

NISO Circulation Interchange Protocol (NCIP) Part 2: Implementation Profile 1

Version 2.02

Abstract: A practical implementation structure for the NISO Circulation Interchange Part 1: Protocol (NCIP) is defined.

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NISO
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Suite 302
Baltimore, MD 21211
www.niso.org

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Foreword

(This foreword is not part of the *NISO Circulation Interchange Protocol (NCIP) Part 2: Implementation Profile 1*, ANSI/NISO Z39.83-2-2012. It is included for information only.)

About This Standard

This Implementation Profile (IMP1) has been developed to provide a practical implementation structure for the NISO Circulation Interchange Part 1: Protocol (NCIP).

The Foreword to Part 1 provides a complete description of the reasons for the NCIP's development and the reasons for describing the physical implementation of the NCIP within an Implementation Profile rather than within the NCIP itself. In brief, the committee decided that this approach would improve the extensibility of the NCIP. This approach also allows the community of application providers and users to adapt the implementation profile to changing technology.

Version 2.00 includes radical changes to the protocol. It is not backward compatible with Version 1.00, as it is based solely on an XML Schema. The Version 2.00 changes build on changes made since original publication of NCIP and known collectively (if inaccurately) as version 1.01, the version several implementers are already using. There are a few other changes that also break backward compatibility. The most significant are in error handling and extensibility. A summary of the changes made in Version 2.00 is included in the Foreword to ANSI/NISO Z39.83-1-2008, *NISO Circulation Interchange - Part 1: Protocol (NCIP)*. A complete change list for Version 2.00 (including the incorporated changes from version 1.01) is posted on the NISO website at: www.niso.org/standards/z39-83-1-2008/.

In 2009, the NCIP standard (parts 1 and 2) moved from a periodically maintained standard that requires reaffirmation every five years to a continuously maintained standard. Under continuous maintenance, a process is put in place for submittal and review of proposed changes on a published schedule. Requests for change must be submitted to the NCIP Standing Committee (NISO-SC) prior to its semiannual in-person meetings. At each meeting, the group will review all of the change requests and decide to accept the change for inclusion in the next revision, accept the change for further study and additional discussion at a future meeting, or reject the change. The complete procedure for the continuous maintenance is available at the NISO website (www.niso.org/workrooms/ncip/continuous). When a sufficient number of changes have been accepted by the NCIP-SC—or one or more changes is deemed to be to significant enough—the NCIP-SC will prepare a revision for ballot and approval by a NISO voting pool of interested NISO voting members.

The NCIP-SC believes that Continuous Maintenance will permit the NCIP standard to adapt more quickly to the ever-changing needs in the implementer community. The group is, however, sensitive to the tension that exists between frequent changes, interoperability, and backwards compatibility. Therefore, the NCIP-SC is committed to maintaining backwards compatibility in minor revisions and reserving more significant structural changes for major revisions. For example, Version 2.00 and 2.01 will be compatible, but there is no guarantee that Version 2.01 and Version 3.0 will be. Of course, a Version 2.0 implementation exchanging with a Version 2.01 implementation will not understand any changes introduced in Version 2.01. It should be noted, too, that the effective version used in any specific transaction is governed by the Initiator.

In December 2010, Version 2.01 was issued by the NISO-SC and treated as a draft for trial use. It was not officially balloted or approved as a revision to the standard. The changes in this standard (*Implementation Profile 1*) include updates for the proper URIs for the 2.01 schema and inclusion of what is the proper XML header for a conforming document. For a full list of the Version 2.01 changes to NCIP, see the Foreword to NISO Z39.83-1-2008 (Version 2.01), *NISO Circulation Interchange - Part 1: Protocol (NCIP)*.

This is Version 2.02. The changes in this revision are primarily corrections to earlier versions. Most notably, the reference in Section [5.3](#) to ISO 8601 for the format for dateTime elements has been

adjusted to reflect changes in the structure of that standard. Also, the location for the NCIP Version schema (Section 6.3.2) has been restored to what it was in Version 1.0 of the standard. The schema for the Version element was intended to remain static across versions and should not have changed with each revision. The URIs of the schemas given in Appendix C, too, have been restored to the values from Version 1.0. A note has been added to explain that the schema URI should not change unless the content of the referenced schema itself changes. In addition, these schemas have been normalized to have a consistent format. Finally, new values have been added to the Bibliographic Item Identifier Code scheme and the Medium Type scheme.

Instructions for Submittal of Proposed Change to ANSI/NISO Z39.83 Under Continuous Maintenance

If a provision of the standard is proposed to be added, deleted, or modified, the text of the provision must be submitted in writing. Comments or proposals for revisions to any part of the standard may be submitted to NISO any time. Submissions must be accompanied by the submitter's name, affiliation, telephone number, and e-mail address.

Written comments are to be sent to:

National Information Standards Organization (NISO)
Attn: NCIP Standing Committee
3600 Clipper Mill Road, Suite 302
Baltimore, MD 21211
Tel.: 301-654-2512 (main)
866-957-1593 (toll-free)
Fax: 410-685-5278
E-mail: nisohq@niso.org

Comments may also be submitted to NISO online at www.niso.org/contact. In addition, the following person may be contacted by those interested in submitting changes:

Robert Walsh
ANSI/NISO Z39.83 Maintenance Agency Representative,
EnvisionWare
E-mail: rwalsh@envisionware.com

Principles

In making decisions about this Implementation Profile 1 (IMP1) the committee examined ways to facilitate rapid and widespread implementation of the NCIP. Two goals drove decision-making: 1) make it easy for service providers to use NCIP in a variety of applications, and 2) make it easy for them to build those applications quickly. From these goals, the committee developed the following principles:

- Use technology that is widely supported. This dictated choosing options that offered the most robust support for application development.
- Stay with the curve. NCIP will be embedded in applications that last an average of several years, if not longer. This requires choosing technology likely to stand the test of time. In some cases, this meant rejecting very promising technology when it was not clear that the technology would be widely adopted. As noted below, the committee deliberately built bridges to emerging technology where possible.

These were judgment calls, not matters of precise calculations. Several areas deserve particular mention:

- **Message Encoding and Structure** – The committee chose Extensible Markup Language (XML) over ASN.1/BER, which has been widely used in library applications. XML is supported by a large number of organizations and tool providers. This provides implementers with a choice of tools. In addition, the expectation is that it will be the dominant encoding

method used in Internet communication. This widespread usage will help those using the NCIP for library applications to connect libraries to the broader stream of information services available in today's electronic environment.

- **Extensibility** – The Foreword to Part 1 discusses the variation in circulation practice and the need for a flexible mechanism for supporting variation in practice and local policy. The business rules that enforce these policies often use enumerated data types to characterize those policies. In some cases these are defined in existing authoritative lists; in other cases, the lists are maintained locally by an agency or a consortium. In either case, the expectation is that the definition of the enumerated types will be independent of the XML Schema definition for NCIP messages.

The committee has adopted a data structure that allows for an optional Scheme attribute on data elements that tend to be values drawn from lists of values (authoritative or local) while leaving implementers free to use values without the mandated constraint of pre-defined lists.”

- **Character Encoding** – The committee chose Unicode (UCS-2) for character encoding because the protocol messages may carry character data unsupported by the ASCII character set (American Standard Code for Information Interchange, ANSI X3.4-1 986).

UTF-8 was chosen as the encoding scheme. Using UTF-8 is consistent with the Internet Engineering Task Force (IETF) mandate for the use of Unicode in Internet standards. UTF-8 will allow applications that only require support provided by ASCII encoding to use ASCII and remain compliant with this IMP1.

- **Message Transport** – The committee carefully considered the options for specifying transport protocols. Two aspects of the anticipated implementations drove the decision-making:
 - The NCIP will be implemented extensively in applications that cross administrative domains. In these applications, secure transmission is a critical issue.
 - In many cases NCIP messages will be embedded within Web applications, but in others, notably self-standing kiosk applications, the use of Web protocols might be difficult.

For these reasons, the IMP1 allows applications to use one of three transport protocols: hypertext transport protocol (HTTP), hypertext transport protocol with secure socket layer (HTTPS), and TCP/IP. The initiating application selects the transport mechanism and the responding application must respond using that transport. These choices may be restricted by an application profile.

The committee also considered using Simple Object Access Protocol (SOAP). While it had several advantages, the committee chose not to adopt it because SOAP is not currently a fully approved protocol.

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ANSI/NISO Z39.83-2-2012 Version 2.02

The following NISO members were in the voting pool that approved this standard.

American Society for Information Science & Technology (ASIS&T)
Mark Needleman

Association of Research Libraries (ARL)
Julia Blixrud

College Center for Library Automation (CCLA)
David Brightbill

EnvisionWare Inc.
Robert Walsh

Ex Libris Inc.
Mike Dicus

Innovative Interfaces Inc.
Betsy Graham

John Wiley & Sons Ltd.
Keith Webster

Library of Congress
John Zagas

Los Alamos National Laboratory
Miriam Blake

Lyrasis
Peter Murray

Minitex
Cecelia Boone

Music Library Association
Mark McKnight

National Archives and Records Administration
Marilyn Redman

National Security Agency
Kate Dolan

Polaris Library Systems
Eric Graham

Ringgold Inc.
Donald Chvatal

The Library Corporation (TLC)
Juli Marsh

NISO Discovery to Delivery Topic Committee Members

This standard is part of the portfolio of the NISO Discovery to Delivery Topic Committee. At the time the Topic Committee approved this standard for ballot, the following individuals were members.

Pascal Calarco
University of Waterloo Library

Lucy Harrison
College Center for Library Automation (CCLA)

Peter Murray
Lyrasis

John Mark Ockerbloom
University of Pennsylvania Libraries

Ido Peled
Ex Libris, Inc.

Jeff Penka
OCLC Online Computer Library Center

Tim Shearer
University of North Carolina Chapel Hill Libraries

Chris Shillum
Reed Elsevier

Robert Walsh
EnvisionWare, Inc.

NCIP-SC Members

The NCIP Standing Committee (NCIP-SC) provides support for the NCIP standard, including voting on and preparing changes according to the continuous maintenance procedures for this standard. The following individuals were members of the NCIP-SC at the time that version 2.02 (2012) was approved.

John Barr
Polaris Library Systems

John Bodfish
OCLC, Inc.

Dhaval Kotecha
RapidRadio Solutions

Ranny Lacanienta
SirsiDynix

Susan Campbell
College Center for Library Automation

Peter Collins
BorrowDirect

Randall Cook
eXtensible Catalog Project

Mike Dicus, *NCIP-SC Chair*
Ex Libris (USA), Inc.

Rob Gray
Polaris Library Systems

Mary Jackson
Auto-Graphics, Inc.

Brent Jensen
SirsiDynix

Brent Jensen
SirsiDynix

Kristen Kokx
The Library Corporation (TLC)

Eric Leckbee
Innovative Interfaces, Inc.

Collette Mak
University of Notre Dame

Juli Marsh
The Library Corporation (TLC)

Scott Mayberry
VTLS Inc.

Tony O'Brien
OCLC, Inc.

John Sandstrum
College Center for Library Automation (CCLA)

Paul Sevcik
3M

Kevin Stewart
Relais International, Inc.

Rob Walsh, *NCIP Maintenance Agency Representative*
EnvisionWare, Inc

NISO Circulation Interchange Protocol (NCIP) Part 2: Implementation Profile 1

1 Purpose

The purpose of this Protocol Implementation Profile 1 (IMP1) is to specify details of implementation of the NISO Circulation Interchange Part 1: Protocol (NCIP). This IMP1 was developed primarily to support three broad application areas:

- Direct Consortial Borrowing,
- Circulation/Interlibrary Loan Interchange, and
- Self Service Circulation.

Secondarily, the profile was intended for use with emerging application areas such as the management of electronic resources.

2 Scope

This IMP1 addresses the following implementation issues:

- Message, Character, and Data Encoding
- Required Components and Behavior
- Network Transport
- Network Security
- Scheme Registration
- Provision for Extension

3 Normative References

This standard references the following documents. When cited in the text of the standard, the standard may be referred to by its number only or an abbreviated title. Where no date is supplied; the most current version of the standards should be used. See the [Bibliography](#) for additional references that are cited in informative sections of the standard.

ANSI/NISO Z39.83-1-2012, *NISO Circulation Interchange Part 1: Protocol (NCIP)*

IETF RFC2119, *Key words for use in RFCs to Indicate Requirement Levels*, March 1997
<<http://www.ietf.org/rfc/rfc2119.txt>>

IETF RFC 2396, *Uniform Resource Identifiers (URI): Generic Syntax*, August 1998
<<http://www.ietf.org/rfc/rfc2396.txt>>

IETF RFC 2616, *Hypertext Transfer Protocol – HTTP/1.1*; June 1999
<<http://www.ietf.org/rfc/rfc2616.txt>>

ISO 4217, *Codes for the representation of currencies and funds*

ISO 8601, *Data elements and interchange formats – Information interchange – Representation of dates and times*

ISO 10646, *Information Technology – Universal multiple-octet coded character set (UCS)*

The Unicode Consortium, *The Unicode Standard* <<http://www.unicode.org/versions/latest/>>

W3C Recommendation, *Character Model for the World Wide Web 1.0: Fundamentals*; February 15, 2005 <<http://www.w3.org/TR/charmod/>>

W3C Recommendation, *Extensible Markup Language (XML) 1.0*, fifth edition; November 26, 2008 <<http://www.w3.org/TR/xml/>>

W3C Recommendation, *XML Schema Part 2: Datatypes*, second edition, October 28, 2004 <<http://www.w3.org/TR/xmlschema-2/>>

4 Definitions and Conventions

4.1 Definitions

The following terms, as used in this standard, have the meanings indicated.

<u>Term</u>	<u>Definition</u>
Strictly Conformant	An implementation is strictly conformant to this IMP1 and the NCIP if the implementation always behaves as mandated in this IMP1 whenever it exchanges messages (either as initiator or responder) with another implementation.
Conformant	An implementation is conformant to this IMP1 and the NCIP if the implementation behaves as if it were a strictly conformant implementation whenever it exchanges messages (either as initiator or responder) with a strictly conformant implementation.
IMP1	<i>NISO Circulation Interchange Protocol (NCIP) Part 2: Implementation Profile 1</i> , ANSI/NISO Z39.83-2-2012.
Initiating Implementations NCIP	Implementations that initiate NCIP services.
Protocol	<i>NISO Circulation Interchange Part 1: Protocol (NCIP)</i> , ANSI/NISO Z39.83-1-2012.
Responding Implementations	Implementations that respond to NCIP messages sent to them by initiating implementations.
Supported	Recognized by the implementation but not necessarily used by the implementation beyond NCIP messaging per se.

4.2 Notational Convention

The key words “must,” “must not,” “required,” “should,” “should not,” “recommended,” “may,” and “optional” in this standard are to be interpreted as described in IETF RFC 2119.

5 Encoding

This IMP1 specifies required behavior with regard to encoding in three contexts, as follows:

- Message encoding and structure
- Character representation
- Representation of data types

5.1 Message Encoding and Structure

5.1.1 XML Schema

For the purposes of this IMP1, conformant messages must be valid according to the rules for valid documents specified in the XML standard. For each message governed by the NCIP, there is an element in the “NCIP XML Schema.” For the XML Schema, see [Appendix A](#). The following URL should be consulted for any changes or revisions that may have occurred subsequent to the publication of this standard:

<http://www.niso.org/schemas/ncip/>

Each message shall contain one and only one NCIP Message element as defined in the NCIP XML Schema.

5.1.2 Compression

This Implementation Profile does not define compression mechanisms. However, implementations should consider supporting optional mechanisms that, by agreement with peer implementations, can be enabled. Examples of compression mechanisms are:

- Using an XML Stylesheet to substitute shorter element names, such as “AI” for “Agency Id”
- Using HTTP content-encoding (e.g., gzip compression)

5.2 Character Representation

For the purposes of this IMP1, conformant messages must employ the UTF-8 encoding of Unicode (UCS-2) as the encoding for all data. All applications must have the ability to recognize any character defined in 16-bit Unicode (UCS-2) as a valid character. Applications are not required by this IMP1 to display, edit, or process all Unicode characters—each application may choose any subset of Unicode characters it will support in sending and receiving messages.

Applications conforming to this IMP1 that make use of string identity matching must adhere to the requirements of Section 6 (“String Identity Matching”) of *Character Model for the World Wide Web 1.0* for strings to be matched. This implies that applications that compare text in data elements in incoming messages for identity with text supplied in outgoing messages, as might be the case with unique identifiers, should ensure that such text in outgoing messages is normalized sufficiently well that further normalization by the recipient of the message will not affect the ability to compare for identity.

Any valid character representation, including character references and entity references, must be supported. However, as the NCIP XML Schema does not define any entity references, in practice the permissible entity references are restricted to “amp” (ampersand), “lt” (less than), “gt” (greater than), “apos” (apostrophe), and “quot” (quote).

5.3 Representation of Data Types

The data types employed by messages conforming to this IMP1 are defined in this section.

The XML Schema governing the structure of conformant messages under this IMP1 employs what are commonly called “fixed attributes” to specify data types of all simple elements.

The data types are presented here in alphabetical order. For each data type a definition, lexical representation, example of usage, and an example data element are presented. The definitions and lexical representations are derived from the *W3C XML Schema Part 2: Datatypes* document (see Section 3). Any terms used in the definitions below that are themselves undefined may be found defined in the aforementioned XML document.

An **Empty** data type is an element that contains no data and indicates, by its presence or absence, a predefined condition or situation. For example, the empty element Item Reported Lost, used in the Report Circulation Status Change Service, indicates that a User has reported that the Item is lost.

Name	dateTime
Definition	The dateTime data type represents a specific instant in time. The value space of dateTime is the space of the combinations of date and time of day from Section 4.3 of ISO 8601-2004.
Representation	A single representation, which is a subset of the lexical representations defined by ISO 8601, is allowed. This lexical representation is the ISO 8601 extended format CCYY-MM-DDThh:mm:ss.sss where “CC” represents the century, “YY” the year, “MM” the month, and “DD” the day, preceded by an optional leading “-” sign to indicate a negative number. If the sign is omitted, “+” is assumed. The letter “T” is the date/time separator, and “hh”, “mm” and “ss” represent hour, minute, and second respectively. Additional digits may be used to increase the precision of fractional seconds if desired, i.e., the format ss.sss ... with any number of digits after the decimal point is supported. The fractional seconds part is optional; all other parts of the lexical form are mandatory. To accommodate year values greater than 9999, additional digits may be added to the left of this representation. The year 0000 is prohibited. The CCYY field must have at least four digits, the MM, DD, hh, mm, and ss fields exactly two digits each (exclusive of fractional seconds); leading zeroes must be used if the field would otherwise have too few digits. This lexical representation must be followed immediately by a “Z” to indicate Coordinated Universal Time (UTC), or the time zone must be omitted. It is important to note also that a value of 00 for hours, minutes, or seconds, refers to the <i>start</i> of the day, hour, or minute respectively, so for example a time of 15:35:00 means the start of the 35th minute after 3 p.m. In this example, if the intent is to indicate an “unspecified” number of seconds then it is up to an application to decide whether indicating the time as 15:35:59 or 15:36:00 might be a more desirable representation of this than 15:35:00.