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Syntax for the Digital Object Identifier

Abstract: Defines the order and composition of the Digital Object Identifier (DOI) used to identify intellectual property in the digital environment.

An American National Standard
Developed by the
National Information Standards Organization

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Contents

Foreword

(This foreword is not part of the American National Standard Syntax for the Digital Object Identifier, ANSI/NISO Z39.84-2000. It is included for information only.)

This standard defines "the composition and order of components of the DOI^{SM} (Digital Object Identifier), a character string used to identify intellectual property in the digital environment." The DOI was developed by the International DOI Foundation (http://www.doi.org/) on behalf of the publishing industry, to provide a framework for managing intellectual content including activities such as linking users with content owners, facilitating electronic commerce, and enabling automated copyright management. *Note:* DOI and DOI.ORG are registered service marks of the International DOI Foundation, Inc.

Some history on the development of this standard is needed to understand how and why the standard appears in its present form.

DOI System Background

The Internet is a new environment for information transactions and it requires new enabling technologies to provide services and to protect intellectual property. Systems must be developed to identify, authenticate, and protect content to ensure that what the user is requesting is what is being delivered. At the same time, the rights owner of the information must have assurances that copyright in content is respected and protected.

In considering the new systems required, international publishers realized that a first step would be the development of an identification system to be used for intellectual property in the digital environment. Such a system was launched at the Frankfurt Book Fair in October 1997: the Digital Object Identifier (DOI) System. The System provides a unique identification mechanism for content in all media, and a way to link users of the materials to the rights holders or their agents to facilitate automated digital commerce.

The DOI in Context (DOI System, Handle System®, IDF)

The DOI System is an implementation of the Handle System®, developed by the Corporation for National Research Initiatives (CNRI). The Handle System® is a distributed computer system that stores names, or handles, of digital items. It can quickly resolve those names into the information necessary to locate and access the items. It was designed by CNRI as a general purpose global system for the reliable management of information on networks such as the Internet over long periods of time and is currently in use in a number of projects. The Library of Congress, the Defense Technical Information Center, the International DOI Foundation, and the National Music Publishers' Association are implementing the Handle System®.

The DOI System is managed by the International DOI Foundation, which sets policies, appoints service providers, and ensures the successful operation of the System. The IDF has issued a document outlining the DOI issues entitled "Guidelines for the Issuance and Use of DOI" (the most current version will be available at http://dx.doi.org/10.1000/25).

Basis of the DOI System

In the CNRI Handle System® the term "DOI" is used instead of "Handle" to describe the identifiers. Handle and therefore DOI is in conformance with IETF RFC 1737 Functional Requirements for Uniform Resource Names. (http://www.ietf.org/rfc/rfc1737.txt)

The Handle System web site (www.handle.net) includes an overview of the technology; protocol specifications, and a discussion of Handle System Scalability. The Handle System is an open specification described in two IETF Internet-Drafts: "Handle System Overview," July 1999, (http://www.ietf.org/internet-drafts/draft-sun-handle-system-04.txt), and "Handle System Namespace and Service Definition," July 1999, (http://www.handle.net/draft-sun-handle-system-def-01.txt).

These documents are in conformance with Section 10 of RFC2026. Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). The list of current Internet-Drafts can be accessed at http://www.ietf.org/ietf/1id-abstracts.txt. The list of Internet-Draft Shadow Directories can be accessed at http://www.ietf.org/shadow.html. An overview of the Handle System is available at http://www.handle.net/overviews/hs-version4.html

Resolution

The DOI System enables resolution of the DOI. A resolution system takes a URN and returns a list of services or instances of the information identified by the URN, commonly one or more URLs. Resolution is here used to mean the act of submitting an identifier to a network service and receiving in return one or more pieces of current information related to the identifier. In the case of the Domain Name System (DNS), as an example, the resolution is from domain name, e.g., www.doi.org, to a single IP address, e.g., 132.151.1.146, which is then used to communicate with that Internet host. In the case of the Handle System, the resolution is from a handle, e.g., 10.1000/140, to one or more pieces of typed data, e.g., three URLs representing three copies of the object.

DOI and Metadata

From the earliest development of the Digital Object Identifier (DOI), one of the most widely discussed issues has been whether or not the identifier string of which the DOI is composed should be meaningful. The syntax of this string, as defined by this standard, contains a set of components with very limited meaning.

- Each DOI string begins with a code indicating that within the Handle System of the Corporation for National Research Initiatives (CNRI) the string will be resolved by the Local Handle System reserved for the DOI.

- The next component of the DOI string notes the number assigned to the registrant who originally created the DOI. It should be noted that this number provides no information about current ownership of the object that the DOI string references.

- The DOI suffix string contains an unspecified identifier.

The elements within the DOI string do not include information about the object identified. The Committee recognized that the lack of descriptive information would limit the usefulness of the DOI string. It was agreed that accompanying information that describes the object would be necessary to make the string meaningful. Such information is called "metadata." This metadata may be aggregated into databases together with the DOI string and used for specific purposes.

The following recommendations are accordingly included here:

1. No DOI string should be registered without an accompanying set of metadata describing the object being referenced in the syntax string.

2. The Maintenance Agency listed in Appendix B should provide the latest information about the relevant metadata schemas and any databases that aggregate metadata about DOI referenced objects.

NISO Involvement and Role of the International DOI Foundation (IDF)

The ongoing management of the DOI System is done by the International DOI Foundation, a not-for-profit, membership-based organization with offices in the United States and Geneva, Switzerland. The Foundation is responsible for licensing Directory Managers/Registration Agencies and technology providers, for setting policy for the system, and for encouraging development of the related enabling technologies to build the infrastructure for electronic transaction systems such as copyright management.

Though the DOI System was originally developed by the publishing industry, it was recognized that the DOI system would have a broader scope and that it should work with established standards bodies as much as possible. NISO participation was requested in early 1998 to develop a standard for the syntax of the DOI identifier string, in order to maximize the broad potential use of a digital object identifier.

Goals of the Syntax Committee

The NISO DOI Syntax standards committee (SC AR) was established with the following goals:

• To formalize the syntax for the DOI identifier string to enable DOI registration.
It has been possible to register DOIs since 1998 but there has been concern that the syntax has not been conclusively set.

• To determine the elements of the DOI identifier string. Several proposals to add elements to the DOI identifier string had been made and the committee was charged with determining which ones should be included in the string.

• To limit the scope of the standard to the DOI identifier string. The DOI System is made up of a number of parts including the identifier string, the resolution mechanism, and the Directory. This standard addresses only the syntax for the identifier string.

While limiting itself to the DOI identifier string, the Syntax committee took into account the wider context of the DOI System, the Handle System®, the International DOI Foundation, and the Internet. This Foreword and the Appendixes provide important information and references for understanding the DOI System, how the DOI is being used, how it relates to other standards and the Internet, and where to get more information.

This standard was processed and approved for submittal to ANSI by the National Information Standards Organization. It was balloted by the NISO Voting Members July 15, 1999 - September 15, 1999. It will next be reviewed in 2005. 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 imply that all Voting Members voted for its approval. At the time it approved this standard, NISO had the following Voting Members:

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Standards Committee AR

The following individuals served on Standards Committee AR, DOI Syntax:

Acknowledgment

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Syntax for the Digital Object Identifier

1. Introduction

1.1 Purpose

This standard defines the syntax for a character string called the Digital Object Identifier (DOI).

1.2 Scope

This standard is limited to defining the syntax of the DOI character string. Policies governing the assignment and use of DOIs are determined by the International DOI Foundation (IDF) and are outside the scope of this document.

2. Standards and References

Referenced standards are those that need to be used to construct a DOI. Secondary standards and references include citations to documents that can be of use in conjunction with the DOI. See Appendix D for related standards and references.

2.1 Referenced Standard

Unicode Consortium " The Unicode Standard Version 3.0" ISBN: 0-201-61633-5 (http://www.unicode.org/).

3. Definitions

Deposit. The act of entering into the Directory a DOI and associated information necessary for the DOI to be used.

Digital Object Identifier (DOI). A character string used in a System conforming to the rules of, and deposited in the Directory administered by, the IDF.

Directory. A repository in which DOIs are deposited and attendant locations are maintained.

Directory Manager. The organization that manages the Directory on behalf of the IDF.

DOI prefix . The Directory and the Registrant codes issued by the Registration agency to a Registrant for use as the prefix in the DOIs allocated by that Registrant.

DOI suffix. The character string assigned by a Registrant. The suffix shall be unique within the set of DOIs specified by the DOI prefix held by the Registrant.