Internet Engineering Task Force (IETF)
Request for Comments: 5774
BCP: 154
Updates: 4776
Category: Best Current Practice
ISSN: 2070-1721

K. Wolf
A. Mayrhofer
nic.at

March 2010

Considerations for Civic Addresses in the Presence Information Data Format Location Object (PIDF-LO): Guidelines and IANA Registry Definition

Abstract

This document provides a guideline for creating civic address considerations documents for individual countries, as required by RFC 4776. Furthermore, this document also creates an IANA Registry referring to such address considerations documents and registers such address considerations for Austria.

Status of This Memo

This memo documents an Internet Best Current Practice.

This document is a product of the Internet Engineering Task Force (IETF). It represents the consensus of the IETF community. It has received public review and has been approved for publication by the Internet Engineering Steering Group (IESG). Further information on BCPs is available in Section 2 of RFC 5741.

Information about the current status of this document, any errata, and how to provide feedback on it may be obtained at http://www.rfc-editor.org/info/rfc5774.

Table of Contents

1. Introduction

The Presence Information Data Format Location Object (PIDF-LO) [RFC4119] is an object format for carrying geographical information on the Internet. PIDF-LO can contain civic address information and supports a range of "civic address types" (CAtypes) to hold the individual attributes of such addresses (see Section 2.2.1 of [RFC4119] and Section 3.1 of [RFC5139]).

In many use cases, PIDF-LOs are populated with data from long-established sources, like postal and governmental building registers, line information databases and yellow/white pages of infrastructure providers, or official residents registers. The structure and format of data from such sources is almost always different from PIDF-LO's CAtypes definition -- additionally, the structure and format of those sources differ from country to country.

To make use of such existing data sources, transposing that data into PIDF-LO format is required. With no guidelines available on how to map source Fields into CAtype Elements, different creators of PIDF-LO documents might end up with different results, even when using the same data source, which reduces interoperability and increases the risk of misinterpretation by recipients.

Therefore, civic address considerations are necessary to ensure uniform usage of PIDF-LO Elements for such data sources. [RFC4776] explicitly requests such documents to be provided, but defines neither their structure nor a way to publish them. This memo provides documentation on how to create such civic address considerations, and IANA has created a registry to store references to such documents. Furthermore, civic address considerations for Austria are provided in Appendix A and have been registered in the IANA registry.

Section 3.4 of [RFC4776] contains some example considerations regarding the use of administrative subdivision Elements for Canada, Germany, Japan, Korea, and the United States. This document registers these examples with IANA as "obsolete" (see Section 6.3).

Section 3.4 of [RFC4776] also contains instructions on the creation of civic address considerations documents on page 8. This document updates that section and replaces said instructions with Sections 4 and 5 of this memo.

The guidelines in this document have been created with a focus on formal application of PIDF-LO (such as conveying location during an emergency call). It is not intended to forbid other, more informal uses of PIDF-LO that may not follow any formal mapping

specifications. An example use case of such informal usage may be the transmission of PIDF-LO documents during an instant-messaging session between humans. Such use may, however, imply some drawbacks, like prohibiting automatic processing of civic addresses from such a PIDF-LO.

2. Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [RFC2119].

In addition, this document uses "Field" to refer to a field of a civic address data source, and "Element" to refer to a CAtype Element of a PIDF-LO.

3. Requirements

The following requirements apply to defining civic-address mapping considerations:

- The considerations document MUST identify the data source to which the definitions apply. A brief description of its structure SHOULD be provided as well.

- For any data source, just one active mapping definition should exist in order to reduce the risk of ambiguous interpretation.

- The document MUST include instructions for any Field that occurs in the data. For any of the Fields, the document MUST describe whether the Field is required, optional, or must not be used in the mapping procedure.

- Instructions MUST be included for any CAtype Element that is registered by the time the document is created. Those instructions MUST include information regarding whether an Element is required, optional, or must not be used in that mapping. In case the set of CAtypes is revised by the IETF, the address considerations document SHOULD be updated. Until an update is approved, the existing mapping procedure MUST be used.

- Address mapping procedures SHOULD be reversible so that location recipients can identify the corresponding record in the original data source (given they have access to that source).

- For any source data Field that is required or optional, at least one example mapping MUST be provided.

- o In many cases, data sources used in the mapping process might be subject to access restrictions. Such restrictions (as imposed on the original data) MUST also be imposed on the resulting PIDF-LO documents. The considerations document SHOULD note such restrictions in its Security Considerations section.

Although the mapping is defined in a national way and the actual meaning of several PIDF-LO Elements may not be clear to an outsider, at least the country Element tells in what context this PIDF-LO was created. In case of emergency calls, a PIDF-LO would just be passed to a Public Safety Answering Point (PSAP) in the same country as the location generator anyway. However, in a border region there might be exceptions and the PIDF-LO could be sent to a neighboring country. The PIDF-LO can still be passed on to a PSAP in the right country (based on the country Element), or the PSAP might be aware of the mapping scheme used in the neighboring country.

A consistent mapping is also very important for checking if two PIDF-LO documents describe the same location. When civic address Fields are put into different PIDF-LO Elements, it may be difficult to identify whether or not two PIDF-LOs describe identical addresses.

4. Specifying PIDF-LO Element Usage

The purpose of the civic address considerations for an individual data source is to create interoperability by specifying a common list of PIDF-LO Elements to be used and by defining the mapping between these Elements and the Fields of the respective data source.

4.1. General Considerations and Workflow

The workflow for creating an address considerations document is as follows:

1. Describe the data source to which the address considerations document applies.

2. Identify all Fields from the data source and decide, for each of the Fields, whether or not it is to be used for the purpose of creating PIDF-LO documents. The considerations document must list all Fields (or at least state which Fields are considered in the mapping and clearly state that the other Fields MUST NOT be used).

3. For each of the Fields that are required or optional, specify a clear mapping instruction according to the guidelines below.

4. Provide a list of all CAtypes registered and describe their level of usage in this mapping (or combine it with the list of Fields above and clearly list which Elements are not used for the mapping procedure). For Elements that are not described in detail, state whether they MUST NOT be used at all or whether they may be used without further restriction.

5. Provide examples of source data and mapping results.

Civic address Elements are designed to be generic containers. In some cases, Fields clearly correspond to such a container; however, in some other cases, identifying the correct container might require some approximation. For example, in some countries the RD (road) Element might also be appropriate for other thoroughfares, like waterways or tunnels.

Fields that are identified to have the same meaning as one of the CAtypes SHOULD be directly mapped to that CAtype Element.

Where CAtype usage diverges from the original specification, the mapping definition of Fields that are mapped to that Element SHOULD include a discussion of the differences.

Fields that do not fit into an existing CAtype:

Even though the list of CAtypes could be extended, it is not feasible to add new Elements for every new Field in every data source in every country. Therefore, unless new generic CAtypes are specified by the IETF, only existing Elements can be used, which leaves the following options:

1. Concatenate several civic address Fields into a single PIDF-LO Element (define delimiters if applicable and make sure the separate civic address parts can be retrieved again).

2. Use a PIDF-LO Element that is unused so far.

Note: Obviously, the first option is required if the number of Fields that are used in the mapping procedure is greater than the number of existing CAtype Elements.

Note that the xml:lang attribute should be present in PIDF-LO XML [W3C.REC-xml-20060816] documents, according to RFC 5139.

4.2. Guidelines for Individual Elements

The following sections discuss individual PIDF-LO Elements and describe what to consider for each Element when defining civic address considerations. It is RECOMMENDED to follow a similar structure for considerations documents.

4.2.1. Country

The country Element must hold the alpha-2 codes from ISO 3166-1 [ISO3166-1] in uppercase characters, as clarified in Section 3.3 of RFC 5139 [RFC5139].

This Element cannot be redefined on a national basis since it identifies the country itself. This Element is used to identify which national mapping for civic addresses has been used in a specific PIDF-LO.

Example for Austria: <country>AT</country>

4.2.2. Country Subdivisions A1-A6

The Elements A1 to A6 are used to hold national subdivision identifiers, with A1 holding the top-level subdivision identifier. A1 may either contain the second part of ISO 3166-2 [ISO3166-2] (see Section 3.4 of RFC 5139 [RFC5139]) or other values as described in the particular address considerations document. Elements "A2" to "A6" may contain additional levels of subdivisions (see Section 2.2.1 of RFC 4119).

For A1, an address considerations document MUST state whether ISO 3166-2 codes are to be used exclusively; alternatively, it should define a list of values to be used (for example, subdivision names). In either case, A1 MUST NOT be redefined for any other use than describing top-level subdivisions.

For each of the A2 - A6 Elements that are required or optional, the document SHOULD define the set of allowed values, either by listing them or by referring to such a list.

Example for Austria:

A1 province (Bundesland)
A2 political district (politischer Bezirk) name or identifier
A3 commune (Gemeinde) name or identifier
A4 village (Ortschaft) name or identifier
A5 cadastral municipality (Katastralgemeinde) name or identifier

A6 must not be used. For more details, see the example in Appendix A.4.2.

4.2.3. Road and Street Names

PIDF-LO contains the following Elements related to road names: RD, RDSEC, RDBR, RDSUBADDR, PRM, POM (Sections 3.1 and 3.2 of RFC 5139 [RFC5139]) and PRD, POD, STS (Sections 3.4 of [RFC4776]). Note: the use of the A6 Element for street names is not valid any more (Section 3.2 of RFC 5139 [RFC5139]).

Besides the basic specification of which of those Elements are required, optional, or not to be used, an address considerations document may also describe more complicated dependencies (for example, "RD is optional, but required if any other road name Element is used").

For any required or optional Element, the relation of those Elements to Fields of the data source used MUST be described, as should special considerations (like concatenation of Fields into an Element), if they apply. The usage of the Element STS (street suffix) SHOULD be consistent. In case no suffixes are known in a data source, or it is common to write the street name and the suffix together, the STS Element SHOULD be left out completely. If suffixes may be abbreviated, the common abbreviations SHOULD be defined.

Example for Austria:

RD: street name

All other road Elements must not be used. Street suffixes are already included in the "street name" Field and must not be abbreviated.

4.2.4. House Numbers

PIDF-LO specifies two Elements related to house numbers: HNO ("house number", numeric part only) and HNS ("house number suffix") (see Section 3.4 of RFC 4776). However, in many countries house numbers have a more complex format. In any case, a clear definition is REQUIRED to minimize the potential for confusion.

An address considerations document should provide the following information with regards to house numbers: if the structure of house numbers fits the HNO/HNS structure, the document MUST mandate to use those Elements as described in RFC 4776. If the structure of house numbers does not directly fit into those two Elements, the document

MUST define strategies on how to map source Fields into Elements. Besides HNO and HNS, LOC and BLD could be considered for carrying house number information.

The document SHOULD describe whether or not abbreviations of house number information is valid. If abbreviations are used, they MUST be clearly defined. If house numbers consist of more than one number, or if multiple prefixes and suffixes may coexist, a delimiter symbol and a clear rule on how to concatenate all this data into the HNO and HNS Element might be necessary. Whenever concatenating data into one Element, keep in mind that the location recipient might want to separate the data again.

Example from Austria:

HNO: concatenate all the data Fields of Austrian house numbers into this single PIDF-LO Element in a defined order with delimiter symbols (see Appendix A.4.4 for the complete definition).

HNS: usage not allowed since there may be multiple suffixes for the different parts of the house number.

LOC and BLD are not to be used to reflect house number information.

4.2.5. Local Names

PIDF-LO contains three Elements to reflect local names: LMK, LOC, and NAM (Section 3.4 of RFC 4776). Such local names may be of importance for the identification of a location and may either coexist with a valid civic address or (in some cases) have no address assigned, in which case the local name, itself, identifies the location. In rural regions, for example, a farm name may be more common than a street address to identify a location. Landmarks typically don’t have any civic address information assigned. Therefore, local names may assist in finding a "street name" type address, but they might also be the authoritative (and only) civic location information.

For any required or optional Element out of LMK, LOC, or NAM, the considerations document should state potential values (source data) for the Element. In the case that multiple values for an Element may occur, a concatenation/selection strategy should be described. Concatenation using ";" as a separator is recommended, unless this character also appears in the source Fields.

If local name information and "common" address information is both available and used, the document SHOULD discuss the relationship between those two address information types and the expected behavior of location recipients.

Example from Austria:

NAM: contains the "Vulgoname" (local name); multiple local names are separated by a semicolon (if applicable).

LMK: contains the farm name (just one name possible) (if applicable).

LOC: can be used without restriction for additional location information (as per RFC 4119).

The "Vulgoname" is useful to identify the location within its locality, since official addresses (especially in rural regions) might not be well known.

4.2.6. Floors

PIDF-LO defines the Element FLR to hold floor information but does not further specify its content. Section 2.1 of RFC 3825 provides guidance about floor numbering but is not directly related to PIDF-LO.

An address considerations document SHOULD clearly specify how to express floors using the FLR Element. Following the above-mentioned guidance is RECOMMENDED; however, local nomenclature might require a completely different system. The document SHOULD specify whether only numbers, text, or both are allowed in the FLR Element. If there are standard values for certain floors, they SHOULD be listed. Abbreviations SHOULD be avoided, unless they are the primary (well-known) way of identifying floors.

Example from Austria:

If floor numbers are to be mapped, the FLR Element MUST be used. Numbers and text are both allowed. The first floor (<FLR>1</FLR>) is the first "full" floor above the floor at street level. The floor at street level is <FLR>EG</FLR> or <FLR>0</FLR>. There might be intermediate floors, especially between the floor at street level and the "first floor". Such intermediate floors have names like "Mezzanine", "Erster Halbstock" ("first half floor"), or "Zweiter Halbstock" ("second half floor"), and have local meanings.

4.2.7. Address Codes

Address codes are available in several countries in different forms (for estates, buildings, or usable units for example). These codes identify an address record and MAY be placed in the ADDCODE Element in PIDF-LO. Address codes can help the location recipient to determine the location and to identify the original record in the

data source. Depending on the type of code, the code alone (without any other Elements) may even be sufficient to fully identify an address within a country.

In such cases, a PIDF-LO containing just the country and ADDCODE Elements might provide enough information to retrieve a civic address, given the location recipient has access to the respective source database.

A civic address considerations document SHOULD specify whether and in which applications the use of the ADDCODE Element is allowed. If ADDCODE is used, its relation to the remaining Elements MUST be clearly stated. If several namespaces for address codes exist in a country, a mechanism to distinguish the different code spaces MUST be described.

Examples from Austria:

Statistik Austria provides 4 codes: Adresscode (AdrCD), Adresssubcode (AdrsubCD), Objektnummer (ObjNr), and Nutzungseinheitenlaufnummer (NtzLnr).

The following format SHOULD be used:

```
<ADDCODE>AdrCD=1234567;AdrsubCD=123;
ObjNr=2333211;NtzLnr=0001</ADDCODE>
```

4.2.8. Other Elements

This section lists all PIDF-LO Elements that have not been discussed so far.

To specify the location inside a building, the following Elements can be useful:

- UNIT
- ROOM
- SEAT

The following Elements are to be used for the representation of postal codes:

- PC
- PCN
- POBOX

To describe the place-type or the building, the following Elements are available:

- PLC - Place-type (for allowed values, refer to the IANA registry defined in [RFC4589])
- BLD - Building (structure)

For any of those Elements that are required or optional in a mapping, the semantics of its contents must be described if it differs from the definition in the PIDF-LO base documents.

It is RECOMMENDED that the Elements SEAT, UNIT, and ROOM remain to be used for identifying a location inside a building. They MAY be used by the owner of the respective building if a considerations document does not restrict their use. For example, an airport could decide to place the gate number in the UNIT Element and a location recipient could identify that PIDF-LO by the value of the PLC Element. The name of the airport could be placed in NAM.

5. Security Considerations

RFC 4119 contains general security considerations for handling PIDF-LOs.

6. IANA Considerations

IANA has created the registry "PIDF-LO Civic Address Considerations Registry", according to the following definitions. Furthermore, this document registers a civic address considerations document for Austrian addresses, as provided in the Appendix of this document, and also registers the considerations of RFC 4776 as obsolete.

6.1. PIDF-LO Civic Address Considerations Registry

6.1.1. Structure

The IANA registry contains the following fields:

- Country-Code: either the ISO 3166 alpha-two code of the country to which the consideration applies or "other" in case the considerations document is not specific to a particular country. This field is to be defined by the requestor.
- Serial Number: a number that uniquely identifies a considerations document within a certain "Country-Code" field value. Serial Numbers are sequentially assigned by IANA per Country-Code value, start at zero, and are never reused.

- Reference to specification: this field contains a reference to the considerations document. The xref type "rfc" should be used for referencing to RFCs, while other documents should use the "uri" type.

- Requestor: the author of the document.

- Status: one of either "active" or "obsolete". When the document is registered by IANA, the status is first set to "active" by IANA. Experts may later request changing the status to "obsolete", especially if there is an updated version of the considerations document available. Authors of considerations documents must contact the experts if they wish to change the status of the document.

Note: the combination of Country-Code and Serial Number fields uniquely identifies a considerations document in the registry (for example, "AT-0", "US-0", "US-1", or "other-0").

6.1.2. Registration Template

For registration of address considerations documents in the registry, requesters SHOULD use the following template. The template SHOULD be contained in the considerations document itself.

```
<record>
  <country> <!-- Country-Code --> </country>
  <serial> <!-- assigned by IANA --> </serial>

  <!-- reference to document -->
  <xref type="uri" data="http://www.example.org/civicaddr/"/>

  <!-- record requesters -->
  <xref type="person" data="John_Doe"/>
  <xref type="person" data="Jane_Dale"/>

  <status> <!-- assigned by IANA --> </status>
</record>

<people>
  <person id="John_Doe">
    <name> <!-- Firstname Lastname --> </name>
    <org> <!-- Organization Name --> </org>
    <uri> <!-- mailto: or http: URI --> </uri>
    <updated> <!-- date format YYYY-MM-DD --> </updated>
  </person>
  <!-- repeat person section for each person -->
</people>
```

6.1.3. Registry Location

Approved registrations are published in the IANA registry named "PIDF-LO Civic Address Considerations Registry", which is available from http://www.iana.org.

Registrations are sorted by ascending order by the Country-Code and by Serial Number within Country-Code values. Registrations with Country-Code of "other" are put at the end of the list.

6.1.4. Registration Procedure

Following the policies outlined in [RFC5226], new address considerations are added to the registry after Expert Review (see Section 4.1 in RFC 5226). The Expert will generally check if the submitted address considerations conform to the civic address guidelines in this document (see Section 4). If in doubt, the Expert SHOULD consult the GEOPRIV mailing list or its dedicated successor. If possible, the Experts SHOULD check the available documentation on which the address consideration is based.

6.2. Registration Request for Austria

This document registers the civic address considerations for addresses from the official Austrian Building and Habitation registry, according to the registration procedure described above. The required information is contained in Appendix A.

6.3. Registration of the Considerations in RFC 4776 as Obsolete

Since this document updates RFC 4776, the considerations on the subdivision Elements in Section 3.4 of RFC 4776 for Canada, Germany, Japan, Korea, and the United States are obsolete. The following IANA registration records register them in the IANA registry as obsolete.

Canada:

```
 <record>
   <country>CA</country>
   <serial>0</serial>
   <xref type="rfc" data="rfc4776"/>
   <xref type="person" data="Henning_Schulzrinne"/>
   <status>obsolete</status>
 </record>

<people>
  <person id="Henning_Schulzrinne">
    <name>Henning Schulzrinne</name>
    <org>Columbia University</org>
    <uri>mailto:hgs+geopriv@cs.columbia.edu</uri>
    <updated>2009-01-09</updated>
  </person>
</people>
```

Germany:

```
 <record>
   <country>DE</country>
   <serial>0</serial>
   <xref type="rfc" data="rfc4776"/>
   <xref type="person" data="Henning_Schulzrinne"/>
   <status>obsolete</status>
 </record>

<people>
  <person id="Henning_Schulzrinne">
    <name>Henning Schulzrinne</name>
    <org>Columbia University</org>
    <uri>mailto:hgs+geopriv@cs.columbia.edu</uri>
    <updated>2009-01-09</updated>
  </person>
</people>
```

Japan:

```
 <record>
   <country>JP</country>
   <serial>0</serial>
   <xref type="rfc" data="rfc4776"/>
   <xref type="person" data="Henning_Schulzrinne"/>
   <status>obsolete</status>
 </record>

<people>
  <person id="Henning_Schulzrinne">
    <name>Henning Schulzrinne</name>
    <org>Columbia University</org>
    <uri>mailto:hgs+geopriv@cs.columbia.edu</uri>
    <updated>2009-01-09</updated>
  </person>
</people>
```

Korea:

```
 <record>
   <country>KR</country>
   <serial>0</serial>
   <xref type="rfc" data="rfc4776"/>
   <xref type="person" data="Henning_Schulzrinne"/>
   <status>obsolete</status>
 </record>

<people>
  <person id="Henning_Schulzrinne">
    <name>Henning Schulzrinne</name>
    <org>Columbia University</org>
    <uri>mailto:hgs+geopriv@cs.columbia.edu</uri>
    <updated>2009-01-09</updated>
  </person>
</people>
```

United States:

```
            <record>
              <country>US</country>
              <serial>0</serial>
              <xref type="rfc" data="rfc4776"/>
              <xref type="person" data="Henning_Schulzrinne"/>
              <status>obsolete</status>
            </record>

           <people>
             <person id="Henning_Schulzrinne">
               <name>Henning Schulzrinne</name>
               <org>Columbia University</org>
               <uri>mailto:hgs+geopriv@cs.columbia.edu</uri>
               <updated>2009-01-09</updated>
             </person>
           </people>
```

7. Acknowledgements

The authors would like to thank Martin Thomson and Richard Barnes for reviewing the document, and Gregor Jaenin for contributing insights into the Austrian civic address data format.

Appendix A. Civic Address Considerations Registration for the Austrian Building and Habitation Registry

The Austrian "Gebaeude- und Wohnungsregistergesetz" (building and habitation registry law) is the legal basis for the obligation to provide a registry of civic addresses, buildings, and their usable units (subdivisions of buildings). The registry is operated by "Statistik Austria GmbH", a fully governmentally owned company. The local administrations of individual townships are responsible for keeping records in the registry up to date.

The data format definition for the individual records is publicly available (data access itself is, however, restricted). Hence, a uniform address database for the whole of Austria is available. A detailed description of the Statistik Austria civic address data format is contained in Appendix A.1.

A.1. Civic Address Format in Austria

Statistik Austria data describes estates, buildings, and usable units [merkmalskatalog]. On a single estate there may be any number of buildings. Apartment houses that have more than one staircase are split up in separate buildings at every staircase. In every building, there may be several usable units. For example, an apartment house may have several apartments, counting as separate usable units. Moreover, one building may have more than one address but will have at least one address. Below, the address Fields for estates (Table 1), buildings (Table 2), and usable units (Table 3) are shown.

The ADDCODE, A5, and PCN Elements are optional, and the other Elements MUST be used if the data source contains their corresponding Fields. The Elements A1 and A2 (not listed in the tables) SHOULD also be used if data is available. Exception: when using the address codes only (access to the codes is necessary for the creator and recipient of the location information), just the ADDCODE and country Elements are mandatory; the other Elements can be used optionally, of course.

Statistik Austria name	Explanation	PIDF-LO Element
Adresscode	address identifier	ADDCODE
Gemeindename, Gemeindekennziffer	commune name and identifier	A3
Ortschaftsname, Ortschaftskennziffer	village name and identifier	A4
Strassenname, Strassenkennziffer	street name and identifier	RD
Katastralgemeindename, Katastralgemeindenummer	cadastral municipality and identifier	A5
Hausnummerntext	text in front of the house number	HNO
Hausnummer - 1. Teil - Nummer	first part of the house number, numeric	HNO
Hausnummer - 1. Teil - Buchstabe	first part of the house number, character	HNO
Hausnummer - Verbindungszeichen Teil 1 -> Bis	links first and Bis part of house number	HNO
Hausnummer - Bis-Nummer	number of Bis part of house number	HNO
Hausnummer - Bis-Buchstabe	character of Bis part of house number	HNO
Hausnummernbereich	indicates if all house numbers specified or just odd or even numbers are stated	HNO
Postleitzahl	postal code	PC
Postleitzahlengebiet	postal community code	PCN

Vulgoname	local name	NAM
Hofname	farm name	LMK

Table 1: Civic Address Fields for Estates

Statistik Austria name	Explanation	PIDF-LO Element
Adresssubcode	address subcode	ADDCODE
Objektnummer	object code	ADDCODE
Hausnummer - Verbindungszeichen Teil Bis -> Teil 2	links Bis and second part of house number	HNO
Hausnummer - 2. Teil - Nummer	second part of the house number, numeric	HNO
Hausnummer - 2. Teil - Buchstabe	second part of the house number, character	HNO
Hausnummer - Verbindungszeichen Teil 2-> Teil 3	links second and third part of house number	HNO
Hausnummer - 3. Teil - Nummer	third part of the house number, numeric	HNO
Hausnummer - 3. Teil - Buchstabe	third part of the house number, character	HNO
Gebaeudeunterscheidung	for differentiation of buildings, e.g. Maierweg 27 Hotel vs. Maierweg 27 Appartmenthaus	HNO

Table 2: Additional Civic Address Fields for Buildings

Statistik Austria name	Explanation	PIDF-LO Element
Nutzungseinheitenlaufnummer	usable unit code	ADDCODE
Tuernummer	door number	HNO
Topnummer	unit number	HNO
Lagebeschreibung	for verbal description	HNO
Lage	describes if the usable unit is in the basement, mezzanine, attic floor, ... (but not the floor number)	FLR
Stockwerk	floor	FLR

Table 3: Additional Civic Address Fields for Usable Units

Note: "floors" in Austria (as in most parts of Europe) are counted differently compared to the US. The "1st floor" in Austria is actually the floor above the floor at street level (2nd floor in US) -- not considering the fact that, in old buildings, there might be even more floors between street level and 1st floor, like "mezzanine" and "2nd mezzanine". So, an Austrian "1st floor" could well be the "4th floor" according to US nomenclature.

According to Statistik Austria [adrwarten], 81.5% of Austrian addresses are of the simple type Musterstrasse 1 (Musterstrasse is an example street name). 5% of all addresses have an additional character, like Musterstrasse 1b. 1% of Austrian addresses look like Musterstrasse 21A - 23A. For 8% of addresses, an additional separator is necessary -- like Musterstrasse 10 Haus 1 Stiege 2, or Musterstrasse 20 Gruppe A Reihe 1 Parzelle 13, or Musterstrasse 30 Weg 1 Parzelle 10. Very seldom, there are so-called special addresses (0.03%) -- for example, Musterstrasse gegenueber 3A, meaning this address is actually opposite of house number 3A. Rather surprisingly, 4.47% of Austrian addresses contain the identifier of the estate since no house number is assigned at all -- for example, Musterstrasse GNR 1234, or Musterstrasse GNR .12/4 Kirche (this type of addresses is common for churches), or a real example in Stockerau:

Kolomaniwoerth GNR 1583. This identifier is stored by Statistik Austria as Hausnummerntext. Otherwise, one could misinterpret this number as a house number, which would be definitely wrong.

A.2. Sample Addresses

In order to clarify the Austrian civic address format, this section provides some exemplary addresses:

1234 Musterstadt, Hauptstrasse 1a - 5a Block 1b Haus 2c Stiege 1
Postleitzahl: 1234
Stadt: Musterstadt
Strasse: Hauptstrasse
Hausnummer - 1. Teil - Nummer: 1
Hausnummer - 1. Teil - Buchstabe: a
Hausnummer - Verbindungszeichen Teil 1 -> Bis: -
Hausnummer - 2. Teil - Nummer: 5
Hausnummer - 2. Teil - Buchstabe: a
Hausnummer - Verbindungszeichen Teil Bis -> Teil 2: Block
Hausnummer - 2. Teil - Nummer: 1
Hausnummer - 2. Teil - Buchstabe: b
Hausnummer - Verbindungszeichen Teil 2-> Teil 3: Haus
Hausnummer - 3. Teil - Nummer: 2
Hausnummer - 3. Teil - Buchstabe: c
Gebaeudeunterscheidung: Stiege 1

1234 Musterstadt, Musterstrasse 13 Hotel
Postleitzahl: 1234
Stadt: Musterstadt
Strasse: Musterstrasse
Hausnummer - 1. Teil - Nummer: 13
Gebaeudeunterscheidung: Hotel

6020 Innsbruck, Anichstrasse vor 35
Postleitzahl: 6020
Stadt: Innsbruck
Strasse: Anichstrasse
Hausnummerntext: vor ("in front of")
Hausnummer: 35

6173 Oberperfuss, Riedl 3097 (Pfarrkirche)
Postleitzahl: 6173
Stadt: Oberperfuss
Strasse: Riedl
Hausnummerntext: 3097
(since the estate identifier is 81305 3097, where 81305 is the

Katastralgemeindenummer (cadastral municipality), and no house number is assigned)
Vulgoname: Pfarrkirche

A.3. Address Codes in Austria

Statistik Austria registers 4 codes: Adresscode, Adresssubcode, Objektnummer, and the Nutzungseinheitenlaufnummer. The Adresscode (7 digits) is a unique code for an address in Austria. The Adressregister maps the Adresscode to the civic address. If there is a building located at an address, there is also an Adresssubcode (3 digits) assigned. Every building at an address has its own Adresssubcode (assigned sequentially starting with 001, 002, 003, and so on) in order to distinguish between buildings at the same address. Furthermore, every building located in Austria has its own unique code, the Objektnummer (7 digits). This code identifies the building independent of the Adresscode. That’s because addresses are subject to change while the building may persist. To differentiate multiple usable units inside a building, the Nutzungseinheitenlaufnummer (4 digits) is used. This code is also assigned in sequential order for each building.

Besides, every address and building is geocoded by Statistik Austria. Hence, if every PIDF-LO would carry data in the format of Statistik Austria and if every PSAP would use the database of Statistik Austria for mapping, a time-saving, definite mapping without irregularities could be achieved.

Besides these codes, Statistik Austria maintains reference numbers for communes, localities, or streets, to mention just a few.

A.4. Austrian Addresses in PIDF-LO

The following subsections define the mapping procedure.

A.4.1. Country

The country Element for Austria must be set to AT, since this is the ISO 3166-1 [ISO3166-1] alpha-2 code for Austria.

```
<country>AT</country>
```

The usage of the ISO 3166 code is demanded by RFC 4119 [RFC4119], and RFC 5139 [RFC5139] proposes to use uppercase characters only.

A.4.2. Country Subdivisions A1-A6

A1 province (Bundesland), Section A.4.2.1
A2 political district name or identifier (politischer Bezirk), Section A.4.2.2
A3 commune name or identifier (Gemeinde), Section A.4.2.3
A4 village name or identifier (Ortschaft), Section A.4.2.4
A5 cadastral municipality name or identifier (Katastralgemeindename or Katastralgemeindenummer), Section A.4.2.5

Element A6 must not be used.

Last, there is an exception to mention that concerns the Austrian capital, Vienna (Wien). The city of Vienna is equal to its political district and even the province is called Vienna. Nevertheless, Vienna is separated in 23 districts within the same political district. Consequently, an address in Vienna would look like:

<country>AT</country>
<A1>Wien</A1>
<A2>Wien</A2>
<A3>Wien</A3>
<A4>Favoriten</A4> or <A4>10<A4>
<A5>Inzersdorf Stadt<A5>

The Element A4, holding the city division, can hold the name or the number of the district.

A.4.2.1. A1 Element

As proposed in RFC 5139 [RFC5139], for the PIDF-LO Element A1, the second part of ISO 3166-2 [ISO3166-2] can be used. However, in Austria it is also common to write out the names of the states. Table 4 shows the possible values of the A1 Element for Austrian states.

Bundesland	second part of ISO 3166-2 code
Burgenland	1
K=U+00E4rnten	2
Nieder=U+00F6sterreich	3
Ober=U+00F6sterreich	4
Salzburg	5
Steiermark	6
Tirol	7
Vorarlberg	8
Wien	9

Table 4: A1 Element Format for Austria

(Note: values are shown in UTF-8, which is recommended to be used for PIDF-LO.)

A.4.2.2. A2 Element

Names of the Austrian political districts are available at Statistik Austria [bezirke]. These names, the unique code for the political district, or both can be used for the A2 Element. If the content of the A2 Element is numeric, obviously the code is provided (there is no political district in Austria with a number in its name). In case both the name and the code are provided, they are separated by a semicolon and the name must be listed first.

The district of "Bruck an der Leitha" could be represented by:

```
<A2>Bruck an der Leitha<A2>

or
<A2>307</A2>

or
<A2>Bruck an der Leitha;307</A2>
```

A.4.2.3. A3 Element

The Element A3 holds the Gemeindename (commune name), the identifier of the Gemeinde, or both separated by a semicolon (the name must be listed first). If the content of the A3 Element consists of a number only, it is obvious that just the identifier is provided. Statistik Austria maintains a table with the Gemeindenamen and identifiers [gemeinden], which must be used as the content for the A3 Element; no other spelling is allowed.

Sample:

```
<A3>Neusiedl am See</A3>

or
<A3>10713</A3>

or
<A3>Neusiedl am See;10713</A3>
```

A.4.2.4. A4 Element

The Element A4 holds the Ortschaftsname (village name), the Ortschaftskennziffer (the identifier), or both separated by a semicolon (the name must be listed first). If the content of the A4 Element consists of a number only, it is obvious that just the identifier is provided, since there are no Ortschaftsnamen in Austria that contain a number. Statistik Austria maintains a table with the Ortschaftsnamen and identifiers [ortschaften], which must be used as the content for the A4 Element; no other spelling is allowed.

Sample:

```
<A4>Wilfleinsdorf</A4>

or
<A4>03448</A4>

or
<A4>Wilfleinsdorf;03448</A4>
```

A.4.2.5. A5 Element

The Element A5 holds the Katastralgemeindename (cadastral municipality), the Katastralgemeindenummer (the identifier), or both separated by a semicolon (the name must be listed first). If the

content of the A5 Element consists of a number only, it is obvious that just the identifier is provided, since there are no Katastralgemeindenamen in Austria that contain a number.

Sample (Vienna, Fuenfhaus):

<A5>Oberbaumgarten</A5>

or
<A5>1208</A5>

or
<A5>Oberbaumgarten;1208</A5>

A.4.3. Road and Street Names

The PIDF-LO Element RD holds the complete street name, including the street suffix. No abbreviations are allowed. No other Elements are needed for streets and must not be used.

A.4.4. House Numbers

Statistik Austria lists 14 data Fields related to the house number of a building plus another 5 Fields for distinction of different usable units inside a building (including the floor, which has a separate Element in PIDF-LO). Unfortunately, PIDF-LO only defines a single house number Element (HNO, numeric part only) and house number suffix Element (HNS). Therefore, this section defines a mapping in order to accommodate all data: all house number data is concatenated into a single HNO Element, even though it is expected to hold numeric part only.

In order to allow automatic procession of the HNO Element, it is necessary to use a semicolon as a delimiter symbol (Austrian house numbers do not contain semicolons). The house number parts MUST be provided in the order in which they are listed by the Statistik Austria document [merkmalskatalog]. For user-interface representation, the semicolon-separated format can be transformed by replacing semicolons by spaces (multiple spaces should be combined) and no space should be present between a numeric part of a house number and its related character.

It is not allowed to use the HNS Element for Austrian addresses, since there are addresses that do not have just a single suffix.

The house number "vor 1 - 1A" (consisting of a house number text "vor", first part of the house number numeric "1", "-" as the link of the first and Bis part, "1" as house number Bis part numeric, "A" as character of the Bis part) would be mapped to:

<HNO>vor;1;;-;1;A;;;;;;;;;;</HNO>

A.4.5. Local Names

NAM: contains the Vulgoname (local name); multiple local names are separated by a semicolon (if applicable).

LMK: contains the farm name (just one name possible) (if applicable).

LOC: can be used without restriction for additional location information (as per RFC 4119).

A.4.6. Floors

The floor Element may contain numbers or text describing the floor. The first floor (<FLR>1</FLR>) is the floor above the floor at street level. The floor at street level is <FLR>EG</FLR> or <FLR>0</FLR>. Other floors may have names like mezzanine, for example. The Statistik Austria data Fields Lage and Stockwerk are concatenated if necessary.

A.4.7. Additional Code Element

The Element additional code may be used to hold the codes provided by Statistik Austria. There is an Adresscode, Adresssubcode, Objektnummer, and a Nutzungseinheitenlaufnummer. These unique codes identify the location. Actually, these codes alone would be enough but require that the location recipient has access to the database of Statistik Austria.

If the additional code in a PIDF-LO document is going to hold the codes from Statistik Austria, the following format should be used:

<ADDCODE>AdrCD=1234567;AdrsubCD=123;
ObjNr=2333211;NtzLnr=0001</ADDCODE>

It is not necessary to provide all codes, but there are some restrictions: the Adresssubcode cannot be used without an Adresscode. More restrictions are defined by Statistik Austria. By setting the country Element to AT (see Section 4.2.1), indicating an Austrian address, the Additional Code Element is expected to hold codes from

Statistik Austria only. When creating PIDF-LO documents using address codes by Statistik Austria, the country and ADDCODE Elements are mandatory.

A.4.8. Other Elements

The Elements PC and PCN can hold the data form Statistik Austria, the POBOX can be used if the post assigned a post office box. At least the PC Element should be present.

PC: Postleitzahl (postal code)

PCN: Postleitzahlengebiet (postal community name)

POBOX: Postfach

The Elements UNIT, ROOM, SEAT, PLC, and BLD may be used without further restriction.

A.4.9. Elements Not to Be Used

A6
STS
HNS
PRD
POD
RDBR
RDSUBBR
PRM
POM

A.5. Example

This section shows an example mapping of an Austrian address to PIDF-LO.

Address:

Bundesland: Wien
Politischer Bezirk: Wien
Gemeindename: Wien
9. Bezirk
Strasse: Lazarettgasse
Hausnummer - 1. Teil - Nummer: 13
Hausnummer - 1. Teil - Buchstabe: A
Hausnummer - Verbindungszeichen Teil 1-Bis: -

```
   Hausnummer - Bis-Nummer: 13
   Hausnummer - Bis-Buchstabe: C
   Postleitzahl: 1090

   PIDF-LO:

   <?xml version="1.0" encoding="UTF-8" ?>
     <presence xmlns="urn:ietf:params:xml:ns:pidf"
        xmlns:gp="urn:ietf:params:xml:ns:pidf:geopriv10"
        xmlns:cl="urn:ietf:params:xml:ns:pidf:geopriv10:civicAddr"
        entity="pres:123@examplehost">
      <tuple id="abcd123456">
       <status>
        <gp:geopriv>
          <gp:location-info>
            <cl:civicAddress xml:lang="de">
              <cl:country>AT</cl:country>
              <cl:A1>Wien</cl:A1>
              <cl:A2>Wien</cl:A2>
              <cl:A3>Wien</cl:A3>
              <cl:A4>9</cl:A4>
              <cl:RD>Lazarettgasse</cl:RD>
              <cl:HNO>;13;A;-;13;C;;;;;;;;;;;</cl:HNO>
              <cl:PC>1090</cl:PC>
            </cl:civicAddress>
          </gp:location-info>
         <gp:usage-rules>
         <gp:retransmission-allowed>yes</gp:retransmission-allowed>
         <gp:retention-expiry>2009-11-10T12:00:00Z</gp:retention-expiry>
         </gp:usage-rules>
        </gp:geopriv>
       </status>
       <timestamp>2009-02-09T12:00:00Z</timestamp>
      </tuple>
     </presence>
```

A.6. IANA Registration Record

```
       <record>
         <country>AT</country>
         <serial>0</serial>

         <!-- reference to document -->
         <xref type="rfc" data="rfc5774"/>

         <!-- record requesters -->
         <xref type="person" data="Alexander_Mayrhofer"/>
         <xref type="person" data="Karl_Heinz_Wolf"/>
```

```
        <status>active</status>
      </record>

     <people>
       <person id="Alexander_Mayrhofer">
         <name>Alexander Mayrhofer</name>
         <org>nic.at GmbH</org>
         <uri>mailto:alexander.mayrhofer@nic.at</uri>
         <updated>2009-01-09</updated>
       </person>
       <person id="Karl_Heinz_Wolf">
         <name>Karl Heinz Wolf</name>
         <org>nic.at GmbH</org>
         <uri>mailto:karlheinz.wolf@nic.at</uri>
         <updated>2009-01-09</updated>
       </person>
     </people>
```

Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

[RFC4119] Peterson, J., "A Presence-based GEOPRIV Location Object Format", RFC 4119, December 2005.

[RFC4589] Schulzrinne, H. and H. Tschofenig, "Location Types Registry", RFC 4589, July 2006.

[RFC4776] Schulzrinne, H., "Dynamic Host Configuration Protocol (DHCPv4 and DHCPv6) Option for Civic Addresses Configuration Information", RFC 4776, November 2006.

[RFC5139] Thomson, M. and J. Winterbottom, "Revised Civic Location Format for Presence Information Data Format Location Object (PIDF-LO)", RFC 5139, February 2008.

[RFC5226] Narten, T. and H. Alvestrand, "Guidelines for Writing an IANA Considerations Section in RFCs", BCP 26, RFC 5226, May 2008.

[W3C.REC-xml-20060816] W3C, "Extensible Markup Language (XML) 1.0 (Fourth Edition)", Recommendation REC-xml-20060816, August 2006, <http://www.w3.org/TR/2006/REC-xml-20060816>.

Informative References

[adrwarten] Statistik Austria, "Handbuch Adress-GWR-Online Teil A Theoretisches Handbuch Kapitel 2 Warten von Adressen im Adress-GWR-Online", Jan 2005.

[merkmalskatalog] Statistik Austria, "Handbuch Adress-GWR-Online Teil C Anhang 2 Merkmalskatalog", Sept 2004.

[ISO3166-1] International Organization for Standardization, "Codes for the representation of names of countries and their subdivisions - Part 1: Country codes", ISO Standard 3166-1:1997, 1997.

[ISO3166-2] International Organization for Standardization, "Codes for the representation of names of countries and their subdivisions - Part 2: Country subdivision code", ISO Standard 3166-2:1998, 1998.

[bezirke] Statistik Austria, "Politische Bezirke, Gebietsstand 2008", Feb 2008.

[gemeinden] Statistik Austria, "Gemeindeliste sortiert nach Gemeindekennziffer, Gebietsstand 2008", Feb 2008.

[ortschaften] Statistik Austria, "Gemeinden mit Ortschaften und Postleitzahlen, Gebietsstand 2008", Feb 2008.

Authors' Addresses

Karl Heinz Wolf
nic.at GmbH
Karlsplatz 1/2/9
Wien A-1010
Austria

Phone: +43 1 5056416 37
EMail: karlheinz.wolf@nic.at
URI: http://www.nic.at/

Alexander Mayrhofer
nic.at GmbH
Karlsplatz 1/2/9
Wien A-1010
Austria

Phone: +43 1 5056416 34
EMail: alexander.mayrhofer@nic.at
URI: http://www.nic.at/