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**Information technology — Open Systems  
Interconnection — The Directory:  
Selected attribute types**

*Technologies de l'information — Interconnexion de systèmes ouverts  
(OSI) — L'annuaire: Types d'attributs sélectionnés*

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Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.org](mailto:copyright@iso.org)  
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## Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 9594-6 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 6, *Telecommunications and information exchange between systems*, in collaboration with ITU-T. The identical text is published as ITU-T Rec. X.520.

This fifth edition of ISO/IEC 9594-6 constitutes a technical revision of the fourth edition (ISO/IEC 9594-6:2001), which is provisionally retained in order to support implementations based on the fourth edition. It also incorporates the Technical Corrigendum ISO/IEC 9594-6:2001/Cor.1:2003.

ISO/IEC 9594 consists of the following parts, under the general title *Information technology — Open Systems Interconnection — The Directory*:

- *Part 1: Overview of concepts, models and services*
- *Part 2: Models*
- *Part 3: Abstract service definition*
- *Part 4: Procedures for distributed operation*
- *Part 5: Protocol specifications*
- *Part 6: Selected attribute types*
- *Part 7: Selected object classes*
- *Part 8: Public-key and attribute certificate frameworks*
- *Part 9: Replication*
- *Part 10: Use of systems management for administration of the Directory*

## Introduction

This Recommendation | International Standard, together with other Recommendations | International Standards, has been produced to facilitate the interconnection of information processing systems to provide directory services. A set of such systems, together with the directory information that they hold, can be viewed as an integrated whole, called the *Directory*. The information held by the Directory, collectively known as the Directory Information Base (DIB), is typically used to facilitate communication between, with or about objects such as application entities, people, terminals, and distribution lists.

The Directory plays a significant role in Open Systems Interconnection, whose aim is to allow, with a minimum of technical agreement outside of the interconnection standards themselves, the interconnection of information processing systems:

- from different manufacturers;
- under different managements;
- of different levels of complexity; and
- of different ages.

This Recommendation | International Standard defines a number of attribute types which may be found useful across a range of applications of the Directory, as well as a number of standard attribute syntaxes and matching rules. One particular use for many of the attributes defined herein is in the formation of names, particularly for the classes of object defined in ITU-T Rec. X.521 | ISO/IEC 9594-7.

This Recommendation | International Standard provides the foundation frameworks upon which industry profiles can be defined by other standards groups and industry forums. Many of the features defined as optional in these frameworks may be mandated for use in certain environments through profiles. This fifth edition technically revises and enhances, but does not replace, the fourth edition of this Recommendation | International Standard. Implementations may still claim conformance to the fourth edition. However, at some point, the fourth edition will not be supported (i.e., reported defects will no longer be resolved). It is recommended that implementations conform to this fifth edition as soon as possible.

This fifth edition specifies versions 1 and 2 of the Directory protocols.

The first and second editions specified only version 1. Most of the services and protocols specified in this edition are designed to function under version 1. However, some enhanced services and protocols, e.g., signed errors, will not function unless all Directory entities involved in the operation have negotiated version 2. Whichever version has been negotiated, differences between the services and between the protocols defined in the five editions, except for those specifically assigned to version 2, are accommodated using the rules of extensibility defined in ITU-T Rec. X.519 | ISO/IEC 9594-5.

Annex A, which is an integral part of this Recommendation | International Standard, provides the ASN.1 notation for the complete module which defines the attributes, attribute syntaxes, and matching rules.

Annex B, which is not an integral part of this Recommendation | International Standard, provides a table of attribute types, for easy reference.

Annex C, which is not an integral part of this Recommendation | International Standard, provides suggested upper bounds value constraints used in these Directory Specifications.

Annex D, which is not an integral part of this Recommendation | International Standard, lists alphabetically the attributes and matching rules defined in this Directory Specification.

Annex E, which is not an integral part of this Recommendation | International Standard, gives examples relevant to the definition of zonal matching.

Annex F, which is not an integral part of this Recommendation | International Standard, lists the amendments and defect reports that have been incorporated to form this edition of this Recommendation | International Standard.

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**INTERNATIONAL STANDARD  
ITU-T RECOMMENDATION**

**Information technology – Open Systems Interconnection –  
The Directory: Selected attribute types**

**SECTION 1 – GENERAL**

**1 Scope**

This Recommendation | International Standard defines a number of attribute types and matching rules which may be found useful across a range of applications of the Directory.

Attribute types and matching rules fall into three categories, as described below.

Some attribute types and matching rules are used by a wide variety of applications or are understood and/or used by the Directory itself.

NOTE – It is recommended that an attribute type or matching rule defined in this Recommendation | International Standard be used, in preference to the generation of a new one, whenever it is appropriate for the application.

Some attribute types and matching rules are internationally standardized, but are application-specific. These are defined in the standards associated with the application concerned.

Any administrative authority can define its own attribute types and matching rules for any purpose. These are not internationally standardized, and are available to others beyond the administrative authority which created them only by bilateral agreement.

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**2 Normative references**

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The following Recommendations and International Standards contain provisions which, through reference in this text, constitute provisions of this Recommendation | International Standard. At the time of publication, the editions indicated were valid. All Recommendations and Standards are subject to revision, and parties to agreements based on this Recommendation | International Standard are encouraged to investigate the possibility of applying the most recent edition of the Recommendations and Standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards. The Telecommunication Standardization Bureau of the ITU maintains a list of currently valid ITU-T Recommendations.

**2.1 Identical Recommendations | International Standards**

- ITU-T Recommendation X.200 (1994) | ISO/IEC 7498-1:1994, *Information technology – Open Systems Interconnection – Basic Reference Model: The basic model.*
- ITU-T Recommendation X.500 (2005) | ISO/IEC 9594-1:2005, *Information technology – Open Systems Interconnection – The Directory: Overview of concepts, models and services.*
- ITU-T Recommendation X.501 (2005) | ISO/IEC 9594-2:2005, *Information technology – Open Systems Interconnection – The Directory: Models.*
- ITU-T Recommendation X.509 (2005) | ISO/IEC 9594-8:2005, *Information technology – Open Systems Interconnection – The Directory: Public-key and attribute certificate frameworks.*
- ITU-T Recommendation X.511 (2005) | ISO/IEC 9594-3:2005, *Information technology – Open Systems Interconnection – The Directory: Abstract service definition.*
- ITU-T Recommendation X.518 (2005) | ISO/IEC 9594-4:2005, *Information technology – Open Systems Interconnection – The Directory: Procedures for distributed operation.*
- ITU-T Recommendation X.519 (2005) | ISO/IEC 9594-5:2005, *Information technology – Open Systems Interconnection – The Directory: Protocol specifications.*

## ISO/IEC 9594-6:2005 (E)

- ITU-T Recommendation X.521 (2005) | ISO/IEC 9594-7:2005, *Information technology – Open Systems Interconnection – The Directory: Selected object classes.*
- ITU-T Recommendation X.525 (2005) | ISO/IEC 9594-9:2005, *Information technology – Open Systems Interconnection – The Directory: Replication.*
- ITU-T Recommendation X.530 (2005) | ISO/IEC 9594-10:2005, *Information technology – Open Systems Interconnection – The Directory: Use of systems management for administration of the Directory.*
- ITU-T Recommendation X.667 (2004) | ISO/IEC 9834-8:2005, *Information technology – Open Systems Interconnection – Procedures for the operation of OSI Registration Authorities: Generation and registration of Universally Unique Identifiers (UUIDs) and their use as ASN.1 object identifier components.*
- ITU-T Recommendation X.680 (2002) | ISO/IEC 8824-1:2002, *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation.*
- ITU-T Recommendation X.681 (2002) | ISO/IEC 8824-2:2002, *Information technology – Abstract Syntax Notation One (ASN.1): Information object specification.*
- ITU-T Recommendation X.682 (2002) | ISO/IEC 8824-3:2002, *Information technology – Abstract Syntax Notation One (ASN.1): Constraint specification.*
- ITU-T Recommendation X.683 (2002) | ISO/IEC 8824-4:2002, *Information technology – Abstract Syntax Notation One (ASN.1): Parameterization of ASN.1 specifications.*

## 2.2 Other references

- ITU-T Recommendation E.123 (2001), *Notation for national and international telephone numbers, e-mail addresses and Web addresses.*
- ITU-T Recommendation E.164 (2005), *The international public telecommunication numbering plan.*
- ITU-T Recommendation F.1 (1998), *Operational provisions for the international public telegram service.*
- CCITT Recommendation F.31 (1988), *Telegram retransmission system.*
- CCITT Recommendation F.401 (1992), *Message handling services: Naming and addressing for public message handling services.*
- ITU-T Recommendation T.30 (2005), *Procedures for document facsimile transmission in the general switched telephone network.*
- ITU-T Recommendation T.62 (1993), *Control procedures for teletex and Group 4 facsimile services.*
- ITU-T Recommendation X.121 (2000), *International numbering plan for public data networks.*
- ISO 3166 (all parts), *Codes for the representation of names of countries and their subdivisions.*
- ISO 639-2:1998, *Codes for the representation of names of languages – Part 2: Alpha-3 code.*
- ISO/IEC 9945-2:2003, *Information technology – Portable Operating System Interface (POSIX) – Part 2: Shell and Utilities.*
- IETF RFC 3377 (2002), *Lightweight Directory Access Protocol (v3): Technical Specification.*
- IETF RFC 3454 (2002), *Preparation of Internationalized Strings (stringprep).*
- The Unicode Consortium. *The Unicode Standard, Version 4.0*, defined by: *The Unicode Standard, Version 4.0* (Reading, MA, Addison-Wesley, 2003. ISBN 0-321-18578-1).
- *Unicode Standard Annex #15: Unicode Normalization Forms*, by Mark Davis and Martin Dürst. An integral part of *The Unicode Standard, Version 4.0*.

## 2.3 ISO/IEC Standards

- ISO/IEC 10646:2003, *Information technology – Universal Multiple-Octet Coded Character Set (UCS).*

### 3 Definitions

For the purposes of this Recommendation | International Standard, the following definitions apply.

The following terms are defined in ITU-T Rec. X.501 | ISO/IEC 9594-2:

- a) *attribute type*;
- b) *object class*;
- c) *matching rule*;
- d) *context*.

### 4 Conventions

With minor exceptions this Directory Specification has been prepared according to the *Rules for presentation of ITU-T | ISO/IEC common text*, November 2001.

The term "Directory Specification" (as in "this Directory Specification") shall be taken to mean ITU-T Rec. X.520 | ISO/IEC 9594-6. The term "Directory Specifications" shall be taken to mean the X.500-series Recommendations and all parts of ISO/IEC 9594.

This Directory Specification uses the term *first edition systems* to refer to systems conforming to the first edition of the Directory Specifications, i.e., the 1988 edition of the series of CCITT X.500 Recommendations and the ISO/IEC 9594:1990 edition. This Directory Specification uses the term *second edition systems* to refer to systems conforming to the second edition of the Directory Specifications, i.e., the 1993 edition of the series of ITU-T X.500 Recommendations and the ISO/IEC 9594:1995 edition. This Directory Specification uses the term *third edition systems* to refer to systems conforming to the third edition of the Directory Specifications, i.e., the 1997 edition of the series of ITU-T X.500 Recommendations and the ISO/IEC 9594:1998 edition. This Directory Specification uses the term *fourth edition systems* to refer to systems conforming to the fourth edition of the Directory Specifications, i.e., the 2001 editions of ITU-T Recs X.500, X.501, X.511, X.518, X.519, X.520, X.521, X.525, and X.530, the 2000 edition of ITU-T Rec. X.509, and parts 1-10 of the ISO/IEC 9594:2001 edition.

This Directory Specification uses the term *fifth edition systems* to refer to systems conforming to the fifth edition of the Directory Specifications, i.e., the 2005 editions of ITU-T Recs X.500, X.501, X.509, X.511, X.518, X.519, X.520, X.521, X.525, and X.530 and parts 1-10 of the ISO/IEC 9594:2005 edition.

This Directory Specification presents ASN.1 notation in the bold Helvetica typeface. When ASN.1 types and values are referenced in normal text, they are differentiated from normal text by presenting them in the bold Helvetica typeface. The names of procedures, typically referenced when specifying the semantics of processing, are differentiated from normal text by displaying them in bold Times. Access control permissions are presented in italicized Times.

If the items in a list are numbered (as opposed to using "-" or letters), then the items shall be considered steps in a procedure.

Attribute types, matching rules and context types are defined in this Recommendation | International Standard by use of the **ATTRIBUTE**, **MATCHING-RULE** and **CONTEXT** information object classes defined in ITU-T Rec. X.501 | ISO/IEC 9594-2.

Examples of the use of the attribute types are described using an informal notation, where attribute type and value pairs are represented by an acronym for the attribute type, followed by an equals sign ("="), followed by the example value for the attribute.

## SECTION 2 – SELECTED ATTRIBUTE TYPES

**5 Definition of selected attribute types**

This Directory Specification defines a number of attribute types which may be found useful across a range of applications of the Directory.

Many of the attributes defined in this Directory Specification are based on a common ASN.1 syntax:

```
DirectoryString { INTEGER : maxSize } ::= CHOICE {
    teletexString      TeletexString (SIZE (1..maxSize)),
    printableString    PrintableString (SIZE (1..maxSize)),
    bmpString          BMPString (SIZE (1..maxSize)),
    universalString    UniversalString (SIZE (1..maxSize)),
    uTF8String         UTF8String (SIZE (1..maxSize)) }
```

Some implementations of the Directory may not support **UniversalString**, **BMPString**, or **UTF8String**, and may not be able to generate, match, shadow, or display attributes with these syntax types.

**5.1 System attribute types****5.1.1 Knowledge Information**

The *Knowledge Information* attribute type specifies a human readable accumulated description of knowledge mastered by a specific DSA.

NOTE – This attribute is now obsolete.

```
knowledgeInformation ATTRIBUTE ::= {
    WITH SYNTAX      DirectoryString {ub-knowledge-information}
    EQUALITY MATCHING RULE caselgnoreMatch
    ID               id-at-knowledgeInformation }
```

**5.2 Labelling attribute types**

These attributes type are concerned with information about objects which has been explicitly associated with the objects by a labelling process.

**5.2.1 Name**

The *Name* attribute type is the attribute supertype from which string attribute types typically used for naming may be formed.

```
name ATTRIBUTE ::= {
    WITH SYNTAX      DirectoryString {ub-name}
    EQUALITY MATCHING RULE caselgnoreMatch
    SUBSTRINGS MATCHING RULE caselgnoreSubstringsMatch
    ID               id-at-name }
```

**5.2.2 Common Name**

The *Common Name* attribute type specifies an identifier of an object. A Common Name is not a directory name; it is a (possibly ambiguous) name by which the object is commonly known in some limited scope (such as an organization) and conforms to the naming conventions of the country or culture with which it is associated.

An attribute value for common name is a string chosen either by the person or organization it describes or the organization responsible for the object it describes for devices and application entities. For example, a typical name of a person in an English-speaking country comprises a personal title (e.g., Mr., Ms., Rd, Professor, Sir, Lord), a first name, middle name(s), last name, generation qualifier (if any, e.g., Jr.) and decorations and awards (if any, e.g., QC).

*Examples*

```
CN = "Mr. Robin Lachlan McLeod BSc(Hons) CEng MIEE";
CN = "Divisional Coordination Committee";
CN = "High Speed Modem".
```

Any variants should be associated with the named object as separate and alternative attribute values.

Other common variants should also be admitted, e.g., use of a middle name as a preferred first name; use of "Bill" in place of "William", etc.

```
commonName ATTRIBUTE ::= {
    SUBTYPE OF      name
    WITH SYNTAX     DirectoryString {ub-common-name}
    ID              id-at-commonName }
```

### 5.2.3 Surname

The *Surname* attribute type specifies the linguistic construct which normally is inherited by an individual from the individual's parent or assumed by marriage, and by which the individual is commonly known.

An attribute value for Surname is a string, e.g., "McLeod".

```
surname ATTRIBUTE ::= {
    SUBTYPE OF      name
    WITH SYNTAX     DirectoryString {ub-surname}
    ID              id-at-surname }
```

### 5.2.4 Given Name

The *Given Name* attribute type specifies the linguistic construct which is normally given to an individual by the individual's parent, or is chosen by the individual, or by which the individual is commonly known.

An attribute value for Given Name is a string, e.g., "David", or "Jean Paul".

```
givenName ATTRIBUTE ::= {
    SUBTYPE OF      name
    WITH SYNTAX     DirectoryString {ub-name}
    ID              id-at-givenName }
```

### 5.2.5 Initials

The *Initials* attribute type contains the initials of some or all of an individual's names, but not the surname(s).

An attribute value for Initials is a string, e.g., "D" or "D." or "J.P.".

```
initials ATTRIBUTE ::= {
    SUBTYPE OF      name
    WITH SYNTAX     DirectoryString {ub-name}
    ID              id-at-initials }
```

### 5.2.6 Generation Qualifier

The *Generation Qualifier* attribute type contains a string which is used to provide generation information to qualify an individual's name.

An attribute value for Generation Qualifier is a string, e.g., "Jr." or "II".

```
generationQualifier ATTRIBUTE ::= {
    SUBTYPE OF      name
    WITH SYNTAX     DirectoryString {ub-name}
    ID              id-at-generationQualifier }
```

### 5.2.7 Unique Identifier

The *Unique Identifier* attribute type specifies an identifier which may be used to distinguish between object references when a distinguished name has been reused. It may be, for example, an encoded object identifier, certificate, date, timestamp, or some other form of certification on the validity of the distinguished name.

An attribute value for Unique Identifier is a bit string.

```
uniqueIdentifier ATTRIBUTE ::= {
    WITH SYNTAX     UniqueIdentifier
    EQUALITY MATCHING RULE bitStringMatch
    ID              id-at-uniqueIdentifier }
```

**UniqueIdentifier ::= BIT STRING**

### 5.2.8 DN Qualifier

The *DN Qualifier* attribute type specifies disambiguating information to add to the relative distinguished name of an entry. It is intended to be used for entries held in multiple DSAs which would otherwise have the same name, and that its value be the same in a given DSA for all entries to which this information has been added.

```
dnQualifier ATTRIBUTE ::= {
    WITH SYNTAX                PrintableString
    EQUALITY MATCHING RULE     caselgnoreMatch
    ORDERING MATCHING RULE     caselgnoreOrderingMatch
    SUBSTRINGS MATCHING RULE   caselgnoreSubstringsMatch
    ID                          id-at-dnQualifier }
```

### 5.2.9 Serial Number

The *Serial Number* attribute type specifies an identifier, the serial number of an object.

An attribute value for Serial Number is a printable string.

```
serialNumber ATTRIBUTE ::= {
    WITH SYNTAX                PrintableString (SIZE (1..ub-serial-number))
    EQUALITY MATCHING RULE     caselgnoreMatch
    SUBSTRINGS MATCHING RULE   caselgnoreSubstringsMatch
    ID                          id-at-serialNumber }
```

### 5.2.10 Pseudonym

The *Pseudonym* attribute type specifies a pseudonym for an object. It is used for naming an object when it is to be made clear that its name is a pseudonym.

```
pseudonym ATTRIBUTE ::= {
    SUBTYPE OF                 name
    WITH SYNTAX                DirectoryString {ub-pseudonym}
    ID                          id-at-pseudonym }
```

### 5.2.11 Universal Unique Identifier Pair

The *Universal Unique Identifier Pair* attribute type specifies a pair of Universal Unique Identifiers (UUID), as specified in ITU-T Rec. X.667 | ISO/IEC 9834-8. The pair collectively represents an issuer/subject relationship, the nature of which is outside the scope of this Directory Specification. The initial UUID in the pair represents the issuer, and the trailing UUID in the pair represents the subject of the issuer/subject relationship. An example of such a relationship is a user account.

```
uUIDPair ATTRIBUTE ::= {
    WITH SYNTAX                UUIDPair
    EQUALITY MATCHING RULE     uUIDPairMatch
    ID                          id-at-uuidpair }
```

```
UUIDPair ::= SEQUENCE {
    issuerUUID    UUID,
    subjectUUID   UUID }
```

```
UUID ::= OCTET STRING (SIZE(16)) -- UUID format only
```

## 5.3 Geographical Attribute Types

These attribute types are concerned with geographical positions or regions with which objects are associated.

### 5.3.1 Country Name

The *Country Name* attribute type specifies a country. When used as a component of a directory name, it identifies the country in which the named object is physically located or with which it is associated in some other important way.

An attribute value for country name is a string chosen from ISO 3166.

```
countryName ATTRIBUTE ::= {
    SUBTYPE OF                 name
    WITH SYNTAX                CountryName
    SINGLE VALUE               TRUE
    ID                          id-at-countryName }
```

**CountryName ::= PrintableString (SIZE(2))** -- ISO 3166 codes only

### 5.3.2 Locality Name

The *Locality Name* attribute type specifies a locality. When used as a component of a directory name, it identifies a geographical area or locality in which the named object is physically located or with which it is associated in some other important way.

An attribute value for Locality Name is a string, e.g., L = "Edinburgh".

```
localityName ATTRIBUTE ::= {
    SUBTYPE OF      name
    WITH SYNTAX     DirectoryString {ub-locality-name}
    ID              id-at-localityName }
```

The *Collective Locality Name* attribute type specifies a locality name for a collection of entries.

```
collectiveLocalityName ATTRIBUTE ::= {
    SUBTYPE OF      localityName
    COLLECTIVE      TRUE
    ID              id-at-collectiveLocalityName }
```

### 5.3.3 State or Province Name

The *State or Province Name* attribute type specifies a state or province. When used as a component of a directory name, it identifies a geographical subdivision in which the named object is physically located or with which it is associated in some other important way.

An attribute value for State or Province Name is a string, e.g., S = "Ohio".

```
stateOrProvinceName ATTRIBUTE ::= {
    SUBTYPE OF      name
    WITH SYNTAX     DirectoryString {ub-state-name}
    ID              id-at-stateOrProvinceName }
```

The *Collective State or Province Name* attribute type specifies a state or province name for a collection of entries.

```
collectiveStateOrProvinceName ATTRIBUTE ::= {
    SUBTYPE OF      stateOrProvinceName
    COLLECTIVE      TRUE
    ID              id-at-collectiveStateOrProvinceName }
```

### 5.3.4 Street Address

The *Street Address* attribute type specifies a site for the local distribution and physical delivery in a postal address, i.e., the street name, place, avenue, and the house number. When used as a component of a directory name, it identifies the street address at which the named object is located or with which it is associated in some other important way.

An attribute value for Street Address is a string, e.g., "Arnulfstraße 60".

```
streetAddress ATTRIBUTE ::= {
    WITH SYNTAX     DirectoryString {ub-street-address}
    EQUALITY MATCHING RULE caselgnoreMatch
    SUBSTRINGS MATCHING RULE caselgnoreSubstringsMatch
    ID              id-at-streetAddress }
```

The *Collective Street Address* attribute type specifies a street address for a collection of entries.

```
collectiveStreetAddress ATTRIBUTE ::= {
    SUBTYPE OF      streetAddress
    COLLECTIVE      TRUE
    ID              id-at-collectiveStreetAddress }
```

### 5.3.5 House Identifier

The *House Identifier* attribute type specifies a linguistic construct used to identify a particular building, for example a house number or house name relative to a street, avenue, town or city, etc.