primitive parameters is stated but no detailed syntactic representations of their data elements or values are specified, nor is the parameter ordering specified.

Table 1 — Mapping of service features to services

SERVICE FEATURE	SERVICE	TYPE	MSG
ILL Request	ILL-REQUEST	non-confirmed	M
Request Forwarding	FORWARD	non-confirmed	M
Forwarding Notification	FORWARD-NOTIFICATION	provider-initiated	M
Shipment	SHIPPED	non-confirmed	U
ILL Answer	ILL-ANSWER	non-confirmed	M
Conditional Reply	CONDITIONAL-REPLY	non-confirmed	M
Cancellation	CANCEL	non-confirmed	M
Cancellation Reply	CANCEL-REPLY	non-confirmed	M
Receipt	RECEIVED	non-confirmed	U
Recall	RECALL	non-confirmed	M
MSG Protocol Message M Mandatory U User Option			

Table 1 *(continued)*

SERVICE FEATURE	SERVICE	TYPE	MSG
Return	RETURNED	non-confirmed	U
Check-in	CHECKED-IN	non-confirmed	U
Overdue	OVERDUE	non-confirmed	M
Renewal	RENEW	non-confirmed	M
Renew Answer	RENEW-ANSWER	non-confirmed	M
Lost Notification	LOST	non-confirmed	M
Damaged Notification	DAMAGED	non-confirmed	M
Message	MESSAGE	non-confirmed	M
Status Query	STATUS-QUERY	non-confirmed	M
Status-or-Error Report	STATUS-OR-ERROR-REPORT	non-confirmed	M
Expiry	EXPIRY	provider-initiated	M

MSG Protocol Message

M Mandatory

U User Option

7.3 ILL services

The types of services that are used are of type non-confirmed or provider-initiated.

Table 1 lists the service features and the name and type of the corresponding services. It also indicates whether the non-confirmed-services have mandatory (M) or optional (U) messages.

For services which are of type non-confirmed, the corresponding protocol message may be mandatory or optional. A mandatory message is one that is always issued as a result of a request primitive. An optional message is one that may or may not be sent following a request primitive. An application-entity may send optional messages whenever it wants to, and in addition is obliged to send them in certain situations.

The initiator of an ILL-transaction can inform the responder of what it is capable of supplying and what it requires in the way of optional messages within the ILL-REQUEST.

The ILL-REQUEST can specify:

a) Whether the requester is capable of sending RECEIVED.

b) Whether the requester is capable of sending RETURNED.

c) Whether the requester requires SHIPPED.

d) Whether the requester requires CHECKED-IN.

e) Whether the requester desires SHIPPED; this choice is meaningful only if choice c. above is NO.

f) Whether the requester desires CHECKED-IN; this choice is meaningful only if choice d. above is NO.

Correspondingly, the ILL-ANSWER and the SHIPPED can specify:

1) Whether the responder is capable of sending SHIPPED; this is of significance only in the context of the ILL-ANSWER service; in the SHIPPED service it is self-evident.

2) Whether the responder is capable of sending CHECKED-IN.

3) Whether the responder requires RECEIVED.

4) Whether the responder requires RETURNED.

5) Whether the responder desires RECEIVED; this choice is meaningful only if choice c. above is NO.

6) Whether the responder desires RETURNED; this choice is meaningful only if choice d. above is NO.

When a responder receives an ILL-REQUEST that indicates either:

— that the requester cannot send a message that the responder requires, or

— that the requester requires a message that the responder cannot send,

then the responder may send an ILL-ANSWER — UNFILLED. If a responder chooses to supply the requested item, it does so on the understanding that the RECEIVED and RETURNED messages will not be sent. In all cases where a message is not required, it may or may not be sent, whether or not it is desired.

For chained and partitioned ILL-transactions, the SHIPPED message must be sent by the final-responder to the intermediary. The receipt of the SHIPPED message by the intermediary is necessary to enable the intermediary to close the processing phase of the ILL-transaction within its own state machine.

Control over the sending of optional messages is modelled in terms of the service parameter "send message". This parameter is not conveyed end to end, but is used by the local application-entity in determining whether an optional message is sent.

The ILL-transaction identification provided at the time of the request, will remain in effect for the lifetime of the transaction, and will serve to identify that ILL-transaction unambiguously.

A particular ILL-transaction identification should not be reused after completion of an ILL-transaction until the probability of confusion between new and old ILL-transactions becomes acceptably low. This length of time is not specified in this International Standard, as it is dependent on implementation considerations.

For each service contained in 7.3, the associated parameters are listed; each parameter in turn may consist of many data elements. Note that parameters are always the same for both request (Req) and indication (Ind) primitives. Parameters are either mandatory (M), user option (U), conditional (C) or not applicable (-).

A conditional parameter is one which is mandatory under certain circumstances and optional otherwise. The circumstances under which conditional parameters become mandatory are specified as part of the definition of each service. A parameter that is not applicable is one which is not associated with a particular service primitive but does apply to a different primitive of the same service. For each service, a description of the associated parameters is included.

7.3.1 ILL-REQUEST service

7.3.1.1 Function

This service is used by the requester in all ILL-transactions to request the loan or supply of a non-returnable copy of an item or a component part of an item from an institution. A copy may be represented on a physical medium or it may be transmitted in electronic format. If the item is held by the responder, it may issue an ILL-ANSWER — CONDITIONAL or an ILL-ANSWER — RETRY, or it may choose to supply the item, in which case it may issue a SHIPPED or an ILL-ANSWER — WILL SUPPLY. If the responder does not have the item or chooses not to supply it, it has the options of: forwarding the request to another responder (if forwarding is allowed by the requester); initiating a chained or partitioned sub-transaction with another responder (if this is allowed by the requester); providing locations of the item to the requester; or simply returning an ILL-ANSWER — NOT-SUPPLIED.

The requester can request a cost estimate for providing the item, or that a hold be placed on an item if it is not immediately available. The requester can also specify its requirements regarding the receipt of the SHIPPED and CHECKED-IN messages, and its capabilities regarding the provision of RECEIVED and RETURNED messages.

The ILL-REQUEST indication service primitive may also occur as a result of the FORWARD service (see 7.3.2). Two of the ILL-REQUEST indication parameters, forward flag and forward note, are present only when a request has been forwarded.

7.3.1.2 Parameters

PARAMETER NAME	Req	Ind
transaction identification	M	M
service date and time	M	M
requester identification	C	C
responder identification	C	C
transaction type	U	U
delivery address	U	U
delivery service	U	U
billing address	U	U
ILL service type	M	M
responder-specific service	U	U
requester optional messages	M	M
search type	U	U
supply medium information	U	U
place on hold	U	U
client identification	U	U
item identification	M	M
supplemental item description	U	U
cost information	U	U
copyright compliance	U	U
third party information	C	C
retry flag	U	U
forward flag	-	U
requester note	U	U
forward note	-	U
NOTE This service request always results in a corresponding indication.		

7.3.1.2.1 Transaction Identification

Information which uniquely identifies an ILL-transaction or, within the scope of a single intermediary, a sub-transaction. It includes the following components:

— initial-requester identification;

— an ILL-transaction group qualifier for related transactions;

— an ILL-transaction qualifier for all messages relating to the ILL-transaction;

— a sub-transaction qualifier if it is a sub-transaction.

The initial-requester identification, ILL-transaction qualifier and ILL-transaction group qualifier may be supplied by the requester; the initial-requester identification and sub-transaction qualifier may be supplied by an intermediary.

7.3.1.2.2 Service Date and Time

The date and time at which a service is invoked. It has two components:

— the date and time at which the current service is invoked (mandatory);

— the date and time at which the original service was invoked (optional).

The optional component serves to identify repeated service requests (see Clause 8).

7.3.1.2.3 Requester Identification

Information identifying the requester (in a chained or partitioned ILL-transaction it identifies the intermediary that initiated the sub-transaction). It includes one or more of the following components:

— person-or-institution-symbol;

— name-of-person-or-institution.

This identification must be unambiguous within the domain of interworking, e.g. within a country.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.1.2.4 Responder Identification

Information identifying the responder. It has the same components as requester identification (see 7.3.1.2.3).

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.1.2.5 Transaction Type

Identifies the type of ILL-transaction. It takes on the following symbolic values:

— simple (i.e.two-party);

— chained;

— partitioned.

7.3.1.2.6 Delivery Address

The postal or electronic address to which the requested item is to be delivered.

The postal address has one or more of the following components:

— name-of-person-or-institution;

— extended-postal-delivery-address;

— street-and-number;

— post-office-box;

— city;

— region;

— country;

— postal-code.

The electronic or system address has one or more of the following components:

— telecom-service-identifier;

— telecom-service-address.

The telecom-service-identifier distinguishes the electronic telecommunications service from among those at the disposal of the requester and responder. It may be left blank if the telecom-service-address is unambiguous. The telecom-service-address identifies the specific address for the identified telecom-service. It pertains to the delivery of the requested item and is not to be confused with the address used for ILL communication.

7.3.1.2.7 Delivery Service

Identification of the delivery service or method to be used in transporting a requested item. If electronic delivery of the item is required or desired, this parameter may be a list of the electronic delivery services supported, in order of preference. Any document type and telecommunication service may be included in this list and subsequently used to deliver a document electronically.

For electronic delivery, the parameter contains a machine-processable identification of the required delivery service and document type and/or a human-readable name or description of the required delivery service and document type. The parameter may also contain a name or code for the delivered document to allow it to be correlated with the ILL-transaction.

7.3.1.2.8 Billing Address

The postal or electronic address to which the invoice is to be delivered. The components are the same as for the delivery address (see 7.3.1.2.6).

7.3.1.2.9 ILL Service Type

An indication of the type of interlibrary loan service required. This parameter may be a list of services entered in sequence of preference. The following services are supported:

— loan;

— copy/non-returnable;

— locations only;

— estimate;

— responder-specific.

7.3.1.2.10 Responder-Specific Service

A type of service provided by a responder that is specific to the responder, i.e. not specified in this standard.

7.3.1.2.11 Requester Optional Messages

Specifies whether the requester is capable of supplying the RECEIVED and RETURNED optional messages and whether the SHIPPED and/or CHECKED-IN messages are required or desired from the responder.

7.3.1.2.12 Search Type

Specifies the search requirements. It consists of one or more of the following components:

— level of service;

— need-before-date;

— expiry-flag;

— expiry-date.

7.3.1.2.13 Supply Medium Information

Information describing the desired characteristics of the medium in which the item is to be supplied. This may be list of media in sequence of preference. The following media are supported:

— printed;

— photocopy;

— microform;

— film or video-recording;

— audio-recording;

— machine-readable;

— other.

7.3.1.2.14 Place on Hold

An indication by the requester that the requested item be put on hold if not immediately available for loan.

7.3.1.2.15 Client Identification

Information describing the client (person or institution) for whom the item is being requested. It includes one or more of the following components:

— client name;

— client status;

— client identifier.

7.3.1.2.16 Item Identification

Includes all the bibliographic information supplied by the requester to describe the required item. It includes one or more of the following components:

— item type, whether monograph, serial or other;

— held medium type; the format of the item believed to be owned by the responder, i.e. printed, microform, film or videorecording, audiorecording, machine readable or other;

— call number;

— author;

— title;

— sub-title;

— sponsoring body;

— place of publication;

— publisher;

— series title or number;

— volume and issue;

— edition;

— publication date;

— publication date of component;

— author of article;

— title of article;

— pagination;

— national bibliography number;

— ISBN;

— ISSN;

— system number;

— additional numbers or letters;

— verification and/or reference source.

7.3.1.2.17 Supplemental Item Description

Additional information describing the item which may be represented in machine readable format, e.g. MARC record. This may be provided by the initial requester or added later by a responder or by an intermediary (e.g. as a result of bibliographic checking).

7.3.1.2.18 Cost Information

Cost-related information, including one or more of the following components:

— account number of the requester;

— the maximum cost that is acceptable;

— the existence of a reciprocal cost agreement;

— the willingness to pay a fee;

— an indication that payment is provided.

7.3.1.2.19 Copyright Compliance

Requester notation indicating the applicable copyright regulations or laws to which the requester is adhering.

7.3.1.2.20 Third-Party Information

Information relevant to ILL-transactions involving more than two parties, e.g. information relevant to forwarding, chaining and partitioning. It includes one or more of the following components:

— permission to forward;

— permission to chain;

— permission to partition;

— permission to change the list of potential responders;

— initial-requester address;

— an indication whether the send-to list is in order of preference or not;

— the list of potential responders (the send-to list, see 7.3.5.2.9);

— the list of responders already tried (the already-tried-list, see 7.3.5.2.10).

Use of this parameter is mandatory when initiating an ILL-REQUEST service for a partitioned ILL sub-transaction. It is also mandatory when initiating an ILL-REQUEST service for an ILL sub-transaction if the received ILL-REQUEST included an already-tried list. Otherwise its use is optional.

7.3.1.2.21 Retry Flag

Requester indication that the ILL-transaction or sub-transaction is or is not a retry of a previous one.

7.3.1.2.22 Forward Flag

Indication generated by the service-provider denoting whether a received ILL-REQUEST has been forwarded from an intermediary.

7.3.1.2.23 Requester Note

Additional information supplied by the requester that is not provided elsewhere in the service primitive.

7.3.1.2.24 Forward Note

Additional information supplied by an intermediary upon forwarding the request. This parameter is not present on the service request, only on the indication.

7.3.2 FORWARD Service

7.3.2.1 Function

This service is used by the responder to forward an unfilled ILL-REQUEST to another institution (if forwarding is allowed by the requester). The choice of new responder may be determined by the contents of the "send-to-list", if provided by the requester, or by the responder in the absence of such a list. The responder which initiates the FORWARD service becomes an intermediary and enters the terminal state FORWARD. The requester receives a FORWARD-NOTIFICATION indicating that the request has been forwarded, and to whom. The new responder receives an ILL-REQUEST indication with the forward flag set to TRUE. The forwarding intermediary may supply additional information that is provided to both the requester and the new responder.

FORWARD is a terminal state for the responder which then takes on the role of intermediary. The FORWARD, STATUS-QUERY, STATUS-OR-ERROR-REPORT and MESSAGE services can still be invoked in the FORWARD state. All other services are illegal. A FORWARD request may be invoked after an ILL-ANSWER request with response WILL SUPPLY or HOLD PLACED.

All service parameters are the same as the ILL-REQUEST service, with the exception of the "forward note" and "notification note".

7.3.2.2 Parameters

PARAMETER NAME	Req
transaction identification	M
service date and time	M
NOTE This service request always results in a corresponding indication.	

PARAMETER NAME	Req
requester identification	C
responder identification	M
transaction type	U
delivery address	U
delivery service	U
billing address	U
ILL service type	M
responder-specific service	U
requester-optional messages	M
search type	U
supply medium information	U
place on hold	U
client identification	U
item identification	M
supplemental item description	U
cost information	U
copyright compliance	U
third party information	M
retry flag	U
requester note	U
forward note	U
notification note	U
NOTE This service request always results in a corresponding indication.	

7.3.2.2.1 Responder Identification

Information identifying the responder to which the request is being forwarded. For more details see 7.3.1.2.4.

Use of this parameter is mandatory in all communication modes.

7.3.2.2.2 Forward Note

Additional information supplied by the responder to the new responder upon forwarding the request.

7.3.2.2.3 Notification Note

Additional information supplied by the responder to the requester when forwarding the request.

7.3.3 FORWARD-NOTIFICATION Service

7.3.3.1 Function

This service is used by the service-provider to inform the requester that its request has been forwarded, and to whom.

7.3.3.2 Parameters

PARAMETER NAME	Ind
transaction identification	M
service date and time	M
requester identification	C
responder identification	M
responder address	U
intermediary identification	M
notification note	U
NOTE This service request always results in a corresponding indication.	

7.3.3.2.1 Transaction Identification

Information which uniquely identifies an ILL-transaction. For more details see 7.3.1.2.1.

7.3.3.2.2 Service Date and Time

The date and time at which a service is invoked. For more details see 7.3.1.2.2.

7.3.3.2.3 Requester Identification

Information identifying the requester. For more details see 7.3.1.2.3.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.3.2.4 Responder Identification

Information identifying the responder to which the request has been forwarded. For more details see 7.3.1.2.4.

Use of this parameter is mandatory in all communication modes.

7.3.3.2.5 Responder Address

Information identifying the telecommunications service and address by which the responder (to which the request has been forwarded) can be reached. Its components are the same as the electronic form of "delivery address" (see 7.3.1.2.6). This information is useful when a directory service is not available.

7.3.3.2.6 Intermediary Identification

The identification or name of the library or other institution that forwards a received request or initiates a chained or partitioned sub-transaction with another responder. Its components are the same as requester identification (see 7.3.1.2.3).

7.3.3.2.7 Notification Note

Additional information supplied by the responder when forwarding the request.

7.3.4 SHIPPED Service

7.3.4.1 Function

This service is used by the responder to record the fact that an item has been shipped. The responder may indicate (for diagnostic purposes) whether it is capable of sending the CHECKED-IN message, and whether it desires or requires RECEIVED and RETURNED messages from the requester.

This service results in a terminal state for the responder if a non-returnable item is shipped.

The "responder address", "intermediary identification" and "transaction type" parameters are mandatory for chained and partitioned ILL-transactions. They are optional for simple ILL-transactions. The "client identification" parameter is mandatory if it was present on the initial ILL-REQUEST indication. Otherwise, it is optional. The "supplier identification" parameter is mandatory if the supplier of the requested item is other than the responder; it is optional otherwise.

7.3.4.2 Parameters

PARAMETER NAME	Req	Ind
transaction identification	M	M
service date and time	M	M
requester identification	C	C
responder identification	C	C
responder address	C	C
intermediary identification	C	C
supplier identification	C	C
client identification	C	C
transaction type	C	C
supplemental item description	U	U
shipped service type	M	M
responder optional messages	U	U
supply details	M	M
return to address	U	U
responder note	U	U
send message	U	-
NOTE The service indication, i.e. the protocol message, is optional for this service, but is mandatory when required by the requester. It is also mandatory for chained and partitioned transactions.		

7.3.4.2.1 Transaction Identification

Information which uniquely identifies an ILL-transaction. For more details see 7.3.1.2.1.

7.3.4.2.2 Service Date and Time

The date and time at which a service is invoked. For more details see 7.3.1.2.2.

7.3.4.2.3 Requester Identification

Information identifying the requester. For more details see 7.3.1.2.3.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.4.2.4 Responder Identification

Information identifying the responder. For more details see 7.3.1.2.4.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.4.2.5 Responder Address

Information identifying the telecommunications service and address by which the responder can be reached. For more details see 7.3.3.2.5.

7.3.4.2.6 Intermediary Identification

The identification or name of the library or other institution that forwards a request or initiates a chained or partitioned transaction. For more details see 7.3.3.2.6.

7.3.4.2.7 Supplier Identification

Information identifying the supplier of the requested item when the supplier is different from the responder. Its components are the same as for requester identification (see 7.3.1.2.3).

7.3.4.2.8 Client Identification

Information describing the client (person or institution) for whom the item is being requested. For more details see 7.3.1.2.15.

7.3.4.2.9 Transaction Type

Identifies the type of ILL-transaction. For more details see 7.3.1.2.5.

7.3.4.2.10 Supplemental Item Description

Additional information describing the item which may be represented in machine readable format, e.g. MARC record. For more details see 7.3.1.2.17.

7.3.4.2.11 Shipped Service Type

Indicates the nature of the service provided by the final-responder. It may take on one symbolic value from a sub-set of those values defined for “ILL-service-type” (see 7.3.1.2.9) as follows:

— loan;

— copy/non-returnable.

7.3.4.2.12 Responder Optional Messages

Specifies (for diagnostic purposes) whether the responder is capable of supplying the SHIPPED and/or CHECKED-IN optional messages and whether the RECEIVED and/or RETURNED messages are required or desired from the requester.

7.3.4.2.13 Supply Details

Information pertaining to the supply of an item. It includes one or more of the following components:

— date shipped;

— date due (For more details see 7.3.13.2.5);

— number of chargeable units;

— total cost;

— shipped conditions;

— shipped via;

— ensured-for (For more details see 7.3.11.2.8);

— return insurance required;

— number of units per medium.

7.3.4.2.14 Return to Address

The postal address to which a requested item is to be returned. Its components are the same as for the postal form of "delivery address" (see 7.3.1.2.6).

7.3.4.2.15 Responder Note

Additional information supplied by the responder that is not provided elsewhere in the service primitive.

7.3.4.2.16 Send Message

Indicates the service issuer's wishes regarding the sending of the optional message. When this parameter takes on the symbolic value TRUE and the implementation supports the transmission of optional messages, then the optional message associated with this service is transmitted, otherwise it is not.

NOTE This is an abstract service parameter that does not result in a value being transmitted.

7.3.5 ILL-ANSWER Service

7.3.5.1 Function

The responder initiates this service in order to send a conditional response, a retry response, an unfilled response, a locations-provided response, a will-supply response, a hold-placed response, or an estimate response to the requester.

The information in the "results explanation" parameter will vary according to the value of the "transaction results". The use of the parameter is optional if transaction-results equals RETRY, UNFILLED, WILL-SUPPLY or HOLD-PLACED. It is mandatory if transaction-results equals CONDITIONAL, LOCATIONS-PROVIDED or ESTIMATE.

A result of CONDITIONAL is used to indicate that the request can possibly be satisfied if certain conditions are met. The requester is required to respond to a conditional reply. A date for response may be optionally supplied.

A result of RETRY is used to indicate that the item is not available now but may be available sometime in the future. The requester is invited to try again, but there is no compulsion on its part to do so, nor is there any guarantee that any such attempt would be successful. A date after which the requester can try again may be optionally provided.

A result of UNFILLED is used to indicate that the request cannot be satisfied, and results in termination of the transaction.

A result of LOCATIONS-PROVIDED is used to supply locations information and results in termination of the transaction.

A result of WILL-SUPPLY is not required to be sent to the requester. It may be invoked when a delay is expected before the SHIPPED service is invoked. This result reflects an intention on the part of the responder to supply the item, and is not a commitment.

A result of HOLD-PLACED indicates an intention to supply the item when it becomes available for loan.

A result of ESTIMATE is used to indicate the cost to provide the service requested and results in termination of the transaction.

When the result is WILL-SUPPLY or HOLD-PLACED, subsequent ILL-ANSWER requests may be invoked which indicate different results. In effect, the WILL-SUPPLY and HOLD-PLACED results may be considered interim responses that are subject to modification. For example, an ILL-ANSWER with a result of WILL-SUPPLY may be followed by a subsequent ILL-ANSWER with a result of UNFILLED.

Locations information must be supplied when the result is LOCATIONS-PROVIDED, and may also be included in a response for other values of "transaction results".

The responder may indicate (for diagnostic purposes) whether it is capable of sending the SHIPPED and/or CHECKED-IN messages, and whether it desires or requires RECEIVED and RETURNED messages from the requester.

7.3.5.2 Parameters

PARAMETER NAME	Req	Ind
transaction identification	M	M
service date and time	M	M
requester identification	C	C
responder identification	C	C
transaction results	M	M
results explanation	C	C
responder-specific-results	U	U
supplemental item description	U	U
send-to list	U	U
already-tried list	U	U
responder optional messages	U	U
responder note	U	U
NOTE This service request always results in a corresponding indication.		

7.3.5.2.1 Transaction Identification

Information which uniquely identifies an ILL-transaction. For more details see 7.3.1.2.1.

7.3.5.2.2 Service Date and Time

The date and time at which a service is invoked. For more details see 7.3.1.2.2.

7.3.5.2.3 Requester Identification

Information identifying the requester. For more details see 7.3.1.2.3.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.5.2.4 Responder Identification

Information identifying the responder. For more details see 7.3.1.2.4.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.5.2.5 Transaction Results

Identifies the result status of the ILL-ANSWER. It may take on one of the following symbolic values:

— conditional;

— retry;

— unfilled;

— locations-provided;

— will-supply;

— hold-placed;

— estimate.

7.3.5.2.6 Results Explanation

Information pertaining to the various results of an ILL request, such as the reason for item unavailability, conditions for loan, date for conditional answer reply, retry date, locations and cost estimate.

This parameter is optional if the “transaction results” parameter has the value “retry”, “unfilled”, “will-supply” or “hold-placed”. It is mandatory is the “transaction-results” parameter has the value “conditional”, “locations-provided” or “estimate”.

7.3.5.2.7 Responder-specific Results

A reason provided in response to an ILL-REQUEST which is specific to the responder, i.e. not specified in this standard. This reason may be in lieu of or supplement one of the standardized results conveyed by the “Results Explanation” parameter (see 7.3.5.2.6).

7.3.5.2.8 Supplemental Item Description

Additional information describing the item which may be represented in machine readable format, e.g. MARC record. For more details see 7.3.1.2.17.

7.3.5.2.9 Send-to List

A list of potential responders for forwarded, chained or partitioned transactions. Each entry in the list includes the following components:

— the responder’s identification;

— the requester’s account number with the responder, if available;

— the responder’s system address.

7.3.5.2.10 Already-tried List

A list of institutions that have been approached but were unable to supply the requested item. Each entry in the list is a responder identification and has components as for requester identification (see 7.3.1.2.3).

7.3.5.2.11 Responder Optional Messages

Specifies (for diagnostic purposes) whether the responder is capable of supplying the SHIPPED and/or CHECKED-IN optional messages and whether the RECEIVED and/or RETURNED messages are required or desired from the requester.

7.3.5.2.12 Responder Note

Additional information supplied by the responder that is not provided elsewhere in the service primitive.

7.3.6 CONDITIONAL-REPLY Service

7.3.6.1 Function

This service is used by the requester to reply to an ILL-ANSWER message having a result value of CONDITIONAL. If the answer is affirmative, the ILL-transaction returns to the PENDING state. If the answer is negative, the ILL-transaction goes into the NOT-SUPPLIED state.

7.3.6.2 Parameters

PARAMETER NAME	Req	Ind
transaction identification	M	M
service date and time	M	M
requester identification	C	C
responder identification	C	C
answer	M	M
requester note	U	U
NOTE This service request always results in a corresponding indication.		

7.3.6.2.1 Transaction Identification

Information which uniquely identifies an ILL-transaction. For more details see 7.3.1.2.1.

7.3.6.2.2 Service Date and Time

The date and time at which a service is invoked. For more details see 7.3.1.2.2.

7.3.6.2.3 Requester Identification

Information identifying the requester. For more details see 7.3.1.2.3.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.6.2.4 Responder Identification

Information identifying the responder. For more details see 7.3.1.2.4.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.6.2.5 Answer

A response to the conditions of a request. It takes on the symbolic value YES or NO.

7.3.6.2.6 Requester Note

Additional information supplied by the requester that is not provided elsewhere in the service primitive.

7.3.7 CANCEL Service

7.3.7.1 Function

This service is used by the requester to request cancellation of an outstanding ILL-REQUEST. It may be issued at any time following the issue of an ILL-REQUEST, until the receipt of one of the following: ILL-ANSWER with a status of UNFILLED, RETRY, ESTIMATE or LOCATIONS-PROVIDED; Shipped message; or the item itself. The responder is expected to respond to the cancellation request via the CANCEL-REPLY service, unless a response that places the responder in a terminal state or the SHIPPED state has already been provided.

7.3.7.2 Parameters

PARAMETER NAME	Req	Ind
transaction identification	M	M
service date and time	M	M
requester identification	C	C
responder identification	C	C
requester note	U	U
NOTE This service request always results in a corresponding indication.		

7.3.7.2.1 Transaction Identification

Information which uniquely identifies an ILL-transaction. For more details see 7.3.1.2.1.

7.3.7.2.2 Service Date and Time

The date and time at which a service is invoked. For more details see 7.3.1.2.2.

7.3.7.2.3 Requester Identification

Information identifying the requester. For more details see 7.3.1.2.3.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.7.2.4 Responder Identification

Information identifying the responder. For more details see 7.3.1.2.4.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.7.2.5 Requester Note

Additional information supplied by the requester that is not provided elsewhere in the service primitive.

7.3.8 CANCEL-REPLY Service

7.3.8.1 Function

This service is used by the responder to respond to a cancellation request. It must be invoked if the responder has not already invoked an ILL-ANSWER service with result UNFILLED, RETRY, ESTIMATE, or LOCATIONS-PROVIDED, nor invoked a SHIPPED or FORWARD service. The responder may reply with a YES or NO. An ILL-transaction is considered by the requester to be cancelled only upon receipt of the CANCEL-REPLY with an answer of YES. If the answer is NO, then the ILL-transaction proceeds as if no cancellation request had been received.

7.3.8.2 Parameters

PARAMETER NAME	Req	Ind
transaction identification	M	M
service date and time	M	M
requester identification	C	C
responder identification	C	C
answer	M	M
responder note	U	U
NOTE This service request always results in a corresponding indication.		

7.3.8.2.1 Transaction Identification

Information which uniquely identifies an ILL-transaction. For more details see 7.3.1.2.1.

7.3.8.2.2 Service Date and Time

The date and time at which a service is invoked. For more details see 7.3.1.2.2.

7.3.8.2.3 Requester Identification

Information identifying the requester. For more details see 7.3.1.2.3.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.8.2.4 Responder Identification

Information identifying the responder. For more details see 7.3.1.2.4.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.8.2.5 Answer

Indicates whether the responder accepts cancellation of the ILL-transaction, and may take on the symbolic value YES or NO.

7.3.8.2.6 Responder Note

Additional information supplied by the responder that is not provided elsewhere in the service primitive.

7.3.9 RECEIVED Service

7.3.9.1 Function

This service is used by the requester to record the fact that an item has been received. This service results in a terminal state for the requester if a non-returnable item is received.

7.3.9.2 Parameters

PARAMETER NAME	Req	Ind
transaction identification	M	M
service date and time	M	M
requester identification	C	C
responder identification	C	C
supplier identification	C	C
supplemental item description	U	U
date received	M	M
shipped service type	M	M
requester note	U	U
send message	U	-
NOTE The service indication, i.e. the protocol message, is optional for this service, but is mandatory when required by the responder.		

7.3.9.2.1 Transaction Identification

Information which uniquely identifies an ILL-transaction. For more details see 7.3.1.2.1.

7.3.9.2.2 Service Date and Time

The date and time at which a service is invoked. For more details see 7.3.1.2.2.

7.3.9.2.3 Requester Identification

Information identifying the requester. For more details see 7.3.1.2.3.

7.3.9.2.4 Responder Identification

Information identifying the responder. For more details see 7.3.1.2.4.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.9.2.5 Supplier Identification

Information identifying the supplier of the requested item. For more details, see 7.3.4.2.7.

7.3.9.2.6 Supplemental Item Description

Additional information describing the item which may be represented in machine-readable format, e.g. MARC record. For more information see 7.3.1.2.17.

7.3.9.2.7 Date Received

The date on which the loaned item is received by the requester.

7.3.9.2.8 Shipped Service Type

Indicates the nature of the service provided by the final-responder. For more details see 7.3.4.2.11.

7.3.9.2.9 Requester Note

Additional information supplied by the requester that is not provided elsewhere in the service primitive.

7.3.9.2.10 Send Message

Indicates the service user's wishes regarding the sending of the optional messages. For more details see 7.3.4.2.16.

7.3.10 RECALL Service

7.3.10.1 Function

This service is used by the responder to request that a loaned item be returned immediately. A Renew service request is not permitted after a Recall service indication is received.

7.3.10.2 Parameters

PARAMETER NAME	Req	Ind
transaction identification	M	M
service date and time	M	M
requester identification	C	C
responder identification	C	C
responder note	U	U
NOTE This service request always results in a corresponding indication.		

7.3.10.2.1 Transaction Identification

Information which uniquely identifies an ILL-transaction. For more details see 7.3.1.2.1.

7.3.10.2.2 Service Date and Time

The date and time at which a service is invoked. For more details see 7.3.1.2.2.

7.3.10.2.3 Requester Identification

Information identifying the requester. For more details see 7.3.1.2.3.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.10.2.4 Responder Identification

Information identifying the responder. For more details see 7.3.1.2.4.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.10.2.5 Responder Note

Additional information supplied by the responder that is not provided elsewhere in the service primitive.

7.3.11 RETURNED Service

7.3.11.1 Function

This service is used by the requester to record the fact that a loaned item has been sent back to the responder. This service results in a terminal state for the requester.

7.3.11.2 Parameters

PARAMETER NAME	Req	Ind
transaction identification	M	M
service date and time	M	M
requester identification	C	C
responder identification	C	C
supplemental item description	U	U
date returned	M	M
returned via	U	U
ensured for	U	U
requester note	U	U
send message	U	-
NOTE The service indication, i.e. the protocol message, is optional for this service, but is mandatory when required by the responder.		

7.3.11.2.1 Transaction Identification

Information which uniquely identifies an ILL-transaction. For more details see 7.3.1.2.1.

7.3.11.2.2 Service Date and Time

The date and time at which a service is invoked. For more details see 7.3.1.2.2.

7.3.11.2.3 Requester Identification

Information identifying the requester. For more details see 7.3.1.2.3.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.11.2.4 Responder Identification

Information identifying the responder. For more details see 7.3.1.2.4.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.11.2.5 Supplemental Item Description

Additional information describing the item which may be represented in machine-readable format, e.g. MARC record. For more information see 7.3.1.2.17.

7.3.11.2.6 Date Returned

The date on which the loaned item is returned by the requester.

7.3.11.2.7 Returned Via

Name or code for delivery service or method used by the requester to return the item.

7.3.11.2.8 Ensured For

The amount of insurance purchased against loss or damage of the item.

7.3.11.2.9 Requester Note

Additional information supplied by the requester that is not provided elsewhere in the service primitive.

7.3.11.2.10 Send Message

Indicates the service user's wishes regarding the sending of the optional message. For more details see 7.3.4.2.16.

7.3.12 CHECKED-IN Service

7.3.12.1 Function

This service is used by the responder to record the fact that a loaned item has been received back from the requester. It may also be used to force an ILL-transaction to a terminal state when problems with the ILL-transaction have been encountered while in the tracking phase. When this service is used to force an ILL-transaction to a terminal state, the loaned item should be accounted for, but not necessarily back at the responder site for return to the collection. This service results in a terminal state for the responder.

7.3.12.2 Parameters

PARAMETER NAME	Req	Ind
transaction identification	M	M
service date and time	M	M
requester identification	C	C
responder identification	C	C
date checked-in	M	M
responder note	U	U
send message	U	-
NOTE The service indication, i.e. the protocol message, is optional for this service, but is mandatory when required by the requester.		

7.3.12.2.1 Transaction Identification

Information which uniquely identifies an ILL-transaction. For more details see 7.3.1.2.1.

7.3.12.2.2 Service Date and Time

The date and time at which a service is invoked. For more details see 7.3.1.2.2.

7.3.12.2.3 Requester Identification

Information identifying the requester. For more details see 7.3.1.2.3.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.12.2.4 Responder Identification

Information identifying the responder. For more details see 7.3.1.2.4.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.12.2.5 Date Checked-in

The date on which a loaned item is received back by the responder.

7.3.12.2.6 Responder Note

Additional information supplied by the responder that is not provided elsewhere in the service primitive.

7.3.12.2.7 Send Message

Indicates the service user's wishes regarding the sending of the optional messages. For more details see 7.3.4.2.16.

7.3.13 OVERDUE Service

7.3.13.1 Function

This service is used by the responder to notify the requester that a loaned item is now overdue; the requester is expected to return the item or request a renewal.

7.3.13.2 Parameters

PARAMETER NAME	Req	Ind
transaction identification	M	M
service date and time	M	M
requester identification	C	C
responder identification	C	C
date due	M	M
responder note	U	U
NOTE This service request always results in a corresponding indication.		

7.3.13.2.1 Transaction Identification

Information which uniquely identifies an ILL-transaction. For more details see 7.3.1.2.1.

7.3.13.2.2 Service Date and Time

The date and time at which a service is invoked. For more details see 7.3.1.2.2.

7.3.13.2.3 Requester Identification

Information identifying the requester. For more details see 7.3.1.2.3.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.13.2.4 Responder Identification

Information identifying the responder. For more details see 7.3.1.2.4.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.13.2.5 Date Due

The date by which the loaned item should be returned to the responder. It includes one or more of the following components:

— date due field;

— renewable, which takes on the symbolic value YES or NO.

7.3.13.2.6 Responder Note

Additional information supplied by the responder that is not provided elsewhere in the service primitive.

7.3.14 RENEW Service

7.3.14.1 Function

This service is used by the requester to request the renewal of a borrowed item. A Renew request is intended to be made only if the item is renewable, as notified by the responder. However, it is not an error if a Renew request is made when the item is not renewable.

7.3.14.2 Parameters

PARAMETER NAME	Req	Ind
transaction identification	M	M
service date and time	M	M
requester identification	C	C
responder identification	C	C
desired due date	U	U
requester note	U	U
NOTE This service request always results in a corresponding indication.		

7.3.14.2.1 Transaction Identification

Information which uniquely identifies an ILL-transaction. For more details see 7.3.1.2.1.

7.3.14.2.2 Service Date and Time

The date and time at which a service is invoked. For more details see 7.3.1.2.2.

7.3.14.2.3 Requester Identification

Information identifying the requester. For more details see 7.3.1.2.3.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.14.2.4 Responder Identification

Information identifying the responder. For more details see 7.3.1.2.4.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.14.2.5 Desired Due Date

The proposed due date for a renewed loan.

7.3.14.2.6 Requester Note

Additional information supplied by the requester that is not provided elsewhere in the service primitive.

7.3.15 RENEW-ANSWER Service

7.3.15.1 Function

This service is used by the responder to reply to a RENEW indication, either affirmatively or negatively. The "date due" parameter is conditional on the "answer" being 'yes'. If so, then the due date for the loan will be the specified date. Otherwise, the current due date remains in effect.

7.3.15.2 Parameters

PARAMETER NAME	Req	Ind
transaction identification	M	M
service date and time	M	M
requester identification	C	C
responder identification	C	C
answer	M	M
date due	C	C
responder note	U	U
NOTE This service request always results in a corresponding indication.		

7.3.15.2.1 Transaction Identification

Information which uniquely identifies an ILL-transaction. For more details see 7.3.1.2.1.

7.3.15.2.2 Service Date and Time

The date and time of which a service is invoked. For more details see 7.3.1.2.2.

7.3.15.2.3 Requester Identification

Information identifying the requester. For more details see 7.3.1.2.3.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.15.2.4 Responder Identification

Information identifying the responder. For more details see 7.3.1.2.4.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.15.2.5 Answer

Indicates whether the renew request has been granted or not. It takes on the symbolic value YES or NO.

7.3.15.2.6 Date Due

The date by which the loaned item should be returned. For more details see 7.3.13.2.5.

7.3.15.2.7 Responder Note

Additional information supplied by the responder that is not provided elsewhere in the service primitive.

7.3.16 LOST Service

7.3.16.1 Function

This service is used by either the requester or the responder to indicate that a requested item has been lost. It should only be used when an item is truly lost. When there is uncertainty whether a lost item will be found, the MESSAGE service should be used instead. This service ends in a terminal state for both the requester and responder.

7.3.16.2 Parameters

PARAMETER NAME	Req	Ind
transaction identification	M	M
service date and time	M	M
requester identification	C	C
responder identification	C	C
note	U	U
NOTE This service request always results in a corresponding indication.		

7.3.16.2.1 Transaction Identification

Information which uniquely identifies an ILL-transaction. For more details see 7.3.1.2.1.

7.3.16.2.2 Service Date and Time

The date and time at which a service is invoked. For more details see 7.3.1.2.2.

7.3.16.2.3 Requester Identification

Information identifying the requester. For more details see 7.3.1.2.3.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.16.2.4 Responder Identification

Information identifying the responder. For more details see 7.3.1.2.4.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.16.2.5 Note

Additional information that is not provided elsewhere in the service primitive.

7.3.17 DAMAGED Service

7.3.17.1 Function

This service is used by either the requester or the responder to indicate that an item has been damaged. This service does not affect the state of the ILL-transaction.

7.3.17.2 Parameters

PARAMETER NAME	Req	Ind
transaction identification	M	M
service date and time	M	M
requester identification	C	C
responder identification	C	C
damage details	U	U
note	U	U
NOTE This service request always results in a corresponding indication.		

7.3.17.2.1 Transaction Identification

Information which uniquely identifies an ILL-transaction. For more details see 7.3.1.2.1.

7.3.17.2.2 Service Date and Time

The date and time at which a service is invoked. For more details see 7.3.1.2.2.

7.3.17.2.3 Requester Identification

Information identifying the requester. For more details see 7.3.1.2.3.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.17.2.4 Responder Identification

Information identifying the responder. For more details see 7.3.1.2.4.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.17.2.5 Damage Details

Information giving machine processable and/or human readable details about damage to the whole or parts of the item whether received in physical or electronic form.

7.3.17.2.6 Note

Additional information that is not provided elsewhere in the service primitive.

7.3.18 MESSAGE Service

7.3.18.1 Function

This service is used by either the requester or responder to transmit free-form text information not normally conveyed by other services for an existing ILL-transaction. This service can be invoked at any time by either the requester or responder and does not affect the state of the ILL-transaction.

7.3.18.2 Parameters

PARAMETER NAME	Req	Ind
transaction identification	M	M
service date and time	M	M
requester identification	C	C
responder identification	C	C
note	M	M
NOTE This service request always results in a corresponding indication.		

7.3.18.2.1 Transaction Identification

Information which uniquely identifies an ILL-transaction. For more details see 7.3.1.2.1.

7.3.18.2.2 Service Date and Time

The date and time at which a service is invoked. For more details see 7.3.1.2.2.

7.3.18.2.3 Requester Identification

Information identifying the requester. For more details see 7.3.1.2.3.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.18.2.4 Responder Identification

Information identifying the responder. For more details see 7.3.1.2.4.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.18.2.5 Note

Additional information that is not provided elsewhere in the service primitive.

7.3.19 STATUS-QUERY Service

7.3.19.1 Function

This service is used by either the requester or responder to request the current status of an ILL-transaction. The “transaction identification” is that of an existing ILL-transaction, the one for which a status report is requested. This service can be invoked at any time by either the requester or the responder and does not affect the state of the ILL-transaction. This service is intended for end-to-end status query, i.e. for requester to responder and responder to requester. This service does not provide for the intermediary to supply status information.

7.3.19.2 Parameters

PARAMETER NAME	Req	Ind
transaction identification	M	M
service date and time	M	M
requester identification	C	C
responder identification	C	C
note	U	U
NOTE This service request always results in a corresponding indication.		

7.3.19.2.1 Transaction Identification

Information which uniquely identifies an ILL-transaction. For more details see 7.3.1.2.1.

7.3.19.2.2 Service Date and Time

The date and time at which a service is invoked. For more details see 7.3.1.2.2.

7.3.19.2.3 Requester Identification

Information identifying the requester. For more details see 7.3.1.2.3.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.19.2.4 Responder Identification

Information identifying the responder. For more details see 7.3.1.2.4.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.19.2.5 Note

Additional information that is not provided elsewhere in the service primitive.

7.3.20 STATUS-OR-ERROR-REPORT Service

7.3.20.1 Function

This service allows the user to supply status and/or error information to the peer user. Status information may be provided at any time or in response to a status query. An error report may be initiated by the service-user or by the service-provider to reject a service request when a problem has been detected. This service can be invoked at any time by either the requester or the responder and does not affect the state of the ILL-transaction.

7.3.20.2 Parameters

PARAMETER NAME	Req	Ind
transaction identification	M	M
service date and time	M	M
requester identification	C	C
NOTE This service request always results in a corresponding indication.		

PARAMETER NAME	Req	Ind
responder identification	C	C
reason no report	C	C
status report	U	U
error report	U	U
note	U	U
NOTE This service request always results in a corresponding indication.		

7.3.20.2.1 Transaction Identification

Information which uniquely identifies an ILL-transaction. For more details see 7.3.1.2.1.

7.3.20.2.2 Service Date and Time

The date and time at which a service is invoked. For more details see 7.3.1.2.2.

7.3.20.2.3 Requester Identification

Information identifying the requester. For more details see 7.3.1.2.3.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.20.2.4 Responder Identification

Information identifying the responder. For more details see 7.3.1.2.4.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.20.2.5 Reason No Report

An indication whether the inability to supply a report as requested is temporary or permanent.

Use of this parameter is conditional on the absence of both the “status report” and the “error report” parameters.

7.3.20.2.6 Status Report

This parameter contains pertinent information on the ILL-transaction’s history and current state that can serve to track the progress of an ILL-transaction and to help identify the nature of the bibliographic item associated with the ILL-transaction. It has the following components:

— User-status-report: One or more of the following elements may be present:

  — date the ILL request was initiated by the requester;

  — author of item;

  — title of item;

  — author of article;

  — title of article;

  — date of last state transition;

  — most recent service invoked;

- date of most recent service;
- initiator of most recent service;
- shipped service type;
- transaction results;
- note contained in most recent service.

— Provider-status-report: Specifies the current state of the ILL-transaction for the responding application-entity. This information is supplied by the service-provider which is responsible for maintaining the ILL-transaction state.

7.3.20.2.7 Error Report

This parameter contains pertinent information on the nature of the detected error and has the following components:

— Correlation Information — used to correlate the error report with the service request to which the report relates.

— Source — indicates the initiating source of the error report. It takes on one of the symbolic values ILL-service-user or ILL-service-provider.

— User-Error-Report — provided when the Source is the ILL-service-user. It specifies the nature of the detected problem and supplies additional explanatory information (if any):

  - Already-Forwarded
  - Intermediary-Problem; the possible reasons are:
    - cannot-send-onward: signifies that an intermediary is unable to send on a request due to communication problems.
  - Security-Problem; the possible reasons are outside the scope of this International Standard.
  - Unable-to-Perform; the possible reasons are:
    - not available: signifies that due to some technical problem the service-user is temporarily unable to consider new requests;
    - resource-limitation: signifies that the service-user is not able to perform the requested service due to resource limitations;
    - other.

— Provider-Error-Report — provided when the Source is the ILL-service-provider. It specifies the nature of the detected problem and the reason (if any):

  - General-Problem; the possible reasons are:
    - unrecognized message;
    - unrecognized data type;
    - badly structured message;
    - protocol-version-not-supported;

- other.

- Transaction-Id-Problem; the possible reasons are:
  - duplicate transaction-id, e.g. a duplicate value received for an original request from the same requester;
  - invalid-transaction-id, e.g. unknown person-or-institution-symbol or person-or-institution-name;
  - unknown-transaction-id (not applicable to ILL request).
- State-Transition-Prohibited; this problem occurs when a received indication primitive is not valid given the recipient's current state. The error report has the following components:
  - service type: identifies the type of the indication primitive rejected
  - current state: identifies the current state of the recipient

The User-Error-Report and the Provider-Error-Report are mutually exclusive.

7.3.20.2.8 Note

Additional information that is not provided elsewhere in the service primitive.

7.3.21 EXPIRY Service

7.3.21.1 Function

This service is used by the service-provider to notify the service-users of ILL-transaction expiry due to timeout. Expiry of an ILL-transaction occurs when an ILL-REQUEST is made with a specified expiration date and no response (in the form of an ILL-ANSWER or SHIPPED request) is initiated by the responder before the expiration date. It can also occur if no CONDITIONAL-REPLY is received before the "date-for-reply" specified in an ILL-ANSWER service with result CONDITIONAL. This service forces the ILL-transaction to the NOT-SUPPLIED state.

7.3.21.2 Parameters

PARAMETER NAME	Ind/Ind
transaction identification	M
service date and time	M
requester identification	C
responder identification	C
NOTE Both the requester and responder service-users receive an indication primitive.	

7.3.21.2.1 Transaction Identification

Information which uniquely identifies an ILL-transaction. For more details see 7.3.1.2.1.

7.3.21.2.2 Service Date and Time

The date and time at which a service is invoked. For more details see 7.3.1.2.2.

7.3.21.2.3 Requester Identification

Information identifying the requester. For more details see 7.3.1.2.3.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

7.3.21.2.4 Responder Identification

Information identifying the responder. For more details see 7.3.1.2.4.

Use of this parameter is optional when using connection-oriented communications, mandatory when using store-and-forward communications.

8 Sequences of Primitives

This clause defines the valid sequences of primitives for the requester, responder and intermediary. This is achieved primarily through the use of state transition diagrams.

8.1 Resilience to Lost and Out-of-Sequence Messages

The ILL service is resilient to lost or out-of-sequence messages.

8.1.1 Lost Messages

Resilience to lost messages is achieved primarily in two ways:

a) through the ability to repeat the most recent service-user initiated request; this allows a service-user to react to situations where no apparent progress is being made in a given ILL-transaction or when a communications problem is known to have occurred;

NOTE An operator may need to intervene to determine when repetition of a service is needed.

b) through a general lack of dependency on specific messages to ensure progress of the ILL-transaction. For example, the filling of a loan request by a responder does not have to be explicitly indicated by the ILL-ANSWER and SHIPPED messages. The receipt of the actual loaned item is sufficient to allow the transaction to proceed. Thus, the loss of the ILL-ANSWER and SHIPPED messages in transit does not cause a problem.

8.1.2 Out-of-Sequence Messages

Resilience to out-of-sequence messages is achieved by:

a) providing alternate paths for progressing an ILL-transaction. For example, the responder can move from the CONDITIONAL state to the CANCEL-PENDING state either directly, as a result of CANCEL-indication, or indirectly, by first returning to the PENDING state upon receipt of a CONDITIONAL-REPLY indication and then to the CANCEL-PENDING state. If the requester sends a CONDITIONAL-REPLY, answer = yes, then a CANCEL message, the responder will move to the CANCEL-PENDING state, regardless of the order in which these messages are received;

b) having the underlying protocol machines detect out-of-sequence messages. In this way, if a message is received that was sent before an already received message, then the protocol machine does not change state but simply passes the contents of the message to the user in case there is some information that is still meaningful to the user. This is not considered to be an error condition and no error report is returned to the originator.

8.2 State Transitions

The state transition diagrams in Figures 9 to 14 indicate valid state transitions as seen by the service user, and what events cause the state transitions. These diagrams indicate only visible interactions permitted between service-users and service-providers. Moreover, the diagrams represent a single ILL-transaction, although the service-provider may support many simultaneous ILL-transactions.

The state transition diagrams in Figures 9 and 10 show the valid states for the requester and responder for the loan of a returnable item, i.e. ILL-service-type is “loan”.

Figures 11 and 12 show the corresponding state transitions for the request of a copy/non-returnable item.

NOTE The use of separate state transition diagrams for returnable and non-returnable items is simply a notational convenience to improve clarity of presentation.

For other service types, e.g. estimate or reservation, either set of diagrams is appropriate.

Figures 13 and 14 show the valid states for an intermediary in the roles of requester and responder, respectively. These figures apply to all types of ILL request.

In these state transition diagrams, the numbers beside the state transitions indicate what event(s) can cause the transitions. Three types of service events are indicated, according to the following convention:

a) A number without additional marking identifies an original event. An original request or indication event may be timely; i.e. it occurs in the normal course of events for an ILL-transaction and may cause a state change. Alternatively, an original indication event may be untimely; i.e. events subsequent to the invocation of the service request leading to the indication have advanced the state of the transaction. Untimely indication events cause no state change. An example of an untimely indication event is the reception by the requester of an ILL-ANSWER — WILL-SUPPLY indication after the item has been received and the RECEIVED service invoked.

b) A number accompanied by an asterisk (*) identifies a service event that is a repeat of a preceding one of the same type.

c) A number accompanied by two asterisks (**) identifies a service event that may be either an original or a repeat event.

To reduce their complexity, these diagrams do not reflect the following types of interaction, which do not cause any state change:

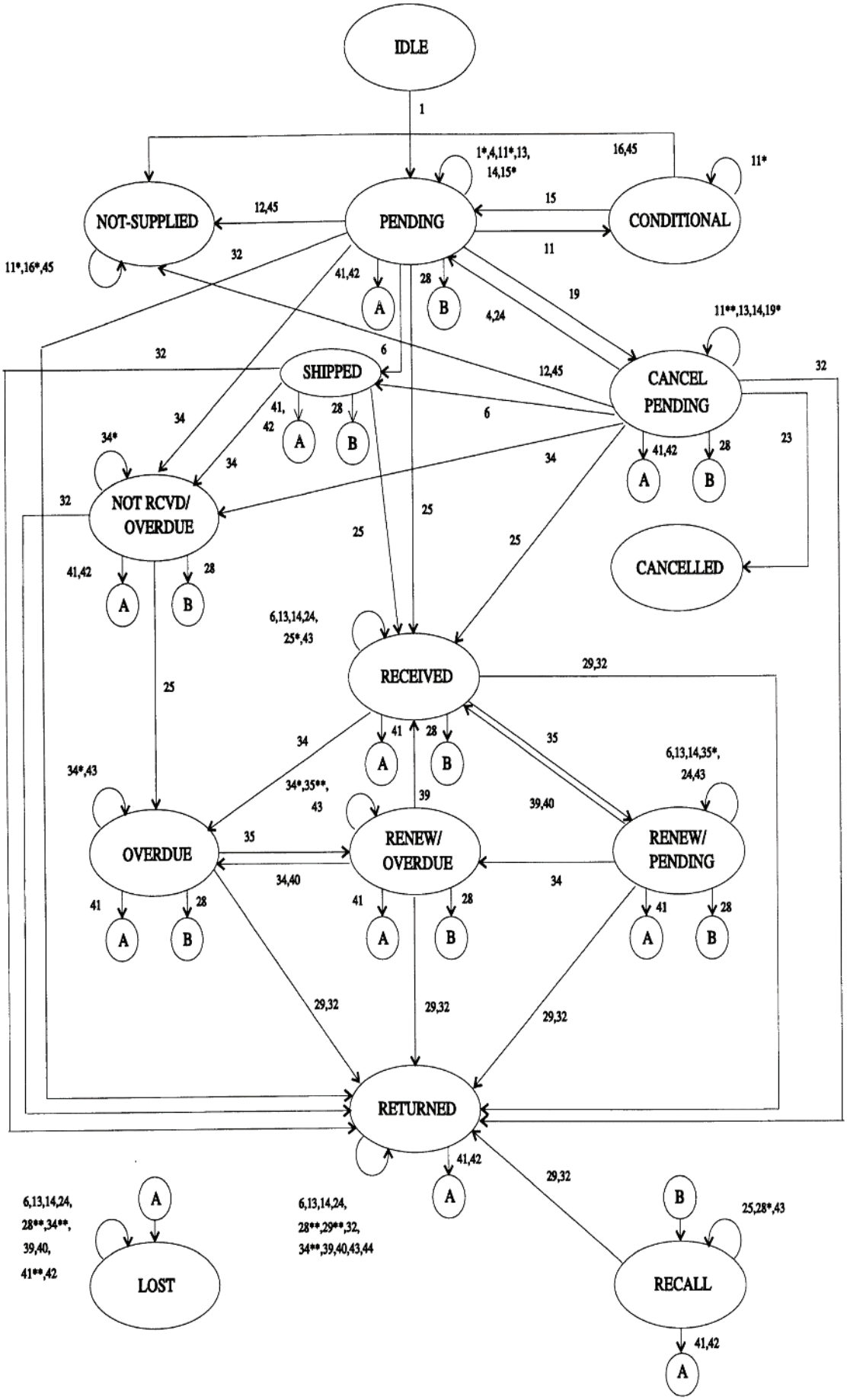
— events related to the MESSAGE, STATUS-REQUEST, and STATUS-OR-ERROR-REPORT services.

— indications for out-of-sequence messages, i.e. messages which are delivered by the underlying communications service in the incorrect order. For example, a responder might invoke a SHIPPED request and subsequently a RECALL request. If the corresponding messages are delivered in the incorrect order, the requester will receive the SHIPPED indication out of sequence, having already made the appropriate state transition in response to the RECALL indication.

— repeated indications to which a response is not normally expected, i.e. ILL-ANSWER (UNFILLED, WILL-SUPPLY, RETRY, ESTIMATE, LOCATIONS-PROVIDED, or HOLD-PLACED), FORWARD-NOTIFICATION, SHIPPED, CONDITIONAL-REPLY, CANCEL-REPLY, RECEIVED, RETURNED, CHECKED-IN, RENEW-ANSWER, LOST, DAMAGED.

Additional rules are provided to supplement the diagrams.

Annex A includes time sequence diagrams which illustrate some possible sequences of events involving the requester and responder service-users and the service-provider.



Key

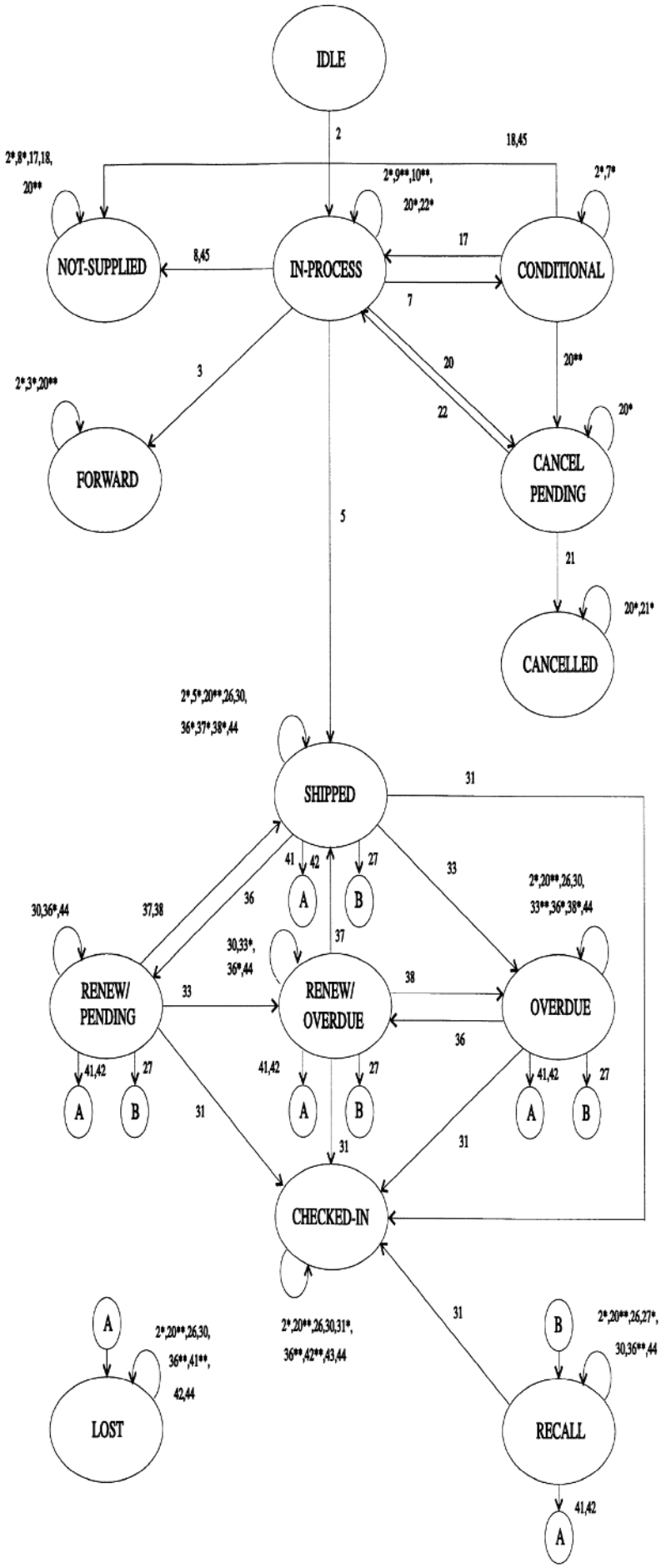
	SERVICE EVENT NUMBERS				
1	ILL-REQUEST request		24	CANCEL-REPLY indication	NO
4	FORWARD-NOTIFICATION indication		25	item received	RECEIVED request
6	SHIPPED indication		28	RECALL indication	
11	ILL-ANSWER indication	CONDITIONAL	29	item returned	RETURNED request
12	ILL-ANSWER indication	UNFILLED	32	CHECKED-IN indication	
		ESTIMATE	34	OVERDUE indication	
		RETRY	35	RENEW request	
		LOCATIONS-PROVIDED	39	RENEW-ANSWER indication	YES
13	ILL-ANSWER indication	WILL-SUPPLY	40	RENEW-ANSWER indication	NO
14	ILL-ANSWER indication	HOLD-PLACED	41	LOST request	
15	CONDITIONAL-REPLY request	YES	42	LOST indication	
16	CONDITIONAL-REPLY request	NO	43	DAMAGED request	
19	CANCEL request		44	DAMAGED indication	
23	CANCEL-REPLY indication	YES	45	EXPIRED indication	

[a] A number without additional marking identifies an original event.

[b] A number accompanied by an asterisk (*) identifies a service event that is a repeat of a preceding one of the same type.

[c] A number accompanied by two asterisks (**) identifies a service event that may be either an original or a repeat event.

Figure 9 — State Transitions for Requester Returnable Item (In-Sequence Messages Only)



Key

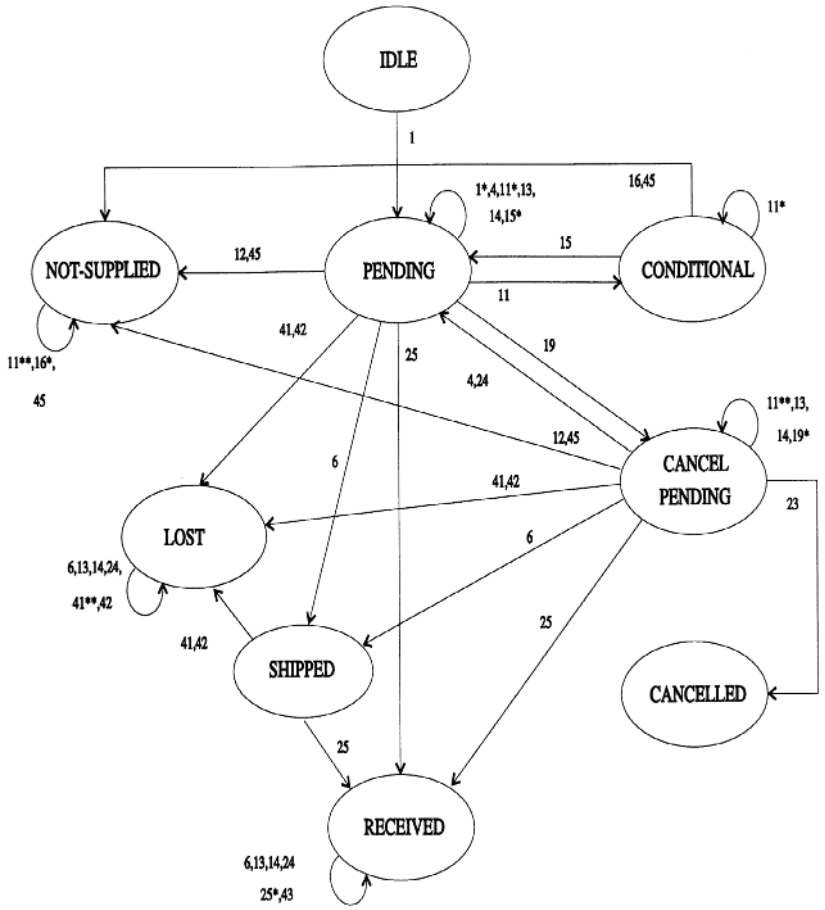
	SERVICE EVENT NUMBERS				
2	ILL-REQUEST indication		22	CANCEL-REPLY request	NO
3	FORWARD request		26	RECEIVED indication	
5	item sent	SHIPPED request	27	RECALL request	
7	ILL-ANSWER request	CONDITIONAL	30	RETURNED indication	
8	ILL-ANSWER request	UNFILLED	31	item received	CHECKED-IN request
		ESTIMATE	33	OVERDUE request	
		RETRY	36	RENEW indication	
		LOCATIONS-PROVIDED	37	RENEW-ANSWER request	YES
9	ILL-ANSWER request	WILL-SUPPLY	38	RENEW-ANSWER request	NO
10	ILL-ANSWER request	HOLD-PLACED	41	LOST request	
17	CONDITIONAL-REPLY indication	YES	42	LOST indication	
18	CONDITIONAL-REPLY indication	NO	43	DAMAGED request	
20	CANCEL indication		44	DAMAGED indication	
21	CANCEL-REPLY request	YES	45	EXPIRED indication	

[a] A number without additional marking identifies an original event.

[b] A number accompanied by an asterisk (*) identifies a service event that is a repeat of a preceding one of the same type.

[c] A number accompanied by two asterisks (**) identifies a service event that may be either an original or a repeat event.

Figure 10 — State Transitions for Responder Returnable Item (In-Sequence Messages Only)



Key

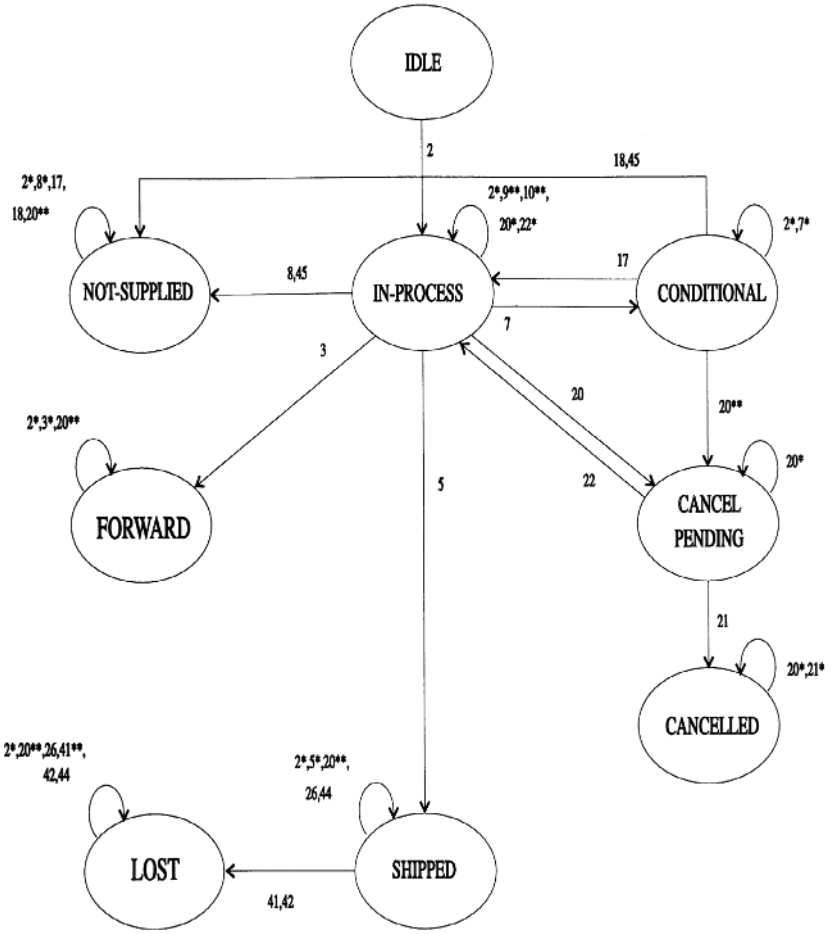
	SERVICE EVENT NUMBERS				
1	ILL-REQUEST request		15	CONDITIONAL-REPLY request	YES
4	FORWARD-NOTIFICATION indication		16	CONDITIONAL-REPLY request	NO
6	SHIPPED indication		19	CANCEL request	
11	ILL-ANSWER indication	CONDITIONAL	23	CANCEL-REPLY indication	YES
12	ILL-ANSWER indication	UNFILLED	24	CANCEL-REPLY indication	NO
		ESTIMATE	25	item received	RECEIVED request
		RETRY	41	LOST request	
		LOCATIONS-PROVIDED	42	LOST indication	
13	ILL-ANSWER indication	WILL-SUPPLY	43	DAMAGED request	
14	ILL-ANSWER indication	HOLD-PLACED	45	EXPIRED indication	

[a] A number without additional marking identifies an original event.

[b] A number accompanied by an asterisk (*) identifies a service event that is a repeat of a preceding one of the same type.

[c] A number accompanied by two asterisks (**) identifies a service event that may be either an original or a repeat event.

Figure 11 — State Transitions for Requester Non-Returnable Item (In-Sequence Messages Only)



Key

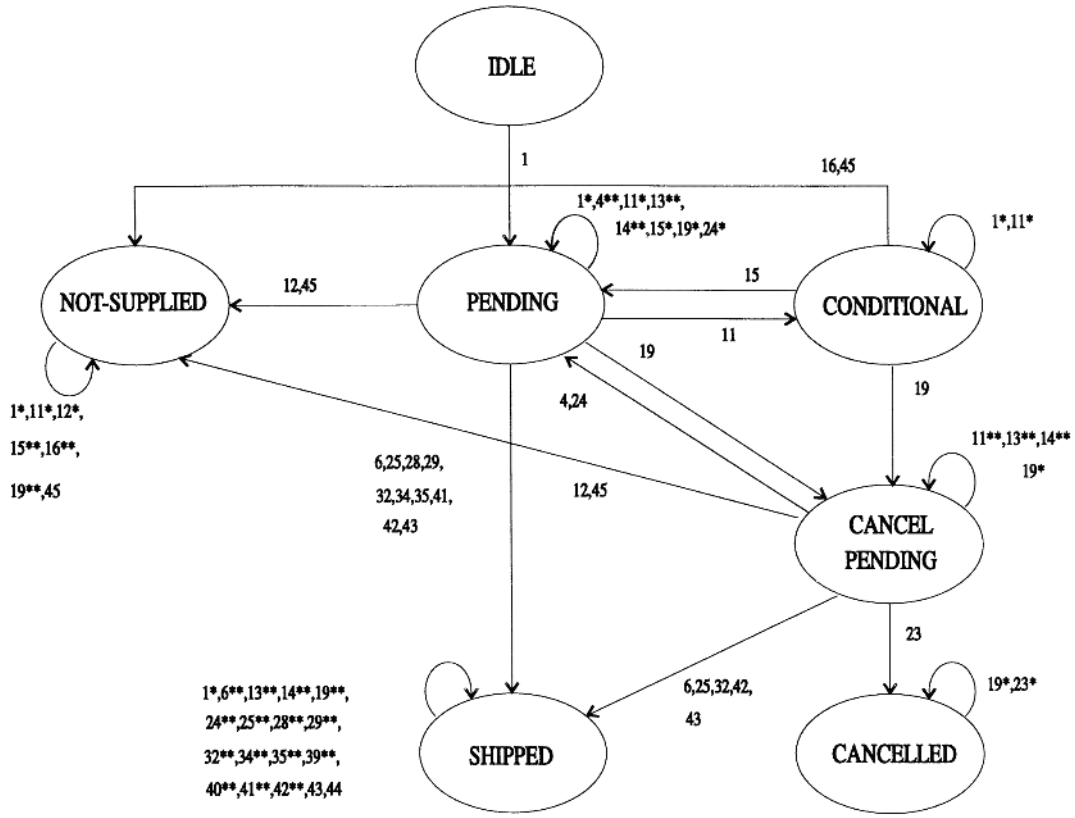
	SERVICE EVENT NUMBERS				
2	ILL-REQUEST indication		17	CONDITIONAL-REPLY indication	YES
3	FORWARD request		18	CONDITIONAL-REPLY indication	NO
5	item sent	SHIPPED request	20	CANCEL indication	
7	ILL-ANSWER request	CONDITIONAL	21	CANCEL-REPLY request	YES
8	ILL-ANSWER request	UNFILLED	22	CANCEL-REPLY request	NO
		ESTIMATE	26	RECEIVED indication	
		RETRY	41	LOST request	
		LOCATIONS-PROVIDED	42	LOST indication	
9	ILL-ANSWER request	WILL-SUPPLY	44	DAMAGED indication	
10	ILL-ANSWER request	HOLD-PLACED	45	EXPIRED indication	

[a] A number without additional marking identifies an original event.

[b] A number accompanied by an asterisk (*) identifies a service event that is a repeat of a preceding one of the same type.

[c] A number accompanied by two asterisks (**) identifies a service event that may be either an original or a repeat event.

Figure 12 — State Transitions for Responder Non-Returnable Item (In-Sequence Messages Only)



Key

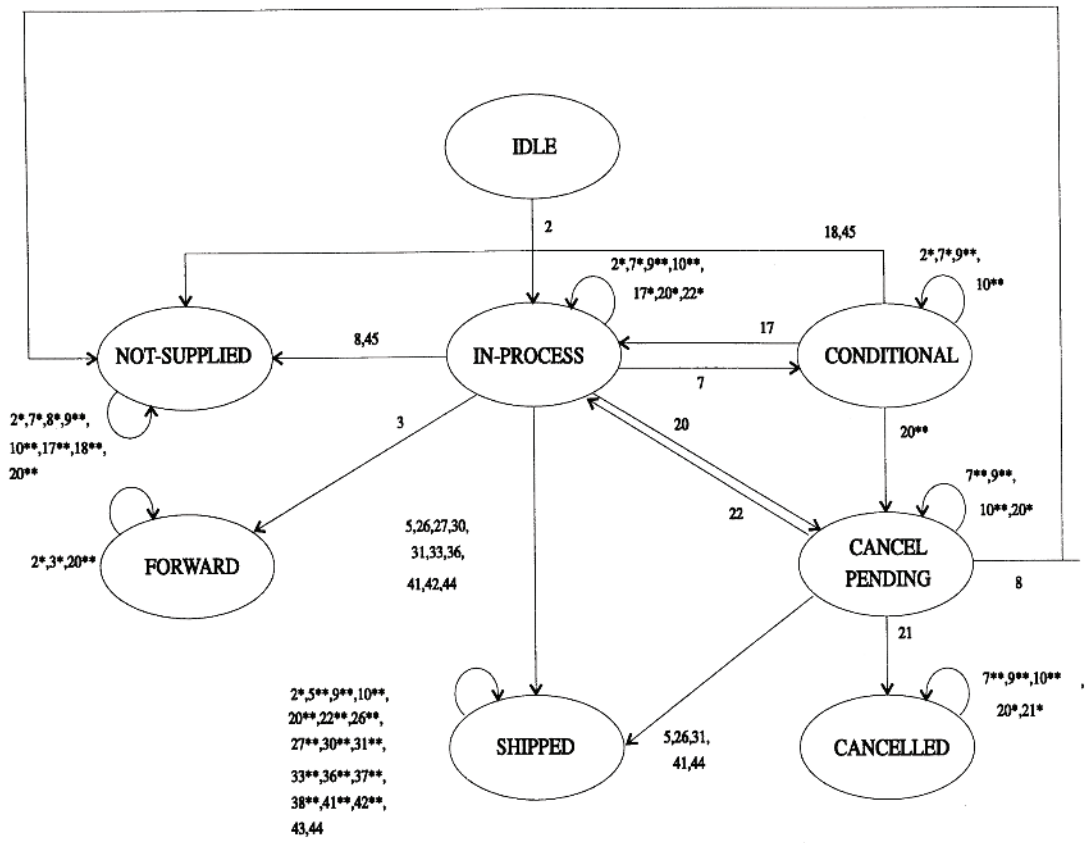
	SERVICE EVENT NUMBERS				
1	ILL-REQUEST request		24	CANCEL-REPLY indication	NO
4	FORWARD-NOTIFICATION indication		25	item received	RECEIVED request
6	SHIPPED indication		28	RECALL indication	
11	ILL-ANSWER indication	CONDITIONAL	29	RETURNED request	
12	ILL-ANSWER indication	UNFILLED	32	CHECKED-IN indication	
		ESTIMATE	34	OVERDUE indication	
		RETRY	35	RENEW request	
		LOCATIONS-PROVIDED	39	RENEW-ANSWER indication	YES
13	ILL-ANSWER indication	WILL-SUPPLY	40	RENEW-ANSWER indication	NO
14	ILL-ANSWER indication	HOLD-PLACED	41	LOST request	
15	CONDITIONAL-REPLY request	YES	42	LOST indication	
16	CONDITIONAL-REPLY request	NO	43	DAMAGED request	
19	CANCEL request		44	DAMAGED indication	
23	CANCEL-REPLY indication	YES	45	EXPIRED indication	

[a] A number without additional marking identifies an original event.

[b] A number accompanied by an asterisk (*) identifies a service event that is a repeat of a preceding one of the same type.

[c] A number accompanied by two asterisks (**) identifies a service event that may be either an original or a repeat event.

Figure 13 — State Transitions for Intermediary: Role of Requester (In-Sequence Messages Only)



Key

	SERVICE EVENT NUMBERS				
2	ILL-REQUEST indication		22	CANCEL-REPLY request	NO
3	FORWARD request		26	RECEIVED indication	
5	SHIPPED request		27	RECALL request	
7	ILL-ANSWER request	CONDITIONAL	30	RETURNED indication	
8	ILL-ANSWER request	UNFILLED	31	CHECKED-IN request	
		ESTIMATE	33	OVERDUE request	
		RETRY	36	RENEW indication	
		LOCATIONS-PROVIDED	37	RENEW-ANSWER request	YES
9	ILL-ANSWER request	WILL-SUPPLY	38	RENEW-ANSWER request	NO
10	ILL-ANSWER request	HOLD-PLACED	41	LOST request	
17	CONDITIONAL-REPLY indication	YES	42	LOST indication	
18	CONDITIONAL-REPLY indication	NO	43	DAMAGED request	
20	CANCEL indication		44	DAMAGED indication	
21	CANCEL-REPLY request	YES	45	EXPIRED indication	

[a] A number without additional marking identifies an original event.

[b] A number accompanied by an asterisk (*) identifies a service event that is a repeat of a preceding one of the same type.

[c] A number accompanied by two asterisks (**) identifies a service event that may be either an original or a repeat event.

Figure 14 — State Transitions for Intermediary: Role of Responder (In-Sequence Messages Only)

8.3 Additional Sequencing Rules

a) Before an ILL-transaction is started (i.e. before an ILL-REQUEST is sent or received) it is in the IDLE state. The only valid message is an ILL-REQUEST.

b) Once no further activity need be performed on an ILL-transaction, it will be in one of the terminal states. Local procedures for ILL-transaction closure are not part of this International Standard.

c) All states are applicable to ILL-transactions involving returnable items, e.g. a book. For such ILL-transactions, the possible terminal states are NOT-SUPPLIED, CANCELLED, RETURNED, and LOST for the Requester, and NOT-SUPPLIED, CANCELLED, FORWARD, CHECKED-IN and LOST for the Responder.

d) The OVERDUE, RETURNED, RECALL and CHECKED-IN states are not applicable to ILL-transactions involving non-returnable items, e.g. a photocopy or micro-reproduction. For such ILL-transactions, the possible terminal states are NOT-SUPPLIED, CANCELLED, RECEIVED and LOST for the Requester, and NOT-SUPPLIED, CANCELLED, FORWARD, SHIPPED and LOST for the Responder.

e) Certain request service primitives, i.e. SHIPPED, CHECKED-IN, RECEIVED, and RETURNED, are associated with optional messages and therefore might not result in a corresponding indication service primitive.

f) The RECEIVED and RETURNED messages (request or indication) do not cause a state change.

g) The minimum set of interactions for a Requester for an ILL-transaction involving a returnable item is:

   — ILL-REQUEST request

   — RECEIVED request

   — RETURNED request

h) The minimum set of interactions for a Responder for an ILL-transaction involving a returnable item is:

   — ILL-REQUEST indication

   — SHIPPED request

   — CHECKED-IN request

i) The minimum set of interactions for a Requester for an ILL-transaction for a non-returnable item is:

   — ILL-REQUEST request

   — RECEIVED request

j) The minimum set of interactions for a Responder for an ILL-transaction for a non-returnable item is:

   — ILL-REQUEST indication

   — SHIPPED request

k) The STATUS-QUERY, STATUS-OR-ERROR-REPORT and MESSAGE services can be invoked at any time and in any state. They do not cause any state transitions.

l) The STATUS-OR-ERROR-REPORT service can be used in response to a STATUS-QUERY or it can be invoked on its own.

m) Once a Responder has forwarded a request to another institution, the only services that remain valid are the FORWARD, STATUS-QUERY, STATUS-OR-ERROR-REPORT and MESSAGE services.

n) To support a service requirement to repeat certain services, e.g. OVERDUE, and to allow for recovery from message loss, message corruption, reception of error reports or the failure of the peer service-user to respond in a timely manner, certain service requests may be re-issued.

Such repeated service requests are characterized by the inclusion of the date and time of the original request as well as the date and time of the repeated request as part of the service date and time parameter. All other service parameters remain the same, with the possible exception of the "Note" parameter which may change.

All service requests except the following may be repeated:

— MESSAGE

— STATUS-QUERY

— STATUS-OR-ERROR-REPORT

— DAMAGED

For the above list of services, multiple service requests may be issued, but each such request is considered to be a new service, and no date and time of original request is ever provided.

Repeated service requests by a requester or responder are permitted only if no events have occurred since the initial request to change the state of the initiating application-entity-invocation. Until such a state change occurs, a request may be repeated any number of times.

For an intermediary, a service request may be repeated as long as no other service requests, apart from the list of non-repeatable services identified above, have been issued. Thus, an intermediary may repeat a service request even if an incoming event has caused a state change for the intermediary.

Repeated service requests do not result in a state change for the application-entity initiating the request. They simply cause the corresponding message to be sent again. At the recipient, the application-entity will process a repeated message as an original if it failed to receive the preceding one(s). Otherwise, it may simply generate an indication to the user without changing state. For example, a responder may reissue an ILL-ANSWER if the requester has failed to receive the message, or has received the message but the message contents are garbled due to equipment or communications problems.

o) The value of the "service date and time" parameter must be distinct for each service request made by the same party (requester, responder, intermediary) for a particular transaction.

p) The service-provider makes visible to the recipient indications that are repeated, out-of-sequence or that occur after their useful time (i.e. that have been overtaken by subsequent events). This is done to allow for the possibility that such indications may contain some useful information. Such indications do not cause any state change.

For those service indications for which a response is normally expected, i.e. ILL-REQUEST, ILL-ANSWER CONDITIONAL, RENEW, OVERDUE, CANCEL and RECALL, the recipient shall respond to the indication, repeating an earlier response if it has already made one. This repetition protects against the possibility that the original response was lost.

q) If a requester receives a message from a responder other than the expected one, i.e. the "responder identification" parameter identifies a system other than the one to which the request was originally sent and the "intermediary identification" parameter is absent and no FORWARD NOTIFICATION indication has been received, then the requester considers this to be a case of implied forwarding. If the requester has issued to the original responder a request for which a reply is expected, e.g. a CANCEL request, this request should be repeated to the new responder, if the request is still appropriate in the light of the received message.

r) Once a responder has received a CANCEL indication, it must respond with a CANCEL-REPLY request, with the following exception. If it has already issued a SHIPPED request, FORWARD request or ILL-ANSWER request with a result of ESTIMATE, RETRY or LOCATIONS-PROVIDED, then the CANCEL indication is ignored and no CANCEL-REPLY request is issued. The service request already issued should be repeated to allow for the possibility that the original message was not received and accepted by the requester.

s) For an intermediary participating in a chained or partitioned ILL-transaction, it must maintain two sets of ILL-transaction state information: one for interactions with the requester and one for the interactions with the responder. For interactions with the requester, the intermediary acts in the role of a responder. Its terminal states are SHIPPED, FORWARD CANCELLED, and NOT-SUPPLIED. For interactions with the responder, the intermediary acts in the role of a requester. Its terminal states are SHIPPED, CANCELLED and NOT-SUPPLIED.

t) For an intermediary participating in a partitioned ILL-transaction, none of the events identified in Figure 14 as occurring in the SHIPPED state should occur. These events are applicable only to chained ILL-transactions.

Annex A
(informative)

Time sequence diagrams

Time sequence diagrams are used to illustrate how sequences of interactions are related in time.

Time sequence diagrams indicate:

a) the sequence of events at each of the requester and responder;

b) where appropriate, the sequence of events between the requester and responder.

Each diagram is partitioned by two vertical lines into three columns. The central column represents the service-provider and the two side columns represent the two service-users. The vertical lines represent the conceptual boundary between the service-users and the service-provider.

Sequences of events at each boundary are positioned along lines representing the passage of time, increasing downwards.

Arrows, placed in the areas representing the service-user, indicate the direction of propagation of primitives (i.e. to or from the service-user) and may include implicit flow control between the service-user and the service-provider.

Necessary sequence relations between the two user-provider interfaces are emphasized by an angled dashed arrow between the time lines. In the absence of this arrow, there is no specific sequence between points in time on the two lines.

The state resulting from the invoking of each primitive is indicated in parentheses.

The time sequence diagram of Figure A.1 depicts the minimum number of interactions required for a simple loan of a returnable item. None of the optional indication primitives is shown.

Figure A.2 represents the same ILL-transaction, but with the optional indication primitives (SHIPPED, RECEIVED, RETURNED, CHECKED-IN) included.

Figure A.3 shows an ILL-REQUEST followed by a RENEWAL. No optional indication primitives are included.

The time sequence diagram of Figure A.4 shows an ILL-transaction where photocopies are supplied, and not required to be returned, and optional indication primitives are included.

The time sequence diagram of Figure A.5 includes an ILL-REQUEST with several collisions. A CANCEL indication is received by the RESPONDER after the item has been shipped, a RENEW message and an OVERDUE message pass in transit, and an OVERDUE message is received by the REQUESTER after the item has been returned.

Figure A.6 is a time sequence diagram for a STATUS-QUERY and STATUS-OR-ERROR-REPORT.

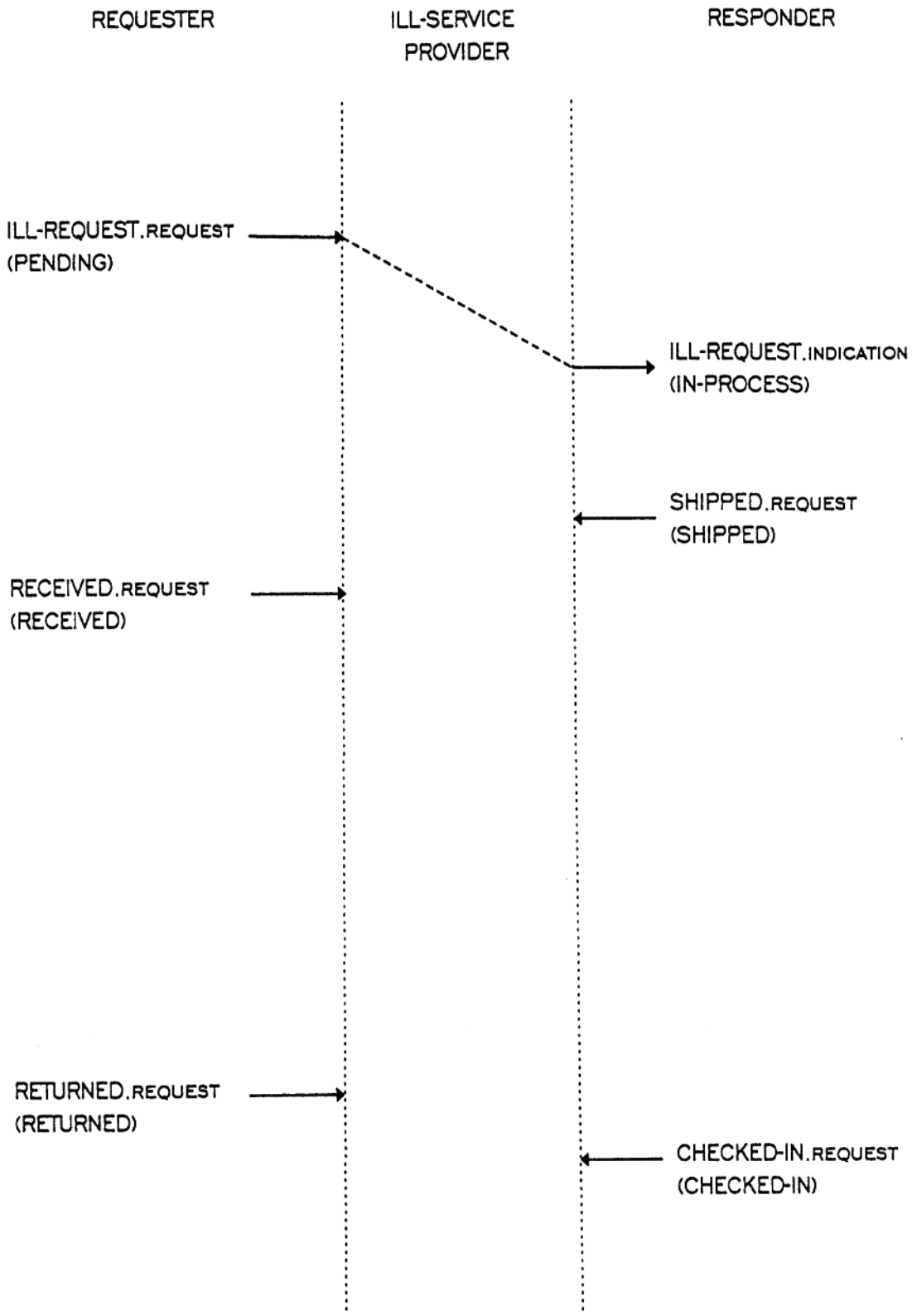


Figure A.1 — Time Sequence Diagram for Loan of Returnable Item (Minimum Number of Interactions — No Optional Indications)

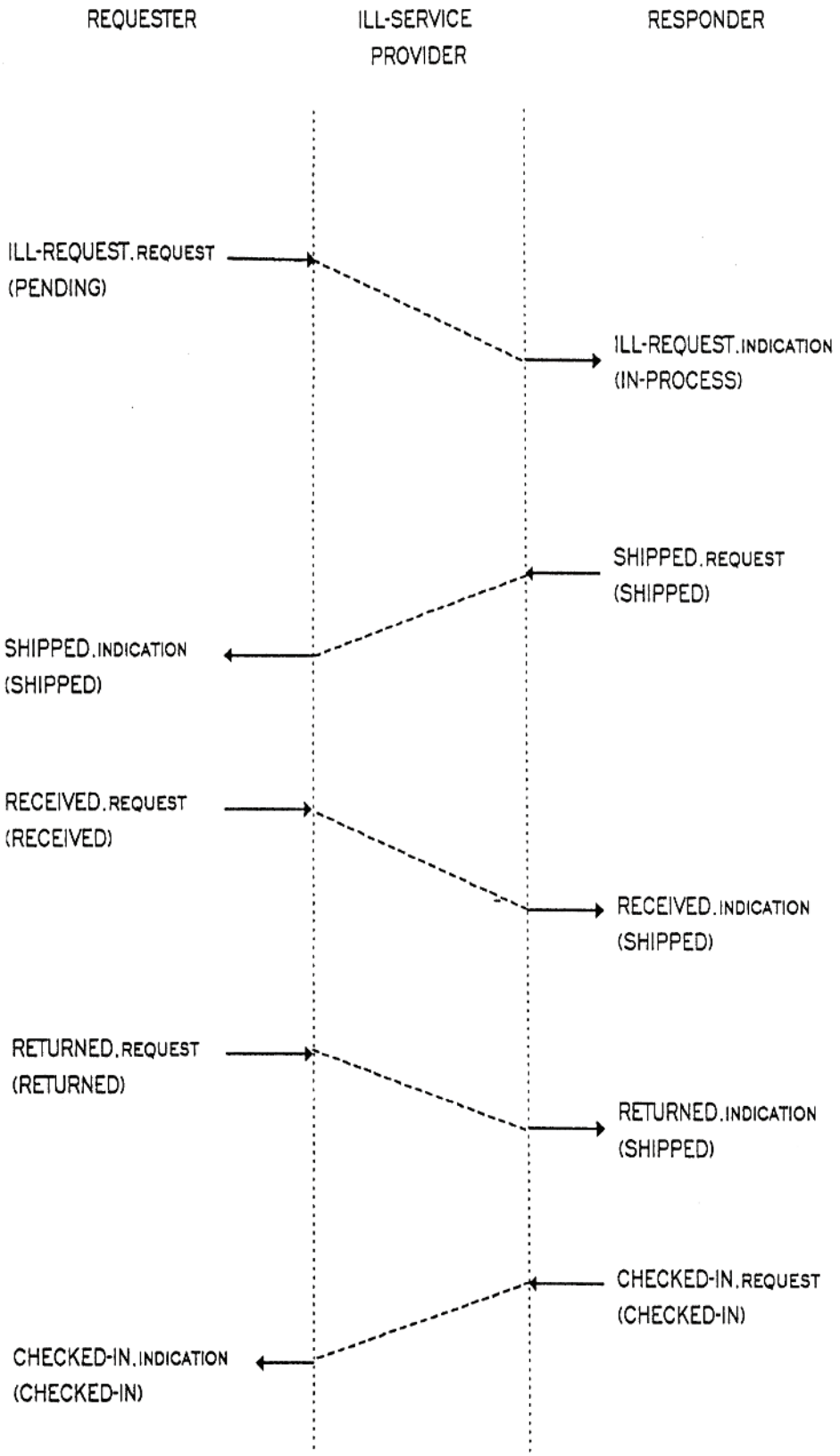


Figure A.2 — Time Sequence Diagram for Loan of Returnable Item (Optional Indication Primitives Included)

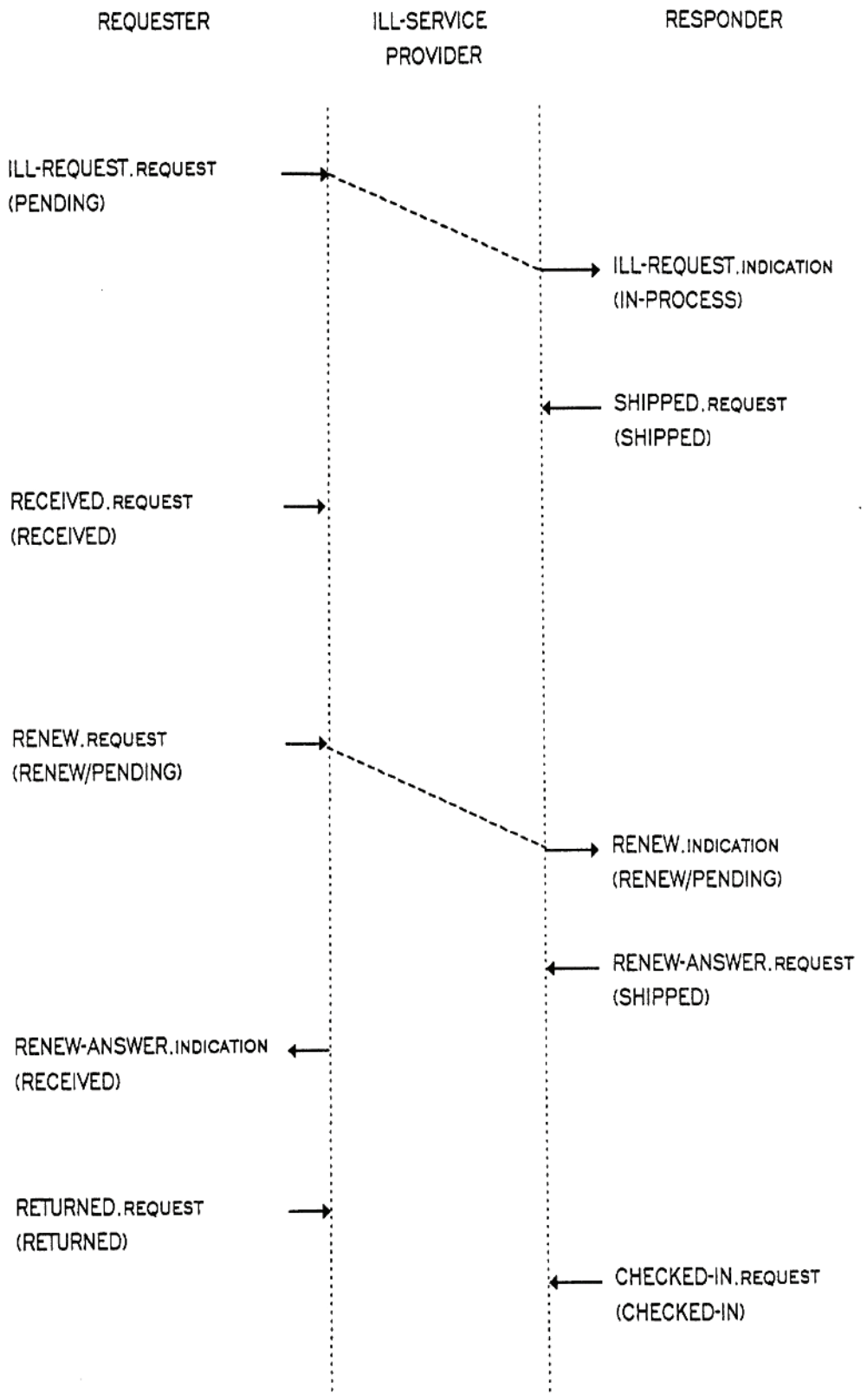


Figure A.3 — Time Sequence Diagram for an ILL-Transaction with Renewal

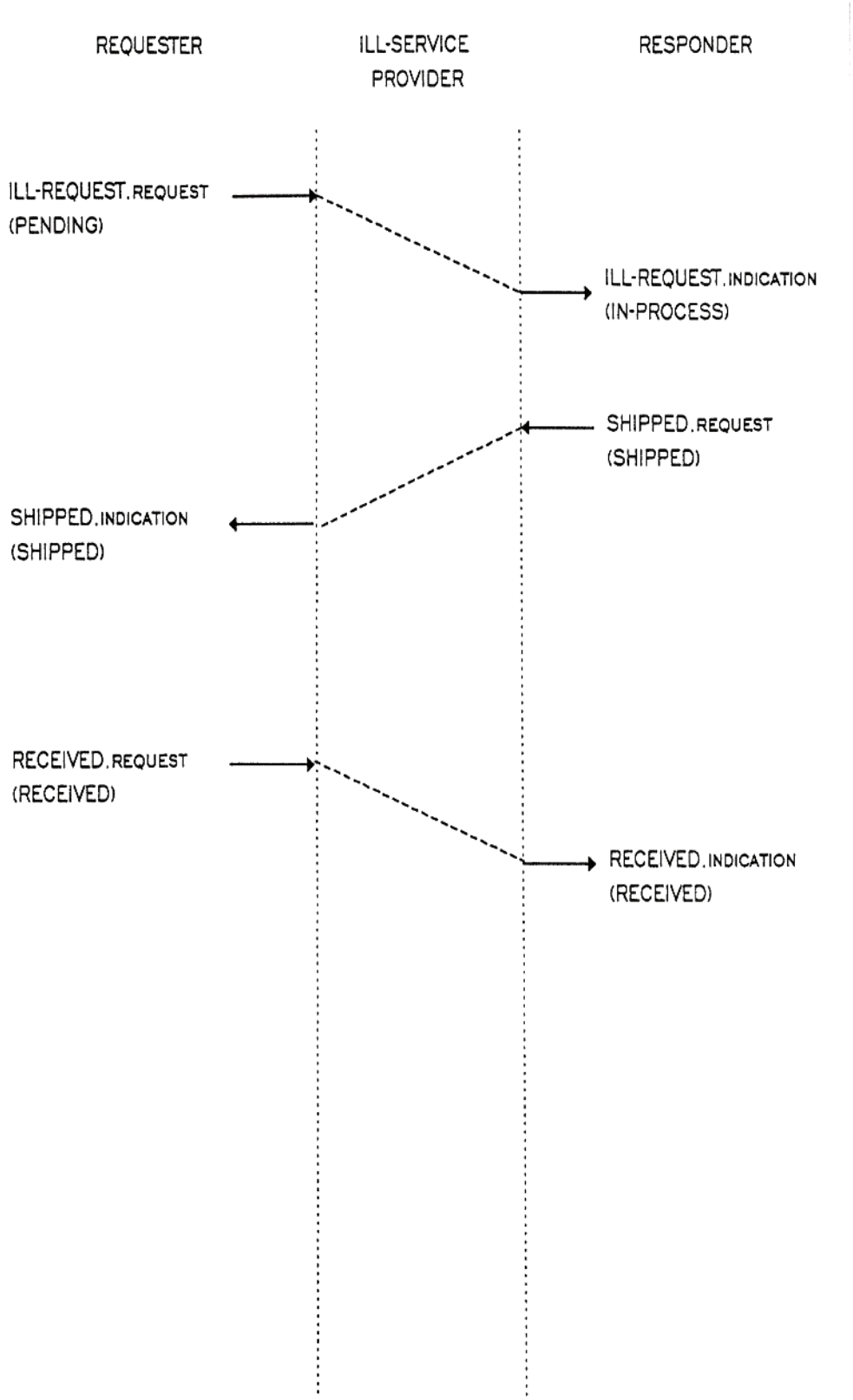


Figure A.4 — Time Sequence Diagram for an ILL-Transaction for Supply of a Photocopy

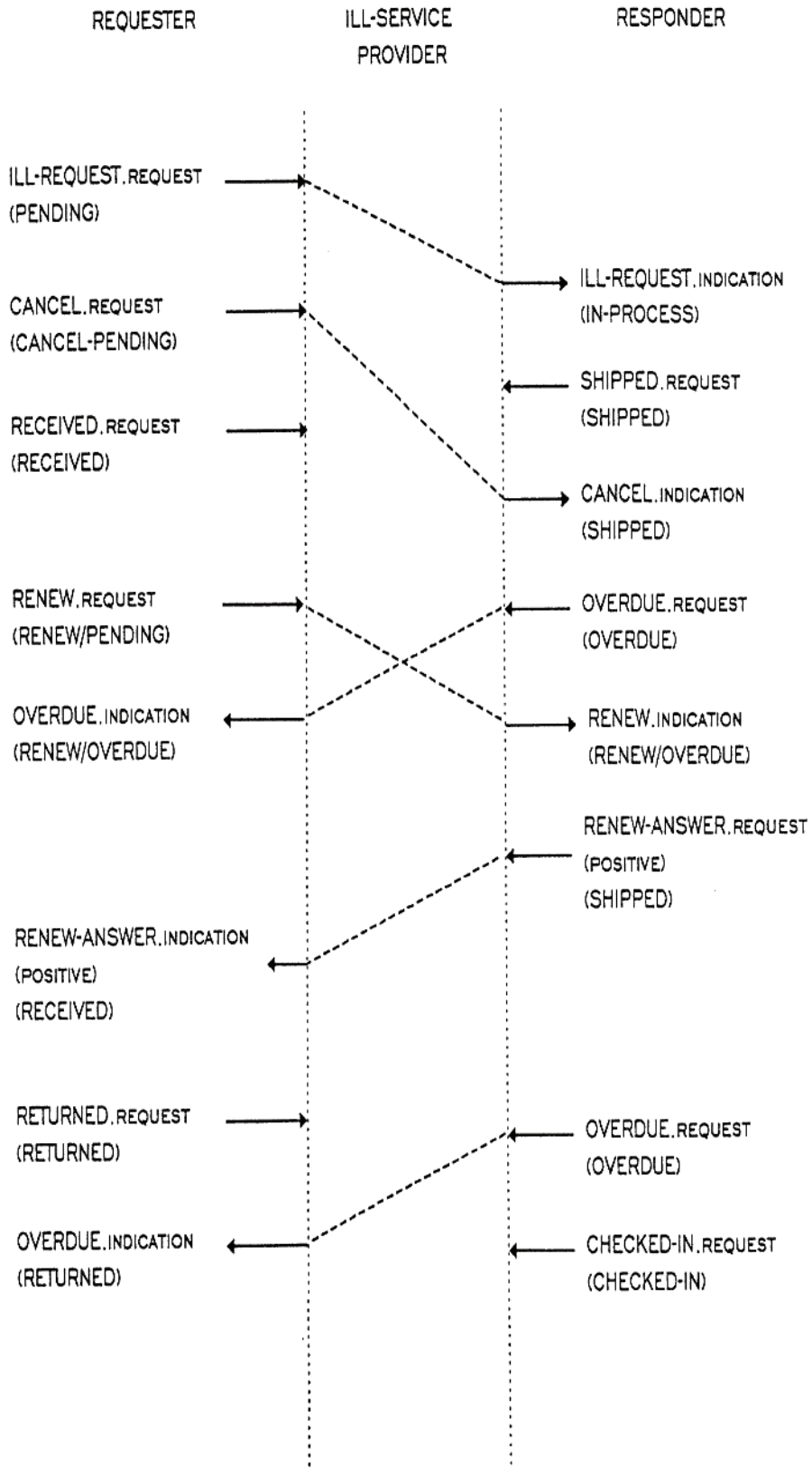


Figure A.5 — Time Sequence Diagram for an ILL-Transaction with Collisions

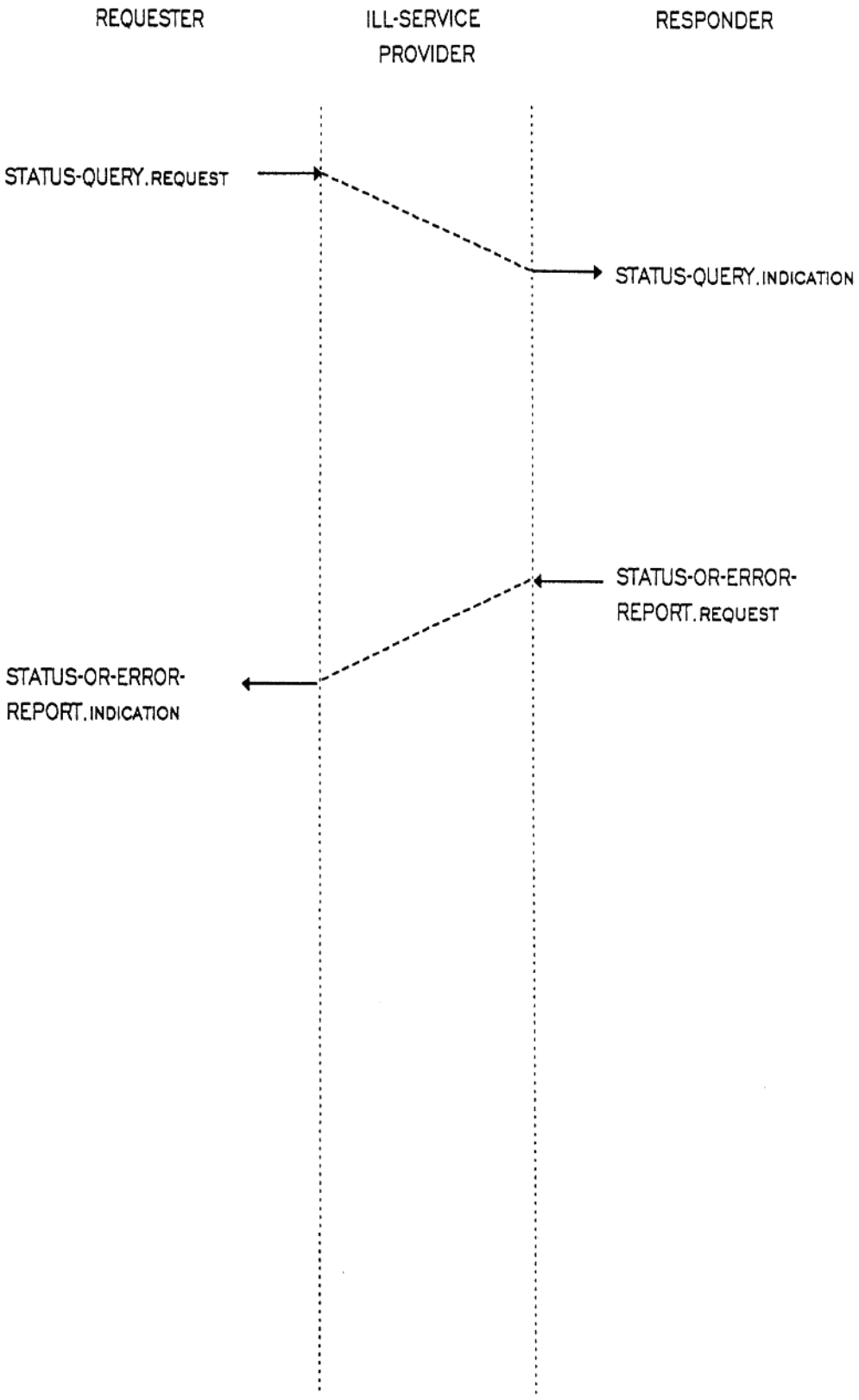


Figure A.6 — Time Sequence Diagram for a Status-Query

Annex B
(informative)

ILL service and document delivery

Delivery of a requested item is not within the scope of the ILL service. It relies for this function on the operation of an appropriate delivery service that may be invoked automatically or through human operator intervention. This applies to items in any format and medium, and the ILL service may be operated in conjunction with a variety of delivery services—both physical and electronic. Version 2 of the protocol specification (ISO 10161) provides features to support the request of documents in electronic form and specification of an appropriate delivery service.

B.1 Electronic documents

The ILL Service provides for requesting both returnable and non-returnable items. A non-returnable item may be a copy of an electronic document in any format such as the following:

— Structured and unstructured IA5 text (ISO 646)

— SGML structured text (ISO 8879, ISO 12083)

— ODA structured text (ISO 8613)

— Page images in CCITT Group 3 or Group 4 Facsimile encoding

— Non-standard PostScript files encoded as IA5 text

— Multi-media documents containing both text and non-text components (e.g. graphics, image, voice)

A requested electronic document may only be available in a specific format; to ensure that the requester is delivered a document in a format that the requester's system can handle, format information in a human readable form may be exchanged between the requester and the responder through use of the parameters **requester note**, **responder note** and **forward note**.

A request for an electronic document may be fulfilled by supplying the document on a transportable mass-storage medium such as a magnetic diskette or an optical CD-ROM. The requested document may also be transmitted electronically via some telecommunication-based transfer facility. The ILL service provides for exchange of supply-medium information between the service users.

An electronic document may be subject to copyright protection and the supplier of copies of such documents may require payment of fees. The ILL Service permits the exchange of information pertinent to these aspects of document supply.

B.2 Electronic delivery

The ILL Service allows the identification of a variety of services–both physical and electronic–for delivering a requested item. Delivery services that may be used in conjunction with the ILL service include, but are not limited to:

— Public or private postal and courier services

— Fax service

— OSI data transfer services (e.g. ISO FTAM, CCITT X.400 Interpersonal messaging)

— Internet data transfer services (e.g. FTP, SMTP)

Hard-copy items like books and photocopies are normally delivered via physical delivery services, as are electronic documents on tangible media. Use of a physical delivery service generally requires human intervention between receipt of the ILL request and desptach of the requested item, and implies no machine-processable link between the ILL-transaction and the delivery service.

Electronic delivery means delivering an electronic item through the operation of a telecommunication-based data transfer service; it does not mean that the electronic item is delivered as user data encapsulated in an ILL APDU. However, delivery of an electronic document can be closely synchronized with the delivery of an ILL APDU, as, for example, when both are carried in the same APDU of a bulk data transfer protocol. A bulk data transfer protocol can be invoked from within an application that uses the ILL service with or without human intervention.

When used with human intervention, the operator simply invokes an appropriate electronic delivery service such as the fax service or a bulk data transfer service such as FTAM or FTP. When the delivery mechanism is required to be invoked automatically without human operator intervention, then a machine-processable link between the ILL-transaction and the delivery service must be provided. By carrying the necessary information in machine-processable form, the ILL Service permits the operation of such machine-processable links.

Each electronic delivery service has its unique method of handling the structure and encoding of the bulk user data (e.g. electronic document) it carries. Specification and registration of FTAM Document Types, X.400 IPM Body-Part Types, etc. is a reflection of this manner of handling user data by the bulk carriers. However, such document type definitions, their registration and the assignment of unique identifiers to them are outside the scope of the ILL standard.

To fulfill ILL requests for electronic documents in a fully automated environment, the coordinated operation of the ILL Service and the electronic document delivery services may be specified in some appropriate ASO (Application Service Object) specification outside the ILL standard.

B.3 Error and damage reporting

When an ILL request for an item remains unfulfilled because of a failure condition in the invoked delivery service, error reporting will depend on the way the delivery service is invoked. If the delivery service is invoked through operator intervention, the error condition of the delivery service could be conveyed to the ILL requester by the operator, possibly by invoking the ILL STATUS-OR-ERROR-REPORT service.

In case the delivery service is electronic and invoked automatically, the error report of the delivery service may be mapped to the error reporting mechanism of the ILL service. This mapping could in principle be defined in an ASO (Application Service Object) specification for the coordinated use of the ILL and the delivery service in question.

The process of electronic delivery may cause the delivered document to be damaged or corrupted. The invocation of the DAMAGED service by the requester informs the responder of the nature of the damage and, if so defined, can trigger retransmission of parts of or the whole of the document until a satisfactory copy is delivered.

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4) ISO/IEC 7498-1 with ISO 7498-2:1989, ISO 7498-3:1989 and ISO/IEC 7498-4:1989 supersede ISO 7498:1984. However, when this International Standard was under development, the previous edition was valid and this International Standard is therefore based on that edition.

5) Revises ISO/TR 8509, which has been withdrawn.

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