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2	1999-09-15	ZIG Holdings Schema v5 included. Various editorial changes	PHJ
1	1999-08-01	First Draft	PHJ

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1. Introduction

This document describes the ONE-2 Profile for use of the Z39.50-1995 Search and Retrieval (ISO 23950) standard and the ISO 10160/10161 ISO ILL Interlibrary Loan standard.

This document is prepared as part of the CEC Project number LB-5643/B ONE-2 (OPAC Network in Europe 2) under Work Package No. WP104000. This document is deliverable No. D104000-1.

The intended audience of this document are all project personnel.

This document was prepared by Poul Henrik Jørgensen (mailto:phj@dbc.dk) from the Danish Library Centre, DBC (www.dbc.dk) .

2. Background

The ONE-2 Profile for Searching and Ordering with Z39.50 is primarily based on the following specifications:

- ***ONE Bib-1 Profile*** for bibliographic Search and Retrieval. This profile was prepared by the previous ONE Project and has been implemented by the partners in the first ONE project and others. This profile is available at the following URL:
  http://www.bibsys.no/one-wg/bib-1.profile.html
- ***Bath Profile*** for bibliographic Search and Retrieval and Cross-domain Searching. An international working group is developing this profile. The basic requirements of the Bath profile are a true subset of the ONE Bib-1 Profile. The first draft will be published for public review during September 1999.

- ***OPAC/Holdings Schema*** and Profile. This schema is being developed by the ZIG. At the time of writing the latest public draft is available at the following URL: http://lcweb.loc.gov/z3950/agency/holdings.html
- ***Z39.50/ILL Profile 1.*** Profile for the use of Z39.50 Item Order Extended Service to transport ISO ILL Protocol APDUs**.** The National Library of Canada prepared this profile in 1996. This profile is available at the following URL: http://www.nlc-bnc.ca/iso/ill/document/standard/z-ill-1a.pdf
- ***Z39.50/ILL Profile 2***. Profile for the use of Parameters from the ISO ILL-Request APDU in Z39.50 Item Order. The National Library of Canada prepared this profile in 1996. This profile is available at the following URL: http://www.nlc-bnc.ca/iso/ill/document/standard/z-ill-2a.pdf
- ***IPIG Profile for the ISO ILL Protocol***. At the time of writing Issue 1 is available at the following URL: http://www.nlc-bnc.ca/iso/ill/ipigprfl.htm
- **Virtual Union Catalogue Z39.50 Profile**. The National Library of Australia prepared this profile. The profile is available at the following URL: http://www.nlc-bnc.ca/resource/vcuc/profil4.htm

The profiles listed here in turn references many other relevant profiles and materials.

3. Scope

The primary objective of the ONE-2 project is to facilitate international access to systems outside the users local institution and country. Access to local- and national systems may require additional facilities, that are outside the scope of this project, and that are therefore not covered by the ONE-2 Profile.

4. Structure

The ONE-2 profile is intended to cover requirements of the following *functional ar*eas.

A. Common Requirements
B. Search and Retrieval of Library Catalogues.
C. Search and retrieval of Holdings information
D. Ordering and Interlibrary Loans.
E. Cross-domain Search and Retrieval
F. Update of Union Catalogues
G. Electronic Document Delivery

Separate sets of specifications are described for each of the functional areas.

The specifications within a given functional area may describe one or more *levels* of requirements. The requirements levels within a given functional area are cumulative.

The profile requirements may be viewed as a matrix:

- Functional **Areas** represent different columns of specifications
- **Levels** represent different rows of specifications

A system may support different levels of requirements within different functional areas. A system may for example support the highest level within functional area A (Search and Retrieval of Library Catalogues), but it may at the same time support only the lowest level within functional area B (Search and Retrieval of Holdings information).

All systems must support the Common Requirements of functional area A.

5. A Common Requirements

Specifications pertaining to different functional areas and levels imply other general requirements in addition to those specified here, e.g. transfer syntax and Z39.50 Services.

The letter *S* designates a Server (Target) requirement and the letter *C* a Client (Origin) requirement.

5.1 A Protocol Version

Servers (Targets) and Clients (Origins) must support *ISO 23950 i.e. Z39.50-1995 Version 3*: http://lcweb.loc.gov/z3950/agency/1995doce.html

5.2 A Attribute Sets

Servers and Clients must support the *Bib-1 attribute set*, (i.e., process requests and responses that contain the OID for Bib-1):
http://lcweb.loc.gov/z3950/agency/defns/bib1.html

Servers and Clients must support the Bib-1 Diagnostic set:
http://lcweb.loc.gov/z3950/agency/defns/bib1diag.html

5.3 A Initialisation Facility

Servers and Clients must support the *Init* Service with ID/Authentication parameters UserId and Password.

Servers must support Character set negotiation as part of the Init service.

Servers must support the ISO 8859-1:1998 Latin-1 and the ISO 10646 BMP character set with UTF-8 encoding.

5.4 A Termination Facility

Servers and Clients must support the *Close* Service.

6. B Bibliographic Search and Retrieval

Search and retrieval of Library Catalogues (Functional Area B) is specified in terms of one level only.

6.1 B-L1 Search Service

Targets and Origins must support Query-type *Type-1*, i.e. RPN.

Targets must support the Database-name = "*xxdefault*". The Target may of course internally map this name to another relevant database name.

Target must support the *Result-set-name* parameter and should attempt to keep at least 2 named result sets for the duration of a session, if the origin names at least two result sets.

Targets and Origins must support level-1 segmentation.

All of the six *Bib-1* attribute types must be supplied in each query. This implies, that a Z39.50 Origin must supply values for all six attribute types in every query. The target must also interpret all of the six attribute types and may either choose to accept the query - or reject it as "Unsupported Attribute Combinations".

A specification of the semantics of the Bib-1 attributes is available at the following URL:
ftp://ftp.loc.gov/pub/z3950/defs/bib1.txt

The default values listed below identify values to be supported in combination with Use- and Structure attribute values:

- *Relation* (default = 3 i.e. *equal*)
- *Truncation* (default = 100, i.e. *do not truncate*)
- *Completeness* (default = 1, i.e. *Incomplete subfield*)
- *Position* (default = 3, i.e. *Any position in field*)

The following *Structure* attribute values must be supported together with relevant Use attributes:

- *Phrase* = 1 (e.g. "the little house on the prairie")
- *Word* = 2 (e.g. "house")
- *Year* = 4 (four digits, e.g. 1999)
- *Name normalised* = 101 (last name, first name, e.g. Jørgensen, Poul Henrik)
- *Name un-normalised* = 102 (first name last name, e.g. Poul Henrik Jørgensen)

Targets must support the following combinations of Bib-1 use- and Structure attributes:

Use attribute name	**Use**	**Structure**
Personal name	1	101
Corporate name	2	2
Conference name	3	2

Use attribute name	Use	Structure
Title	4	1
Title	4	2
Title series	5	1
Title series	5	2
ISBN	7	2
ISSN	8	2
Dewey	13	2
UDC	14	2
Local class number	20	2
Subject	21	1
Subject	21	2
Date of publication	31	4
National bibliography number	48	2
Author	1003	101
Author	1003	102
Author-name personal	1004	101
Author-name corporate	1005	102
Author-name conference	1006	102
Any	1016	2
Doc-id	1032	2

6.2 B-L1 Present Service

Targets must support the following *Element-set-names*:

- *B* for Brief, e.g. Author, Title and Publication date
- *F* for Full, e.g. as much relevant information as the Target permits
- R for Reduced, i.e. same as F but without any Holdings information..

Targets must support the following *Preferred-record-syntaxes*:

- SUTRS
- USMARC Concise format for bibliographic data
- UNIMARC

6.3 B-L1 Scan Service

Targets must support scanning of the Use attribute values listed under Search Service requirements, **except** the following:

Use Attribute Value	Name
7	ISBN
8	ISSN
31	Date of Publication
48	National Bibliographic Number
Document Id	1032

Target must support *Step-size* = 0, i.e. "do not skip any entries" and *Position-in-response* = 1.

Target must return the number of entries (hits) associated with each SCAN Term.

Targets should support "xxdefault" as database name for SCAN, c.f. the requirement for Search Service.

7. C Holdings Information Search and Retrieval

Search and retrieval of bibliographic Holdings information is specified in two levels:

- Retrieval of Location Holdings information in a single bibliographic MARC Record
- Retrieval of Summary Holdings information in a GRS-1 structure according to the present draft OPAC/Holdings Schema

A previous scheme to support "OPAC Records" consisting of a bibliographic record plus a number of associated MARC Holdings records is not addressed by this profile.

Detailed specifications for this functional area must wait, until the Z39.50 Implementers Group (ZIG) eventually decides on a final version of the OPAC/Holdings schema.

The latest official draft at the time of writing is available at the following URL:

http://lcweb.loc.gov/z3950/agency/holdings.html

7.1 C Level-1 Holdings Information

Level-1 supports searches on minimal bibliographic level holdings information, i.e. locations only.

Holdings information corresponding to minimal bibliographic holdings information is presented within bibliographic USMARC records.

7.1.1 C-L1 Search Service

Target and Origin must support the attribute set *Holdings* in the "old" attribute architecture. The current draft of the Holdings attribute set is available at the following URL: http://lcweb.loc.gov/z3950/agency/august/holdattr.html

Holdings attributes may be combined with Bib-1 attributes within a query.

Targets must support searching on those Holdings attributes that are included within the OPAC/Holdings schema element set *B-1 siteLocation* i.e. Minimal bibliographic level Holdings information.

7.1.2 C-L1 Present Service

Targets must be able to deliver USMARC and UNIMARC as transfer syntax and *B1* as Element Set Name (ESN).

This implies, that holdings information corresponding to the B-1 siteLocation ESN must be presented in USMARC- or UNIMARC bibliographic records within tags 850/852.

7.2 C Level-2 Holdings Information

Level-2 supports searches on summary bibliographic level holdings information, i.e. non copy-specific summary holdings.

7.2.1 C-L2 Search Service

Targets must support searching on those Holdings attributes that are included within the OPAC/Holdings schema element set *B-2 summaryBibLevelHoldings* i.e. non Copy-specific bibliographic level Holdings information.

7.2.2 C-L2 Present Service

Targets must be able to deliver *GRS-1 OPAC/Holdings* Records as transfer syntax and *B2* as Element Set Name.

This implies that information corresponding to the B-2 summaryBibLevelHoldings ESN must be presented in a GRS-1 OPAC/Holdings structure.

Targets are only required to present Holdings Data within GRS-1 structures - not Bibliographic Records.

Holdings Data must be in the form of OPAC/Holdings schema Holdings Statements - not MARC Holdings Records.

8. D Ordering and Interlibrary Loans

This profile addresses the ordering of non-returnable items between parties acting as either borrowers (ISO ILL Requester) or lenders (ISO ILL Responder). Other ISO ILL Transaction modes and roles, e.g. Intermediary parties are outside the scope of this profile.

ISO ILL Parameters are based on relevant corresponding specifications from the IPIG Profile Issue 1.

Preparing a common profile for Ordering and Interlibrary Loans transactions ILL is difficult, because the ISO 10160/10161 ILL standard does not specify which transport mechanism or transfer syntax to use.

The most popular transport mechanisms for ISO ILL are Z39.50 Item-Order Extended service and SMTP/MIME E-mail.

The most widespread transfer syntax alternatives at the moment are ISO EDIFACT and ASN.1 BER.

Matters are complicated further by the fact that ISO ILL is a Peer-to-Peer protocol instead of the more common Client-Server protocols. In respect to individual ILL Transaction packages, a party may act as either the Client (i.e. initiating system) or Server (e.g. the responding system).

Further details of the ONE-2 specifications for ILL are given in a separate document:

ONE-2 Profile for the ISO ILL Protocol. Liv A. Holm. 29. June 1999.

8.1 D ILL Levels

Item Ordering and Interlibrary Loans (ILL) are specified at two **Levels**:

- *D-L1 Item Order*: Item Order transaction between parties **without** local ISO ILL compliant systems, e.g. the scenario represented by Z39.50/ILL Profile 2
- *D-L2 ISO ILL*: Interlibrary Loan transaction between parties **with** local ISO ILL compliant system, e.g. the scenario represented by Z39.50/ILL Profile 1

8.2 D ILL Transport Mechanisms

The ONE-2 Profile specify two alternative **Transport** methods for the ILL messages:

- *D-Lx-TZ Z39.50 Item Order Extended Service:* ISO ILL Application Protocol Data Units (APDU) are transported by means of the Z39.50 Item-Order Extended Service.
- *D-Lx--TM E-Mail*: ISO ILL Application Protocol Data Units (APDU) are transported by means of Internet E-mail (SMTP/MIME).

8.3 D ILL Formats

The ONE-2 Profile specify two alternative formats for ILL messages:

- *D-Lx-Tx-FB*: ASN.1 BER (Abstract Syntax Notation 1 Basic Encoding Rules)
- *D-Lx-Tx-FX*: W3C XML, possibly based on the current XER initiative.

8.4 D ILL Roles

ISO ILL distinguishes between two different **Roles:**

- *D-Lx-RB Requester*: The **borrower** institution placing a request to supply an item
- *D-Lx-RL Responder*: The **lender** institution that undertakes to arrange the supply of the item requested

8.5 D-L1 ILL Level-1

ONE-2 ILL Level-1 is intended to support scenarios where the borrower (Requester) and/or the lender (Responder) do **not** use an ISO ILL system.

E.g. when a borrower requests an item via his local workstation. Or a library forwards a request to an external document delivery service etc.

ILL Level-1 is based on the specifications of the *Z39.50/ILL Profile 2* for the Use of Parameters from the ILL-Request APDU in Z39.50 Item Order.

Z39.50/ILL Profile 2 is available at the following URL:

http://www.nlc-bnc.ca/iso/ill/document/standard/z-ill-2a.pdf

ONE-2 ILL Level-1 profile supports two alternative combinations of transport mechanisms and formats::

- D-L1-TZ-FB: Z39.50 Item-Order with BER format
- D-L1-TM-FX: E-Mail with XML format

The only ISO-ILL Service supported is REQUEST

8.5.1 D-L1-TZ-FB ILL Level-1 Z39.50 with BER

ONE-2 ILL Level-1 with Z39.50 Item-Order transport use BER as format.

The only mandatory service for both Clients and Servers is the ISO ILL REQUEST.

L1-TZ-FB	Role	Service	Function	Transport	Format
L1-Tz-Fb-Rc	Requester	REQUEST	Client	Z39.50 Item-Order	BER
L1-Tz-Fb-Rs	Responder	REQUEST	Server	Z39.50 Item-Order	BER

8.5.2 D-L1-TM-FX ILL Level-1 E-mail with XML

ONE-2 ILL Level-1 with E-mail use XML (XER) as format. The ILL Item-Order XML Schema will be defined during the ONE-2 Implementation Phase.

The only service for both Clients and Servers is the ISO ILL REQUEST.

L1-TM-FX	Role	Service	Function	Transport	Format
L1-Tm-Fx-Rc	Requester	ILL-REQUEST	Client	E-Mail	XML
L1-Tm-Fx-Rs	Responder	ILL-REQUEST	Server	E-Mail	XML

8.6 D-L2 ILL Level-2

ONE-2 ILL Level-2 is intended to support communications between two ISO ILL conformant systems.

Level-2 supports two alternative transport mechanisms:

- D-L2-TZ-FB: Z39.50 Item-Order with BER format
- D-L2-TM-FB: E-Mail with BER format

The ISO ILL messages supported by ONE-2 ILL Level-2 conforms to the corresponding IPIG Profile specifications.

8.6.1 D-L2-TZ-FB ILL Level-2 Z39.50 with BER

The use of Z39.50 Item Order transport is guided by the *Z39.50/ILL Profile 1* for the Use of Z39.50 Item Order Extended service to Transport ILL Protocol APDUs.

Z39.50/ILL Profile 1 is available at the following URL:

http://www.nlc-bnc.ca/iso/ill/document/standard/z-ill-1a.pdf

Z39.50 is primarily designed as a Client-Server protocol. The borrower (ILL Requester) is represented by a Z39.50 Client and the lender (ILL responder) is represented by a Z39.50 Server.

ISO ILL messages from the borrower to the lender are submitted within Z39.50 Item-Order Requests from the Z-Client to the Z-Server.

ISO ILL messages from the lender to the borrower are returned within Z39.50 Extended Service Responses from the Z-Server to the Z-Client.

It is not possible for the lender to initiate Z39.50 Sessions to the borrowers Z39.50 Client, e.g. in order to send an unsolicited ISO ILL SHIPPED- or EXPIRY Messages from the lender to the borrower.

Instead, the borrower can search the lenders Extended Service Task Database with a normal Search request in order to examine the current status of an ISO ILL Transaction. The ILL Protocol Data Units (PDUs) are returned piggyback on ES Task Package records in a Present response.

The mandatory ISO ILL Services for Client and Server are listed in the following table.

L2-Tz-Fb	Role	Service	Function	Transport	Format
L2-Tz-Fb-Rc	Requester	ILL-REQUEST	Client	Z39.50 Item-Order	BER
L2-Tz-Fb-Rc	Requester	CANCEL	Client	Z39.50 Item-Order	BER
L2-Tz-Fb-Rc	Requester	RECEIVED	Client	Z39.50 Item-Order	BER
L2-Tz-Fb-Rc	Requester	MESSAGE	Client	Z39.50 Item-Order	BER
L2-Tz-Fb-Rc	Requester	STATUS-QUERY	Client	Z39.50 Item-Order	BER
L2-Tz-Fb-Rs	Responder	ILL-ANSWER	Server	Z39.50 Item-Order	BER
L2-Tz-Fb-Rs	Responder	CONDITIONAL-REPLY	Server	Z39.50 Item-Order	BER
L2-Tz-Fb-Rs	Responder	CANCEL-REPLY	Server	Z39.50 Item-Order	BER
L2-Tz-Fb-Rs	Responder	STATUS-OR-ERROR-REPORT	Server	Z39.50 Item-Order	BER

8.6.2 D-L2-TM-FB ILL Level-2 E-mail with BER

NAILD IPIG Profile issue 1 guides the use of E-mail transport mechanism for the ISO ILL Protocol.

The IPIG Profile is available at the following URL: http://www.nlc-bnc.ca/iso/ill/ipigprfl.htm

BER is used as the E-mail format in order to conform to the IPIG Profile E-mail specifications. In future versions of the ONE-2 Profile, it may be preferable to XML instead.

L2-Tm-Fb	Role	Service	Function	Transport	Format
L2-Tm-Fb-Rc	Requester	ILL-REQUEST	Client	E-mail	BER
L2-Tm-Fb-Rc	Requester	CANCEL	Client	E-mail	BER
L2-Tm-Fb-Rc	Requester	RECEIVED	Client	E-mail	BER
L2-Tm-Fb-Rc	Requester	MESSAGE	Client	E-mail	BER
L2-Tm-Fb-Rc	Requester	STATUS-QUERY	Client	E-mail	BER
L2-Tm-Fb-Rs	Responder	SHIPPED	Server	E-mail	BER
L2-Tm-Fb-Rs	Responder	ILL-ANSWER	Server	E-mail	BER
L2-Tm-Fb-Rs	Responder	CONDITIONAL-REPLY	Server	E-mail	BER
L2-Tm-Fb-Rs	Responder	CANCEL-REPLY	Server	E-mail	BER
L2-Tm-Fb-Rs	Responder	MESSAGE	Server	E-mail	BER
L2-Tm-Fb-Rs	Responder	STATUS-OR-ERROR-REPORT	Server	E-mail	BER
L2-Tm-Fb-Rs	Responder	IEXPIRY	Server	E-mail	BER

9. E Cross-domain Search and Retrieval

Cross-domain Searching Functional Area E is intended to support two scenarios:

- A library user searching a Museum/Archive CIMI Target without MARC records
- A museums user searching a library Bibliographic Target without CIMI GRS-1 records

In both cases metadata will be presented in the shape of DC-RDF information encoded by either SUTRS (Level-0) or XML (Level-1) according to a draft from Paul Miller.

9.1 E-L1 Cross-domain Searching

Level-1 Search attribute combinations are the same as specified for the *B-L1 Search Service*. Most existing CIMI Targets support relevant Bib-1 attributes.

Targets and Origins must support the SUTRS transfer syntax.

The metadata will be based on Dublin Core (DC) attributes corresponding to the *Brief* (B) Element Set Name described in relation to the *B-L1 Present Service* specifications.

9.2 E-L2 Cross-domain Searching

Level-2 Targets must support the XML Transfer syntax.

The metadata will correspond to the Full (F) Element Set Specification described in relation to the B-L1 Present Service specification.

The structure and content is based on the DC-RDF draft specification, which is available at the following URL: http://www.ukoln.ac.uk/metadata/resources/dc/datamodel/WD-dc-rdf/

10.F Update of Union Catalogues

The ONE-2 Profile Functional Area F *Update* is based on the *Z39.50 Union Catalogue Profile* Chapter 11 conformance requirements.

The referenced Union Catalogue Profile is available at the following URL:

http://www.nla.gov.au/ucp/

11.G Electronic Document Delivery

The ONE-2 Profile Functional Area G *Electronic Document Delivery* (EDD) utilise the GEDI Header information as defined by ISO/DIS 17933.

The GEDI Draft International Standard is available at the following link:

http://www.rlg.org/gedistand99.pdf

The GEDI Header information is encoded as an XML structure. The GEDI Header XML Schema will be defined during the ONE-2 Implementation Phase.

Optional transfer methods includes SMTP/MIME and HTTP.

Further details of the ONE-2 specifications for Electronic Document Delivery with GEDI are given in a separate document:

ONE-2 Profile of GEDI, Liv A. Holm, 29. June 1999.