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Considerations for Civic Addresses in PIDF-LO
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Abstract

This document provides a guideline for creating civic address consideration documents for individual countries, as required by RFC 4776. Since civic addresses may have a different format in individual countries, such address considerations are necessary in order to map the civic address elements to the PIDF Location Object (PIDF-LO) elements.

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The ["Presence Information Data Format Location Object" (PIDF-LO)
(Peterson, J., "A Presence-based GEOPRIV Location Object Format,"
December 2005.)](#) [RFC4119] is an an object format for carrying

geographical information on the Internet. PIDF-LO can be used to carry civic address information, and supports a range of "civic address types" (CATypes) to describe individual attributes of an civic address (see Section 2.2.1 of RFC 4119). The list of CATypes is currently under revision (see Section 3.1 of draft-ietf-geopriv-revised-civic-lo (Thomson, M. and J. Winterbottom, "Revised Civic Location Format for PIDF-LO," December 2007.) [I-D.ietf-geopriv-revised-civic-lo] - this document is based on the revised set of CATypes.

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

To make use of such existing data sources, instructions for transposing such data into PIDF-LO format (element mapping) is required. Preferrably, those mapping operations are reversable, so that location receipients like public safety answering points (PSAPs) can reconcile such PIDF-LOs with the original data source. Additionally, for any data source just a single mapping should exist in order to reduce the risk of ambiguous interpretation.

Therefore, civic address considerations are necessary for individual countries to ensure uniform usage of PIDF-LO elements. RFC 4776 explicitly asks for such documents. This guideline aims to support the creation of such civic address considerations. For some countries RFC4776 already has some considerations on the administrative sub-divisions in Section 3.4. Note that these examples are not compliant to draft-ietf-geopriv-revised-civic-lo (Thomson, M. and J. Winterbottom, "Revised Civic Location Format for PIDF-LO," December 2007.) [I-D.ietf-geopriv-revised-civic-lo], since the A6 element is not used for street names any more.

This guideline document is based on the experience of writing such a civic address considerations document for Austria. Since there were some difficulties when trying to define a mapping for Austrian civic address elements to PIDF-LO, this document summarizes important experience and issues to consider. Even though every country has it's own address format and therefore other problems will occur, this guideline should help to identify difficulties. As examples, Austrian addresses are used.

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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 (Bradner, S.,

"Key words for use in RFCs to Indicate Requirement Levels," March 1997.) [RFC2119].

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3. Requirements

The following requirements apply to defining address mapping considerations:

*For any data source, all elements must be considered (even if some of those fields are to be left out of the mapping, the document must describe that).

*Any CAtype field registered by the time the document is produced must be considered, and if it is not being used, that fact must be mentioned. In case the set of CAtypes is revised by the IETF, the address consideration document should be updated. Until then, the old mapping procedure must be used.

*Address mappings should be reversible, so that location recepients can identify the original records if they have access to the original source

*For any element used, at least one example must be provided.

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4. Specifying PIDF-LO Element Usage

The purpose of the civic address consideration document for an individual country is to specify the list of PIDF-LO elements to be used, and the mapping between these elements and the fields of the respective local data source.
The motivation for such a civic address consideration is to ensure interoperability. Location recipients certainly want to rely on finding civic address parts in defined elements of PIDF-LO for further processing. Especially when it comes to emergency calling, location information is a critical data where misinterpretation has to be avoided. Therefore, a consistent mapping scheme is required. Since it is not possible to have global PIDF-LO elements which can be unambiguously used in every country in the world, the mapping must be defined on an national level. It has to be ensured, that the mapping is used for all civic addresses in this country.
Is is important to identify the civic address elements that can be mapped directly to the corresponding PIDF-LO elements and which civic address parts need special consideration. PIDF-LO elements that are not

needed in a specific country, can simply be omitted. The civic address
consideration document has to specify clearly that those elements must
not be used for representing civic addresses in this country.
Even though the list of CAtypes could be extended, it is no feasible to
add new elements for any new field in any data source in any country.
Therefore, unless new CAtypes are specified by the IETF, just the
existing elements can be used. That leaves the following two options in
case the CAtypes do not provide a perfect fit for local civic address
data (especially in case the local data contains more fields than PIDF-
LO provides):

1. Concatenate several civic address elements 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

All existing civic address parts must find a place in the PIDF-LO. Even
exotic addresses, that might be very rare, must be considered. Civic
addresses can be very complex in some countries. So it is very
important to identify the data source that is representing all the
possible civic addresses in a country. Perhaps this database is
maintained by a governmental company, by an authority, or the post.
Moreover, it is important, that this data format is accepted by Public
Safety Answering Point (PSAP) operators and they have access to the
data source. Even PSAPs within a country may be organized differently
and use different data bases for civic addresses. It is crucial to
define the PIDF-LO mapping in a way that all PSAPs can use it. It is
disireable to have PSAP operators involved in the process of developing
civic address considerations, so that their needs are especially
considered.
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 PSAP in the same country as the location generator anyway. However,
in border region there might be exceptions and the PIDF-LO is sent to a
neighboring country. The PIDF-LO can still be passed on to a PSAP in
the right country because of the country element or the PSAP knows the
mapping of the neighbor 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 recognize two
equal addresses.
The following sections discuss individual PIDF-LO elements and describe
what to consider when defining civic address considerations.

4.1. Country

The country element must hold the alpha-2 codes from ISO 3166-1 [refs.ISO3166-1] (International Organization for Standardization, "Codes for the representation of names of countries and their subdivisions - Part 1: Country codes," 1997.) in upper case characters as clarified in Section 3.3 of draft-ietf-geopriv-revised-civic-lo (Thomson, M. and J. Winterbottom, "Revised Civic Location Format for PIDF-LO," December 2007.) [I-D.ietf-geopriv-revised-civic-lo]. 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. 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 [refs.ISO3166-2] (International Organization for Standardization, "Codes for the representation of names of countries and their subdivisions - Part 2: Country subdivision code," 1998.) (see section 3.4 of draft-ietf-geopriv-revised-civic-lo (Thomson, M. and J. Winterbottom, "Revised Civic Location Format for PIDF-LO," December 2007.) [I-D.ietf-geopriv-revised-civic-lo]), or values as described in the address consideration document for that country. Elements "A2" to "A6" may contain additional levels of subdivisions (see section 2.2.1 of RFC 4119).
For A1, an address consideration document for a country should state whether ISO 3166-2 codes are to be used, alternatively it should define a list of valid 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.
The document should also specify for each of the A2 - A6 elements whether they are required, optional, or not allowed. For each element that is required or optional, it should define the set of valid values, either by listing them, or referring to such a list.
For countries which are already discussed in section 3.4 of RFC 4776, it is recommended to follow those mappings.
Example for Austria

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A1 province (Bundesland)
A2 political district name or identifier (politscher Bezirk)
A3 commune name or identifier (Gemeinde)
A4 village name or identifier (Ortschaft)
A5 cadastral municipality name or identifier (Katastralgemeindename
   or Katastralgemeindenummer)
```

A6 must not be used. For more details see the example in .

4.3. Road and Street Names

PIDF-LO contains the following elements related to road names: RD, RDSEC, RDBR, RDSUBADDR, PRM, POM (section 3.1 and 3.2 of draft-ietf-geopriv-revised-civic-lo (Thomson, M. and J. Winterbottom, "Revised Civic Location Format for PIDF-LO," December 2007.) [I-D.ietf-geopriv-revised-civic-lo]) and PRD, POD, STS (section 3.4 of [RFC4776] (Schulzrinne, H., "Dynamic Host Configuration Protocol (DHCPv4 and DHCPv6) Option for Civic Addresses Configuration Information," November 2006.)). Note that the use of the A6 element for street names is not valid (Section 3.2 of draft-ietf-geopriv-revised-civic-lo (Thomson, M. and J. Winterbottom, "Revised Civic Location Format for PIDF-LO," December 2007.) [I-D.ietf-geopriv-revised-civic-lo]).
An address considerations document for a country should specify which of those nine elements are required, optional or not allowed. If neccessary, the 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, it should describe the relation of those elements to elements of the data source used. If special considerations apply to certain elements, they should be described.
Also focus on the element STS, the street suffix. It must be assured that this suffix is used in a consistent way. In case no suffixes are known in a country or it is common to write the street name and the suffix together, it is allowed to forbid the usage of the STS element completely. Suffixes may also be abbreviated. Define the common abbreviations.
Example for Austria:
RD: street name
All other road elements must not be used, street suffix is already included in RD element. Street suffixes must not be abbreviated.

4.4. House Numbers

PIDF-LO specifies two elements related to house numbers: "house number" (HNO, numeric part only) and "house number suffix" (HNS) (see section 3.4 of RFC 4776). However, in many countries house numbers have a more complex format. In any case, a clear definition on mapping national house numbers to PIDF-LO is needed to minimize confusion potential.
An address consideration document for a country should provide the following information with regards to house numbers: If the structure of house numbers in that country fits the HNO/HNS structure, the document must mandate to use those fields as described in RFC 4776. If the structure of house numbers does not directly fit into those two elements, the document must propose rules on how to map origin data into PIDF-LO elements. Besides HNO and HNS, LOC and BLD could be considered for carrying house number information.
The document should describe whether abbreviations of house number elements are valid or not. If abbreviations are used, they must be clearly defined. If the house number consists of more than one number or 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 field, keep in mind that the location recipient might want to separate the data again.
Example from Austria:
HNO: concatenate all the data elements of Austrian house numbers into this single PIDF-LO element in a defined order with delimiter symbols (see Section 5.4.6 (House Numbers) for the complete definition).
HNS: not recommended to be used since there may be multiple suffixes for the different parts of the house number.

4.5. Local Names

PIDF-LO contains three elements to reflect local names: LMK, LOC, 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) no address may be assigned so that the local names itself identify the location. In rural regions for example, a farm name may be more common than a street address to identify a location. Therefore, local names may either assist in finding a "street name" type addess, but they might also be the authoritative (and only) location information.
Address consideration documents for individual countries should state for each of the LMK, LOC, NAM elements whether they are required, optional, or not to be used. For any required or optional field, it should state potential values (source data) for the element. In case that multiple values for an element may occur, a concatenation /

selection strategy should be described. Concatenation using ";" as seperator is recommended.
If local name information and "common" address information is both available and used, the document should discuss the relation between those two address information types, and expected behaviour of location receipients.
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.

4.6. Floors

PIDF-LO defines the element FLR to hold the 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 consideration document for a country 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 way of identifying floors.
Example from Austria:
Numbers and text 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"), "Zweiter Halbstock" ("second half floor").

4.7. 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 can 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 may be sufficient as location information within a country.

The PIDF-LO country element can be used to identify the name space in which the address code elements are valid. Countries may have more than one type of address codes (multiple namespaces), so it might be necessary to choose the code that is most widely accepted (by PSAPs) or to have identifiers for the different codes.

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 for a country should specify whether and in which applications the use of ADDCODE elements 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>

4.8. Other Elements

This section lists all the other PIDF-LO elements, that are not considered so far.

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

UNIT

ROOM

SEAT

The following elements are related to postal codes:

PC

PCN

POBOX

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

PLC – Place-type (see RFC 4589)

BLD – Building (structure)

The xml:lang attribute should be present in PIDF-LO XML documents.

An address considerations document should specify for any of those elements whether they are required, optional, or must not be used. For

any element that is required or optional, the semantics of its contents must be described, if it differs from the PIDF-LO base documents.

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5. Austria Example

The Austrian "Gebäude- 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 governmental owned company. Responsibility for keeping records in the registry up to date is an obligation to the local administration of the individual townships.
The data format definition for the individual records is publicly available (data access itself is however restricted). Hence, an uniform address data base for whole Austria is available. Unfortunately, Austrian civic addresses use a much more complex format compared to civic addresses in PIDF-LO. A detailed description of the Austrian civic address data format is contained in section Section 5.1 (Civic Address Format in Austria).
A guideline of how to use PIDF-LO for Austrian addresses is necessary in order to avoid misinterpretations. This is especially important if the PIDF-LO is conveyed during an emergency call to a Public Safety Answering Point (PSAP). A precise location information is needed in case of emergency to send out responders without any delay to the correct location of the caller. If every data-provider uses its own address mapping to PIDF-LO, confusion and misunderstandings are bound to happen. However, ideally any PSAP should have full access to the data by Statistik Austria. PSAPs must be able to rely that location information is always provided the same way by all data-providers. To address the idiosyncrasies in Austria, the civic address elements are discussed subsequently.

5.1. Civic Address Format in Austria

Statistik Austria data describes estates, buildings and usable units [refs.merkmalskatalog] (Statistik Austria, "Handbuch Adress-GWR-Online Teil C Anhang 2 Merkmalskatalog," Sept 2004.). 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 at least one address. Below, the address elements for estates (Table 1 (Civic Address Elements for Estates)), buildings (Table 2

) and usable units () are shown.

Statistik Austria name	Explaination	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		HNO

	indicates if all house numbers specified or just odd or even numbers are stated	
Postleitzahl	postal code	PC
Postleitzahlengebiet	postal community code	PCN
Vulgoname	local name	NAM
Hofname	farm name	LMK

Table 1: Civic Address Elements for Estates

Statistik Austria name	Explaination	PIDF-LO Element
Adressubcode	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
		HNO

Hausnummer – 3. Teil – Buchstabe	third part of the house number, character	
Gebäudeunterscheidung	for differentiation of buildings, e.g. Maierweg 27 Hotel vers. Maierweg 27 Appartmenthaus	HNO

Table 2: Additional Civic Address Elements for Buildings

Statistik Austria name	Explaination	PIDF-LO Element
Nutzungseinheitenlaufnummer	usable unit code	ADDCODE
Türnummer	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 Elements 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", "2nd mezzanine". So, an Austrian "1st floor" could well be the "4th floor" according to US nomenclature.

According to [Statistik Austria (Statistik Austria, "Handbuch Adress-GWR-Online Teil A Theoretisches Handbuch Kapitel 2 Warten von Adressen im Adress-GWR-Online," Jan 2005.)](#) [refs.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 gegenüber 3a, meaning this address is actually vis-a-vis 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: Kolomaniwörth GNR 1583. This identifier is stored by Statistik Austria as Hausnummerntext. Otherwise one could misinterpret this number as a house number, what would be definitely wrong.

5.2. 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
Gebäudeunterscheidung: Stiege 1

1234 Musterstadt, Musterstraße 13 Hotel
Postleitzahl: 1234
Stadt: Musterstadt
Straße: Musterstraße
Hausnummer - 1. Teil - Nummer: 13
Gebäudeunterscheidung: 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

5.3. 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 differ 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 location object would carry data in the format of Statistik Austria and 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.

5.4. Austrian Addresses in PIDF-LO

A good number of Austrian addresses do not fit into the PIDF-LO format, as described above. So the following subsection define the mapping procedure.

5.4.1. Country

The country element for Austria must be set to AT, since this is the ISO 3166-1 [refs.ISO3166-1] (International Organization for Standardization, "Codes for the representation of names of countries and their subdivisions - Part 1: Country codes," 1997.) alpha-2 code for Austria.

    <country>AT</country>

The usage of the ISO 3166 code is demanded by RFC 4119 (Peterson, J., "A Presence-based GEOPRIV Location Object Format," December 2005.) [RFC4119] and I-D.ietf-geopriv-revised-civic-lo (Thomson, M. and J. Winterbottom, "Revised Civic Location Format for PIDF-LO,"

[I-D.ietf-geopriv-revised-civic-lo] proposes to use
upper case characters only.

5.4.2. Country Subdivisions A1-A6

> A1 province (Bundesland), Section 5.4.2.1
> A2 political district name or identifier (politscher Bezirk),
>   Section 5.4.2.2
> A3 commune name or identifier (Gemeinde), Section 5.4.2.3
> A4 village name or identifier (Ortschaft), Section 5.4.2.4
> A5 cadastral municipality name or identifier (Katastralgemeindename
>   or Katastralgemeindenummer), Section 5.4.2.5

Element A6 must not be used.
Last, there is an exception to mention concerning 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.

5.4.2.1. A1 Element

As proposed in I-D.ietf-geopriv-revised-civic-lo (Thomson, M. and J.
Winterbottom, "Revised Civic Location Format for PIDF-LO,"
December 2007.) [I-D.ietf-geopriv-revised-civic-lo], for the PIDF-LO
element A1, the second part of ISO 3166-2 [refs.ISO3166-2]
(International Organization for Standardization, "Codes for the
representation of names of countries and their subdivisions - Part 2:
Country subdivision code," 1998.) can be used. However, in Austria it
is also common to write out the names of the states. Table 4 (A1
element format for Austria) shows the possible values of the A1 element
for Austrian states.

Bundesland	second part of ISO 3166-2 code
Burgenland	1
Kärnten	2
Niederösterreich	3
Oberösterreich	4
Salzburg	5
Steiermark	6
Tirol	7
Vorarlberg	8
Wien	9

Table 4: A1 element format for Austria

5.4.2.2. A2 Element

Names of the Austrian political districts are available at Statistik
Austria [refs.bezirke] (Statistik Austria, "Politische Bezirke,
Gebietsstand 2008," Feb 2008.). These names, the unique code for the
politcal district or both can be used for the A2 element. If the
content of the A2 elment is numeric, obviously the code is provieded
(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 seperated 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>

5.4.2.3. A3 Element

The element A3 holds the Gemeindename (commune name) or 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 [refs.gemeinden] (Statistik Austria, "Gemeindeliste sortiert nach Gemeindekennziffer, Gebietsstand 2008," Feb 2008.), 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>

5.4.3. 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 which contain a number. Statistik Austria maintains a table with the Ortschaftsnamen and identifiers [refs.ortschaften] (Statistik Austria, "Gemeinden mit Ortschaften und Postleitzahlen, Gebietsstand 2008," Feb 2008.), 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>

5.4.4. A5 Element

The element A5 holds the Katastralgemeindename (cadastral municipality), the Katastralgemeindekennziffer (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
Katastragemeindenamen in Austria which contain a number.
Sample (Vienna, Fünfhaus):

    <A5>Oberbaumgarten</A5> or <A5>1208</A5> or
    <A5>Oberbaumgarten;1208</A5>

5.4.5. 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.

5.4.6. 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 a house number suffix
element (HNS). Therefore, the rules of the HNO element have to be
violated in order to accomodate all data: All house number data is
concatenate into a single HNO element, even though it is expected to
hold numeric part only.
If the location recipient does not need to separate the data elements
again, the house number parts may be simply concatenated with spaces in
between (no spaces between the numeric part of a house number and its
related character). However, if the location recipient needs to get
back the original data, it is necessary to use a semicolon as delimiter
symbol (Austrian house numbers do not contain semicolons). The house
number parts MUST be provided in the order as they are listed by the
Statistik Austria document [refs.merkmalskatalog] (Statistik Austria,
"Handbuch Adress-GWR-Online Teil C Anhang 2 Merkmalskatalog,"
Sept 2004.). 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 part and its related character.
It is recommended, not to use the HNS element for Austrian addresses,
since there are addresses that do not have just a single suffix. For
example, the address Lazarettgasse 13A could be mapped by:

    <HNO>13</HNO> <HNS>A</HNS>

However, the building at Lazarettgasse has the house number 13A - 13C. Consequently, just the HNO element should be used:

    <HNO>13A - 13C</HNO>

And even for addresses with a house number consisting of a single number and a single prefix, just HNO should be used because of uniformity:

    <HNO>13A</HNO>

Addresses with a house number text would look like:

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

with no HNS element.
The same example with semicolon as delimiter symbol would look like:

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

5.4.7. 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)

5.4.8. 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 elements Lage and Stockwerk are concatenated if necessary.

5.4.9. Additional Code Element

The element additional code may be used to hold the codes provided by Statistik Austria. There is an Adresscode, Adressubcode, Objektnummer and a Nutzungseinheitenlaufnummer. These unique codes identify the

location. Actually, these codes alone would be enough, but requires 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 definded by Statistik Austria. By setting the country element to AT (see Section 4.1 (Country)), 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.

5.4.10. 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.

5.4.11. Elements not to be used

    A6
    STS
    HNS
    PRD
    POD
    RDBR
    RDSUBBR
    PRM
    POM

5.5. Example

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

```
<?xml version="1.0" lang="de" 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="123456">
   <status>
    <gp:geopriv>
      <gp:location-info>
        <cl:civicAddress>
          <cl:country>AT</country>
          <cl:A1>Wien</A1>
          <cl:A2>Wien</A2>
          <cl:A3>Wien</A3>
          <cl:A4>9</A4>
          <cl:RD>Lazarettgasse</RD>
          <cl:HNO>;13;A;-;13;C;;;;;;;;;;;;;</HNO>
          <cl:PC>1090<PC>
        </cl:civicAddress>
      </gp:location-info>
      <gp:usage-rules>
        <gp:retransmission-allowed>yes</gp:retransmission-allowed>
        <gp:retention-expiry>2007-11-10T12:00:00Z</gp:retention-expiry>
      </gp:usage-rules>
     </gp:geopriv>
    </status>
    <timestamp>2007-11-09T12:00:00Z</timestamp>
   </tuple>
  </presence>
```

6. Security & Privacy Considerations

RFC 4119 contains general security considerations for handling PIDF-LOs. In addition to that, it has to be considered that data from the Austrian building and habitation unit registry are generally not public, so restrictions as imposed on the original data set MUST also be imposed on the resulting PIDF-LO document.

7. IANA Considerations [TOC]

At this stage, this document contains no considerations for IANA.

---

8. Acknowledgements [TOC]

The authors wish to thank Gregor Jänin for contributing insights about the Austrian civic address data format.

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9. References [TOC]

9.1. Normative References [TOC]

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

9.2. Informative References [TOC]

[refs.adrwarten]	Statistik Austria, "Handbuch Adress-GWR-Online Teil A Theoretisches Handbuch Kapitel 2 Warten von Adressen im Adress-GWR-Online," Jan 2005.
[refs.merkmalskatalog]	Statistik Austria, "Handbuch Adress-GWR-Online Teil C Anhang 2 Merkmalskatalog," Sept 2004.
[refs.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.
[refs.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.
[refs.bezirke]	Statistik Austria, "Politische Bezirke, Gebietsstand 2008," Feb 2008.
[refs.gemeinden]	Statistik Austria, "Gemeindeliste sortiert nach Gemeindekennziffer, Gebietsstand 2008," Feb 2008.
[refs.ortschaften]	Statistik Austria, "Gemeinden mit Ortschaften und Postleitzahlen, Gebietsstand 2008," Feb 2008.
[I-D.ietf-geopriv-revised-civic-lo]	Thomson, M. and J. Winterbottom, "Revised Civic Location Format for PIDF-LO," draft-ietf-geopriv-revised-civic-lo-07 (work in progress), December 2007 (TXT).

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