Circulation Interchange Part 1: Protocol (NCIP)

Abstract: This Standard defines a protocol that is limited to the exchange of messages between and among computer-based applications to enable them to perform the functions necessary to lend and borrow items, to provide controlled access to electronic resources, and to facilitate co-operative management of these functions.

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National Information Standards Organization
4733 Bethesda Avenue, Suite 300
Bethesda, MD 20814-5248
Telephone: 301-654-2512  Fax: 301-654-1721
nisohq@niso.org
www.niso.org
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Foreword

(This foreword is not part of the American National Standard for Circulation Interchange Part 1: Protocol (NCIP), ANSI/NISO Z39.83-2002. It is included for information only.)

Acknowledgements

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About This Standard

Both the rapid evolution of Web-based library services and the growing number of resource-sharing arrangements among libraries require an open standard for the exchange of circulation data. These applications must exchange data about library users, the items they wish to use, the owners of the items, and the relationships among these three entities.

In the absence of an agreed-upon standard for exchanging circulation data, interoperability among disparate applications has been ad hoc and proprietary. The cost of such solutions is high for individual agencies and in any case, these solutions often provide for only a limited exchange of data because proprietary solutions limit the number of implementations that can participate in the exchange.

This Standard is intended to address the growing need for interoperability among disparate circulation, interlibrary loan, and related applications. Interoperability between self-service applications and circulation applications, between and among various circulation applications, between circulation and interlibrary loan applications, and between other related applications, has been the principal focus of this Standard. All key terms used in this Standard are defined in Section 4 or Section 6.

The demand for self-service applications led to the development of the 3M Standard Interchange Protocol (SIP) which has become the de facto standard interface for self-service applications. This Standard supports the deployment of self-service applications by building on experience obtained from the broad use of the 3M SIP.

This Standard has been developed within the context of a variety of existing standards, as well as through an awareness of existing applications. Wherever possible, existing terminology and definitions are used, duplication is avoided, and every effort has been made to permit developers to meld standards into a single application.
The Protocol

The protocol specified in this Standard (NCIP) defines and specifies a set of objects, a set of services, messages that support those services, a set of data elements used in the messages, and a pair of state tables governing the exchange of messages over a single connection. NCIP is a connection-oriented, sessionless protocol.

- **Connection-oriented** - Circulation processes happen in real time, often with the user present and awaiting service. A connection-oriented protocol facilitates a timely interaction between applications and allows the application requesting a service to know with confidence that a message was received by the partner application.

- **Sessionless** - The lifecycle of a particular circulation activity provided by an agency to a user is often extended over days, weeks, or months. It is impractical to maintain sessions between two applications. This environment is unlike information retrieval where a single service involves related exchanges within a brief period of time.

- **State of the message** - The protocol does provide a simple state table that governs the exchange of messages within a connection. This table does not govern the order of messages across the lifecycle of any particular circulation exchange between a user and agency or agencies.

Extensibility

NCIP is intended to support multiple applications and to evolve with technology and library practice. This requires an extensible framework that includes the protocol and two types of profiles.

- **The Standard** - This Standard describes the services, data objects and data elements at an abstract level. The protocol defined herein may be deployed using different encoding and transport implementation methods.

- **Implementation Profiles** - Each implementation method is described in a separate Implementation Profile that specifies how messages are exchanged. Specifications include message, character, and data encoding; required components and behavior; network transport; network security; scheme registration; and provision for extension. Note: Implementation profiles were originally called Cross-Application Profiles.

- **Application Profiles** - Application Profiles describe how the protocol would be used to support a specific application with a given set of practices and policies. An Application Profile includes a description of services that must be supported. Each profile also provides an event table that maps specific external events and circumstances to the use of particular services specified in the protocol.

This total framework will provide the stability required for longevity of use along with the flexibility necessary for NCIP to adapt to changing usage and technology. It will also allow it to be used across multiple applications.

- **Evolving technology and usage** - Separating services and data objects from actual implementation details will allow the NCIP to be implemented with new technology without needing to redefine services or data objects.

- **Multiple applications** - Practical implementation of the NCIP will vary among and even within broad application areas. If each application were to follow its own rules, interoperability would inevitably suffer. The application profiles allow for detailed specification of the use of the NCIP within a particular application area. Two implementors exchanging messages have a common set of rules to determine what
messages must be sent in a particular circumstance.

Of equal importance in thinking about extensibility is balancing the requirement for supporting the wide variation in local circulation practices and policies with support for interoperability among libraries and other organizations. Investigation showed that much of local practice and policy data is encapsulated in enumerated lists that capture descriptive elements for both items and users. The values in those lists vary from library to library, even among libraries of the same type.

As a solution to the need to support variation in local library practice, the NCIP uses a scheme-value pair instead of a single primitive data element for all such enumerated lists. The scheme name identifies the specific enumerated list that is being used. The value element provides a specific entry from this list. Each scheme is identified by a URI to guarantee a unique name for the scheme.

The Committee, its Membership, and Process

Committee AT began its work in January of 1999. NISO formed the committee so that it was broadly representative of organizations active in this area. It included individuals who represent libraries and other organizations that use circulation applications and providers that develop and sell those applications.

This committee has worked from the beginning to develop a protocol that would be of the greatest benefit to the entire community. The inclusive nature of the committee was helpful in achieving this goal. It was also necessary to operate in a very open fashion. Meeting attendees from outside the committee were invited to participate in discussions; several were asked to join the committee. At key stages throughout the process the committee has reached out to the community for comment through announcements on key online discussion lists, through appearances at conferences, and by presentations to key standards groups like the Z39.50 Implementors Group (ZIG) and the ISO ILL Protocol Implementors Group (IPIG). This has brought in invaluable comment and discussion.

The committee began its work by developing a set of goals for the NCIP that was published on the NISO Web site in November of 1999. The committee responded to all comments and revised the document as appropriate.

The committee then set to work on writing the NCIP itself. The first task was to define the data objects and the message structure. Once the basic outline of objects and services was complete, the committee undertook the complex task of assuring that the NCIP as defined would support the intended applications.

In order to accomplish this efficiently, the committee organized itself into teams around the three broad application areas. Each application team included experts from that application area. These teams reviewed the message structure from the perspective of their application and suggested changes. Through this process, the committee discovered the need for several new messages and for additional data elements.

During this time, the committee also took up the task of developing and finalizing an Implementation Profile. The committee had agreed early in 2000 that it would use XML for message encoding and that it would use a DTD to encapsulate the structure. By August of that year, the committee had settled on the transport mechanisms. With this completed, the committee had taken the NCIP to the point that it could be implemented.
As a result, in 2000 December, the committee reached consensus that the protocol and the Implementation Profile were ready for initial testing. To encourage this testing, NISO published the Standard (Protocol and Implementation Profile 1) as a Draft Standard for Trial Use in 2001 January. The committee took this step because it felt that only practical field implementations could identify the areas in which the Standard would need to be refined to support robust interchange of data among disparate systems. As hoped, several organizations undertook serious implementation efforts and these efforts guided changes to the Draft Standard.

These implementations also heightened the committee’s awareness that application profiles were an absolute necessity. For most of 2001, the committee focused on developing a structure for these profiles and developing a series of profiles. The committee anticipates that these profiles will be modified through use and that additional profiles will be created.

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This Standard was processed and approved for submittal to ANSI by the National Information Standards Organization. It was balloted by the NISO Voting Members 2002 May 24 - 2002 July 8. It will next be reviewed in 2007. Suggestions for improving this Standard are welcome. They should be sent to the National Information Standards Organization, 4733 Bethesda Avenue, Suite 300, Bethesda, MD 20814. NISO approval of this Standard does not necessarily imply that all Voting Members voted for its approval. At the time it approved this Standard, NISO had the following members:

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3M
Jerry Karel
Susan Boettcher (Alt)

American Association of Law Libraries
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Mary Alice Baish (Alt)

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Robert S. Tannehill, Jr.

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Library of Congress

**Norman Paskin**  
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U.S. National Archives and Records Administration

**Albert Simmonds**  
OCLC, Inc.
Committee AT Members

John Bodfish  
epixtech, inc.

Robert A. Daugherty  
University of Illinois at Chicago

Mary E. Jackson  
Association of Research Libraries

Jerry Karel  
3M

Sally H. McCallum  
Library of Congress

Randy Menakes  
Ex Libris (USA), Inc.

Mark H. Needleman, NISO Standards Development Committee Liaison  
SIRSI Corporation

Julie Blume Nye  
Fretwell-Downing, Inc.

Tony O'Brien  
OCLC, Inc.

Patricia Renfro  
Columbia University

James E. Rush  
Consultant

William Schickling  
Gaylord Information Systems

Barbara Shuh  
National Library of Canada

Patricia Stevens, Chair  
OCLC, Inc.

James Thomas  
The Library Corporation

Sandy Westall  
Innovative Interfaces, Inc.

Mark Wilson  
The Library Corporation
Circulation Interchange Part 1: Protocol (NCIP)

1. Purpose

The NISO Circulation Interchange Part 1: Protocol (NCIP) defines a set of messages and associated rules of syntax and semantics for use by applications to:

- Perform the functions necessary to lend and borrow items
- Provide controlled access to electronic resources
- Facilitate co-operative management of these functions

This Standard defines and specifies a set of objects, a set of services and the messages of which they are composed, a set of data elements used in the messages, and a pair of state tables governing the exchange of messages over a single connection. NCIP is a connection-oriented, sessionless protocol. This Standard specifically addresses conditions in which the application or applications that initiate the lending of items or control of access must acquire or transmit data about the user, agency, items, and/or access that is essential to successful conclusion of the function. This Standard also addresses the use of an agency's circulation application to manage access by a user to electronic resources such as electronic books, serials, and sound recordings.

While this Standard may be used in other applications, it specifically supports the following application areas.

- **Direct Consortial Borrowing** – Through direct consortial borrowing, users of one agency can request and borrow items from another agency within a consortium. NCIP facilitates the transfer of User and Item data between disparate circulation applications, thereby allowing an agency to manage traffic for non-local patrons and/or provide local control of items belonging to another agency.

- **Circulation/Interlibrary Loan Interaction** – NCIP facilitates the exchange of circulation data between interlibrary loan (ILL) applications and circulation applications, thereby permitting agencies to use circulation applications to track all loans to a user. Items belonging to the local collection and items borrowed for that User via interlibrary loan can be recorded together in the user's circulation record. Notifications for pickup, listing of charges, overdue notifications, etc., can be handled in the same way, whether items are owned locally or borrowed from another agency. Agencies may also expedite the tracking of items lent via interlibrary loan within their local circulation applications.

- **Self-Service Circulation** – Self-service circulation applications allow users to check out or check in desired items without assistance from agency staff. These applications may also support fine/fee transactions and supply user account data from the agency's circulation system.

2. Scope

This Standard describes a protocol (NCIP) that defines the exchange of messages between and among computer-based applications to enable them to perform the functions necessary to lend and borrow items, to provide controlled access to electronic resources, and to facilitate co-operative management of these functions.