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Information and documentation — International standard link identifier (ISLI)

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National foreword

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Information and documentation — International standard link identifier (ISLI)

Information et documentation — Identification de connexion standard international (ISLI)

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ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

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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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 9, *Identification and description*.

Introduction

Developments in technology have already provided a reliable foundation to set up links between resources, whether these are stored in digital or traditional form. The developments have, in particular, reinforced the ability to link resources of different types. This allows users to experience rich media content, such as audio files or video files, more easily. Further, they not only provide traditional users with enriched information, but also improve accessibility of textual material to individuals who are visually impaired and extend the capabilities of educational materials.

Technologies providing such capabilities have typically been hardware dependent or enclosed within a particular ecosystem. To provide improved interoperability and better access to these technologies and services, the International Standard Link Identifier (ISLI) defines connections between these resources. The approach taken in this International Standard comes from experience in several different projects, but it allows a general way of identifying links which enables new applications in more fields, such as multimedia. The link built by ISLI makes resources more readily available, and thus creates more value through their use.

Information and documentation — International standard link identifier (ISLI)

1 Scope

This International Standard specifies an identifier of links between entities (or their names) in the field of information and documentation. These entities can be documents, media resources, people, or more abstract items such as times or places.

The ISLI system identifies links between entities that are related to each other so that, for instance, they can be rendered jointly. It does this by registering each link identifier with information (metadata) that specifies the link. The ISLI does not change the content, ownership, right of access, or existing identification of these entities.

This International Standard does not specify the technology used to represent the identifier or realize the link. It enables applications to be built which use the interoperable ISLI system for the identification of links.

2 Terms and definitions

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

2.1
entity
something capable of being uniquely identified

Note 1 to entry: Entities include material objects, electronic representations of content, abstract items (such as times, places), parties (human and corporate), as well as anything else that can be identified uniquely.

Note 2 to entry: A defined fragment of an entity is itself an entity.

2.2
ISLI code
International Standard Link Identifier assigned in accordance with the specifications of this International Standard

2.3
link
directed relationship between two *entities* (2.1) in the field of information and documentation

2.4
name
string of characters that identifies an *entity* (2.1), possibly (but not necessarily) in the form of an identifier specified in an International Standard

2.5
registrant
party requesting the assignment of an *ISLI code* (2.2) to a *link* (2.3)

2.6
service
class of *links* (2.3) with a common application between typed *sources* (2.7) and typed *targets* (2.8)

2.7
source
entity (2.1) which is the origin of a *link* (2.3)

2.8
target
entity (2.1) which is the destination of a *link* (2.3)

3 Link model of ISLI

An ISLI code specifies the link between a source and a target as shown in Figure 1.

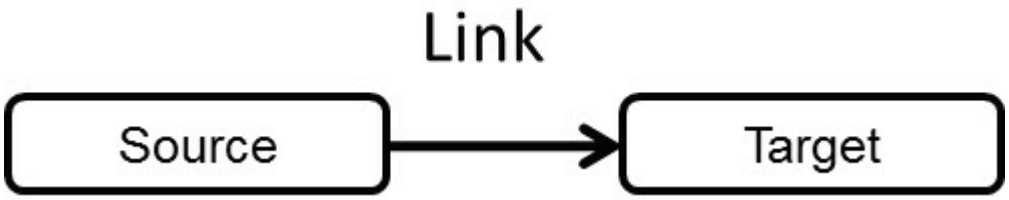

Figure 1 — Link model of ISLI

4 Structure and syntax of ISLI

An ISLI code, as shown in Table 1, comprises decimal digits in three fields, which includes

— service field,

— link field, and

— check digit field.

Table 1 — ISLI structure

Service field	Link field	Check digit field
six digits (see 4.1)	variable length (see 4.2)	one digit (see 4.3)

4.1 Service field

The service field contains the service code, which is allocated by the registration authority.

The service code comprises six decimal digits.

4.2 Link field

The link field contains the link code, which defines the link between the source and the target. It is assigned by the registration authority. The link code comprises decimal digits and its length is defined for each service by the registration authority.

4.3 Check digit field

The check digit provides protection against errors.

The check digit field contains a single decimal digit calculated from the contents of the service field and link field in accordance with Annex D.

4.4 ISLI representation for human reading

ISLI is a code intended for machine reading. When an ISLI code needs to be shown on a screen or printed, the hyphen symbol "-" should be added to separate the fields and "ISLI" should be inserted before the numeric code. The symbol "-" and "ISLI" do not form part of the identifier.

EXAMPLE ISLI 116063-4520086293791473426443001-9

5 Principles for allocation of ISLI

5.1 Allocation of ISLI service codes

5.1.1 An ISLI service code shall be allocated to a service by the registration authority if an application meets the criteria that the registration authority shall publish.

5.1.2 An ISLI service code shall be allocated to one service and each service shall be allocated only one ISLI service code.

5.1.3 An ISLI service code shall be permanently allocated to a given service and shall never be altered, replaced, or reused, although it may be withdrawn from use for new assignments of ISLI codes.

5.1.4 Details on the allocation of ISLI service codes are contained in A.1.

5.2 Assignment of ISLI codes

5.2.1 An ISLI code shall be assigned by the registration authority on receipt of an application for a code to be associated with a particular service.

5.2.2 An ISLI code shall not be assigned unless the registrant wishes to designate that the relevant source and target are to be linked within the requested service.

5.2.3 Within a service, each ISLI code shall be assigned to only one link from a given source to a given target, and each such link shall be assigned only one ISLI code.

NOTE Provided two ISLI codes are assigned in different services, they can refer to the same sources and targets.

5.2.4 The ISLI shall identify a link rather than a single entity.

5.2.5 An ISLI code may be assigned to a link where the source and/or the target is an entity whose content changes over time, such as a webpage.

5.2.6 A link from entity A to entity B shall have a different ISLI code than a link from entity B to entity A.

5.2.7 An ISLI code shall be permanently assigned to a given link and shall never be altered, replaced, or reused, although it may be cancelled and marked as cancelled in the register of the registration authority.

NOTE Cancellation can be required if the ISLI code was assigned in error or has become out of date.

5.2.8 In identifying sources and targets, the use of identifiers specified in ISO standards shall be preferred.

5.2.9 Details on the assignment of ISLI codes are contained in A.2.

6 Metadata

6.1 ISLI metadata

Each ISLI code shall be associated with ISLI metadata as defined in Annex B. The ISLI code and ISLI metadata shall be included in a register operated by the registration authority.

6.2 Service metadata

Each service code shall be associated with metadata as defined in Annex B. The service code and its metadata shall be included in a register operated by the ISLI registration authority.

7 Administration of the ISLI system

The ISLI system shall be administered by the registration authority of this International Standard, hereafter referred to as the ISLI registration authority.

The responsibilities of the ISLI registration authority are contained in Annex C.

Annex A
(normative)

Allocation of service codes and assignment of ISLI codes

A.1 Allocation of service codes

A.1.1 The registration authority shall allocate a service code to a service if an application for such an allocation meets the criteria for the allocation of such a code which it has published.

A.1.2 When a service code is allocated, the registration authority shall provide the kernel metadata in Table B.3.

A.1.3 When the registration authority allocates a service code, it shall specify which of the metadata elements are to be made public through the resolution and query services operated in accordance with C.1.

A.1.4 The registration authority may withdraw a service code from use with future ISLI assignments.

A.1.5 The registration authority shall not allocate service codes which start with the digit "9" to allow for extension of the length of the service field in a future edition of this International Standard.

A.2 Assignment of ISLI codes

A.2.1 The registration authority shall assign an ISLI code by combining the service code, an assigned link code, and a check digit calculated according to Annex D.

A.2.2 The assigned link code shall be unique within the service.

A.2.3 The registration authority shall enter the assigned ISLI code, together with the metadata specified in Clause 6, into the register it shall operate for the purpose.

Annex B
(normative)

ISLI metadata specification

B.1 ISLI metadata

The descriptive metadata elements contained in Table B.1 and the administrative metadata elements in Table B.2, together with additional elements defined by the registration authority, shall be registered with each ISLI code. The registration authority shall define appropriate schemas for the representation of these elements.

The registration authority shall also define appropriate schemas for the representation of the metadata contained in Table B.3 and Table B.4.

Table B.1 — Kernel metadata for ISLI code

Kernel element(s)	Description	Example
ISLI code	Code assigned under this International Standard	ISLI 116063-4520086293791473426443001-9
Source type	Data type of the source selected from a list maintained by the registration authority and specified in the service code kernel metadata (see Table B.3)	Notated music
Source name	Name of source (if no fragment defined) or entire source from which fragment is taken	ISMN 9790345123458
Source name type	Type of identifier used to specify source name selected from the permitted source name types list maintained by the registration authority	ISMN
Source fragment (optional)	Name of fragment within source	first movement, second bar, on sheet 2
Target type	Data type of the target selected from a list maintained by the registration authority and specified in the service code kernel metadata (see Table B.3)	Sound recording
Entire target name	Target (if no fragment defined) or entire target from which fragment is taken.	http://www.spname.org/con-data/toAlice
Target name type	Type of identifier used to specify entire target name selected from the permitted target name types list maintained by the registration authority	URI
Target fragment (optional)	Name of fragment within target	Sheet2/movement1/bar2.mp3

Table B.2 — Administrative metadata for ISLI code

Kernel element	Description
Registrant	Party that registered this ISLI code
Allocation date	Date when this ISLI code was allocated
Cancellation date (optional)	Date when this ISLI code was cancelled
Cancellation reason (optional)	Reasons for cancellation of ISLI code
Contact information	Name/address/email of administrative contact

Table B.3 — Kernel metadata for service code

Kernel element(s)	Description	Example
Service code	Code assigned by registration authority for the service	116063
Service	Name of the service	Service XYZ
Link type	Type of the link selected from a list maintained by the registration authority	"is creator of", "has created", "is hometown of", or "lives in"
Source type list	List of one or more data types selected from the designated source data types list maintained by the registration authority	Book Magazine Notated music
Target type list	List of one or more data types selected from the designated target data types list maintained by the registration authority	Sound recording Audio-visual
Link field length	The number of digits in link field	25

Table B.4 — Administrative metadata for service code

Kernel element	Description
Allocation date	Date when this service code was allocated
Cancellation date (optional)	Date when this service code was cancelled

B.2 Other metadata

The registration authority may define other metadata elements.

Annex C
(normative)

Administration of the ISLI system

C.1 Responsibilities of the ISLI registration authority

ISO maintains an online list of maintenance agencies and registration authorities relevant to their standards at http://www.iso.org/iso/maintenance_agencies.html. Users are encouraged to consult this database for the most up-to-date information concerning maintenance agencies and registration authorities.

The ISLI registration authority shall provide the following services:

— promote, coordinate, and supervise the ISLI system in accordance with the specifications of this International Standard;

— on request from registrants, assign ISLI codes to links and enter them into the ISLI register in accordance with A.2;

— manage the ISLI register;

— cancel ISLI codes in accordance with the rules in the ISLI handbook and record the cancellation in the ISLI register, together with the reason for the cancellation;

— operate a registration service that allows automatic processing of registration requests;

— provide a resolution service, which accepts a service code and, upon request, returns the associated kernel metadata of the associated service together with information about how metadata for a particular ISLI code can be obtained, where appropriate;

— operate a query service to allow users to find the ISLI code associated with certain metadata;

— manage the allocation of service codes in accordance with A.1 and publish a register of such codes and the associated metadata as specified in Table B.3;

— review the allocated service codes from time to time and, where appropriate, publish proposals for withdrawal of service codes, allowing a period for appeals;

— publish criteria for the allocation of new service codes;

— maintain lists of link types for use in ISLI kernel metadata and codes for their identification, in accordance with C.3;

— maintain lists of source types and source name types, in accordance with C.2;

— maintain lists of target types and target name types, in accordance with C.2;

— maintain the schemas for kernel and administrative metadata based on the tables in Annex B, including additional elements as needed;

— develop documentation (including a handbook) for users of the ISLI system, making this available in relevant languages as required by such users;

— provide training and technical support to users of the ISLI system;

— develop and publish an equitable appeals process for users who wish to appeal against one of its decisions;

— report annually to ISO on its activities, recommending any changes required to this International Standard.

C.2 Registration of source and target types

The ISLI registration authority shall provide the following services:

— publish a list of designated data types allowed for use as the source or target element of an ISLI;

— publish a list of permitted name types that can be used to identify source or target elements of a particular type;

— publish procedures for evaluating proposals for the designation of new source and target types and of name types;

These procedures shall allow any interested party to make a proposal. Proposals shall be evaluated in a timely, fair, and non-discriminatory manner, taking into account the interests of existing and prospective users of the ISLI system.

— review the designated source and target types and name types from time to time and, where appropriate, publish proposals for withdrawal of selected types, allowing a period for appeals.

C.3 Registration of link types

The ISLI registration authority shall provide the following services:

— publish lists of designated link types allowed for use as the link type element of an ISLI and codes for their identification;

— publish for each such designated link type, the data types that are permitted as the source and target data types to be associated with links of that type;

— publish procedures for evaluating proposals for the designation of new link types;

These procedures shall allow any interested party to make a proposal. Proposals shall be evaluated in a timely, fair, and non-discriminatory manner, taking into account the interests of existing and prospective users of the ISLI system.

— review the designated link types from time to time and, where appropriate, publish proposals for withdrawal of selected types, allowing a period for appeals.

Annex D
(normative)

Method for calculating the check digit of an ISLI

D.1 Calculation of check digit

The check digit for an ISLI code shall be calculated according to the procedure specified in this clause. Note that the length of an ISLI code is variable according to the length of the link field assigned by the registration authority.

The check digit is calculated with modulo 10 arithmetic over the service field and link field with weights of 1 and 2 assigned sequentially from right to left.

The following is the computational method for calculation of the check digit.

1) Assign a weighting factor of 1 to the right-most (least significant) digit of the link field. Assign a weighting factor of 2 to the next digit, a weighting factor of 1 to the next digit and so on for each digit of the link field and then the service field.

2) Multiply each digit by its corresponding weighting factor.

3) Where the product is 10 or greater, sum the digits of the product (so that a product of 16 becomes 1 + 6 = 7).

4) Add all the products together.

5) Calculate the remainder when the sum is divided by 10.

6) Subtract the remainder from 10.

7) If the result is in the range 1 to 9, this is the check digit.

8) If the result is 10, the check digit is 0.

EXAMPLE Sample calculation of a check digit:

	Service field						**Link field**																									
Digits	1	1	6	0	6	3	4	5	2	0	0	8	6	2	9	3	7	9	1	4	7	3	4	2	6	4	4	3	0	0	1
Weighting	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1
Products	1	2	6	0	6	6	4	10	2	0	0	16	6	4	9	6	7	18	1	8	7	6	4	4	6	8	4	6	0	0	1
Sums	1	2	6	0	6	6	4	1	2	0	0	7	6	4	9	6	7	9	1	8	7	6	4	4	6	8	4	6	0	0	1

Total of bottom row = 131

Remainder when divided by 10 = 1

Check digit = 10 – 1 = 9

So the ISLI is:

ISLI 116063-4520086293791473426443001-9

D.2 Verification of check digit

The following is the computational method for verification of the check digit:

1) Assign a weighting factor of 1 to the right-most (least significant) digit of the link field. Assign a weighting factor of 2 to the next digit, a weighting factor of 1 to the next digit and so on for each digit of the link field and then the service field.

2) Multiply each digit by its corresponding weighting factor.

3) Where the product is 10 or greater, sum the digits of the product (so that a product of 16 becomes 1 + 6 = 7).

4) Add all the products together (include the check digit).

5) Calculate the remainder when the sum is divided by 10.

6) If the remainder is 0, the ISLI code is verified as having a correct check digit, otherwise the ISLI code is not verified.

EXAMPLE 1 Sample verification of the ISLI code where the check digit is correct:

ISLI 116063-4520086293791473426443001-9

	Service field						**Link field**																										**Check field**
Digits	1	1	6	0	6	3	4	5	2	0	0	8	6	2	9	3	7	9	1	4	7	3	4	2	6	4	4	3	0	0	1		9
Weighting	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1		-
Products	1	2	6	0	6	6	4	10	2	0	0	16	6	4	9	6	7	18	1	8	7	6	4	4	6	8	4	6	0	0	1		-
Sums	1	2	6	0	6	6	4	1	2	0	0	7	6	4	9	6	7	9	1	8	7	6	4	4	6	8	4	6	0	0	1		9

Total of bottom row = 140

Remainder when divided by 10 = 0

The ISLI code is verified.

EXAMPLE 2 Sample verification of ISLI code where the check digit is **in**correct:

ISLI 116063-4520086293791473426443001-8

	Service field						**Link field**																										**Check field**
Digits	1	1	6	0	6	3	4	5	2	0	0	8	6	2	9	3	7	9	1	4	7	3	4	2	6	4	4	3	0	0	1		8
Weighting	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1		-
Products	1	2	6	0	6	6	4	10	2	0	0	16	6	4	9	6	7	18	1	8	7	6	4	4	6	8	4	6	0	0	1		-
Sums	1	2	6	0	6	6	4	1	2	0	0	7	6	4	9	6	7	9	1	8	7	6	4	4	6	8	4	6	0	0	1		8

Total of bottom row = 139

Remainder when divided by 10 = 9

The ISLI code is not verified.

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