Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Finance FDF

Federal Office of Information Technology, Systems, and Telecommunication FOITT

PRO-IEW-EWM

26 June 2017

EPR – Central Services

Interface Documentation

Customer	Federal Office of Public Health (FOPH)
Version	1.2
Version Date	13.09.2017
Authors	Louis Bernath, Daniel Birnbaumer, Reto Ghioldi
State	☒ in progress ☐ in review ☐ reviewed ☐ approved
Classification	☒ none ☐ internal ☐ classified
Document location	tbd

Document history

Version	Date	Changes	Authors
0.1	26.01.2017	Initial version	FOITT, Louis Bernath
…	…	…	…
1.0	26.06.2017	Finalization for EPR “June Release”	FOITT, Reto Ghioldi
1.1	05.07.2017	Clean up HPD/CPI attributes	FOITT, Reto Ghioldi
1.2	06.09.2017	Externalised LDAP attribute tables to separate files. Added CPI documentation for gateway information. Updated LDAP schema diagram. Restructured document to indicate common information for both HPD and CPI.	FOITT, Louis Bernath

Reviews

Version	Date	Reviewer	Remarks
0.2	30.03.2017	FOITT, Louis Bernath	
0.3	03.04.2017	FOITT, Hilary Green	
0.4	03.04.2017	FOPH, Reinhold Sojer	
1.0	26.06.2017	FOITT, Anuk Schenker FOITT, Hilary Green	
1.2	13.09.2017	FOITT, Reto Ghioldi	

Releases

Version	Date	Responsible	Signature
1.0	26.06.2017	FOITT, Reto Ghioldi	
1.2 [Preview]	13.09.2017	FOITT, Reto Ghioldi	

Table of contents

1. Introduction

This is an intermediate version that documents the current state of the EPR central services implementation. Please consider the contents as a work in progress.

1.1 Purpose of this document

This technical interface documentation of the EPR central services describes implementation specific details. Not implemented, optional interfaces are highlighted. Ambiguous definitions in the underlying regulations and standards are defined more precisely.

1.2 References

Reference	Description
[IHE-HPD]	IHE IT Infrastructure - Supplement HPD Profile (http://www.ihe.net/uploadedFiles/Documents/ITI/IHE_ITI_Suppl_HPD.pdf)
[BAG-A5]	National extensions to the IHE Technical Framework (https://www.bag.admin.ch/dam/bag/de/dokumente/nat-gesundheitsstrategien/strategie-ehealth/gesetzgebung-elektronisches-patientendossier/gesetze/SR%20816.111.1_ergaenzung-1-Anhang-5.pdf.download.pdf/SR%20816.111.1_Ergaenzung%201%20Anhang%205_DE.pdf)
[BAG-A5-S]	Schemas of the national extensions to the IHE Technical Framework (https://www.bag.admin.ch/dam/bag/de/dokumente/nat-gesundheitsstrategien/strategie-ehealth/gesetzgebung-elektronisches-patientendossier/gesetze/schemata-ergaenzung-1-anhang-5.zip.download.zip/Schemata%20Ergaenzung%201%20Anhang%205%20EPDV-EDI.zip)
[RFC4511]	Lightweight Directory Access Protocol (LDAP): The Protocol (https://www.ietf.org/rfc/rfc4511.txt)
[RFC4517]	Lightweight Directory Access Protocol (LDAP): Syntaxes and Matching Rules (https://tools.ietf.org/rfc/rfc4517.txt)
[RFC2798]	Definition of the inetOrgPerson LDAP Object Class (https://tools.ietf.org/rfc/rfc2798.txt)
[RFC4519]	Lightweight Directory Access Protocol (LDAP): Schema for User Applications (https://tools.ietf.org/rfc/rfc4519.txt)
[RFC2696]	LDAP Control Extension for Simple Paged Results Manipulation (https://www.ietf.org/rfc/rfc2696.txt)
[RFC2891]	LDAP Control Extension for Server Side Sorting (https://www.ietf.org/rfc/rfc2891.txt)

[RFC2985]	PKCS #9: Selected Object Classes and Attribute Types Version 2.0 (https://tools.ietf.org/rfc/rfc2985.txt)
[RFC 4648]	The Base16, Base32, and Base64 Data Encodings (https://tools.ietf.org/rfc/rfc4648.txt)
[W3C-SOAP12]	SOAP Version 1.2 Part 1: Messaging Framework (Second Edition) (https://www.w3.org/TR/soap12)
[ISO 21091]	Health informatics -- Directory services for healthcare providers, subjects of care and other entities (https://www.iso.org/standard/51432.html)
[LDAP RCODE]	LDAP result code reference (https://www.ldap.com/ldap-result-code-reference)
[SwissGov-PKI]	Swiss Government PKI http://www.pki.admin.ch/
[Digicert-RootC]	DigiCert Trusted Root Authority Certificates https://www.digicert.com/digicert-root-certificates.htm
[EPR-WSDL]	EPR WSDL and schema files https://www.e-health-suisse.ch/fileadmin/user_upload/Dokumente/2017/E/WSDL_Files.zip
[EPR-HPD-Schema]	EPR attribute and object class definitions for the HPD [TBD] https://www.e-health-suisse.ch/gemeinschaften-umsetzung/umsetzung/programmierhilfen.html → EPD_ZAD_HPD_Attribute.xlsx
[EPR-CPI-Schema]	EPR attribute and object class definitions for the HPD [TBD] https://www.e-health-suisse.ch/gemeinschaften-umsetzung/umsetzung/programmierhilfen.html → EPD_ZAD_CPI_Attribute.xlsx

1.3 Glossary

Term	Definition
AD LDS	Microsoft Active Directory - Lightweight Directory Services https://technet.microsoft.com/en-us/windowsserver/dd448612.aspx
CPI	Community Portal Index
DIT	Directory Information Tree
DN	Distinguished Name (LDAP)
DSML	Directory Service Markup Language
EPR	Electronic Patient Record

FOITT	Federal Office of Information Technology, Systems and Telecommunication
FOPH	Federal Office of Public Health
HPD	Healthcare Provider Directory
LDAP	Lightweight Directory Access Protocol
MDI	Metadata Index
PIDD	Provider Information Delta Download
RDN	Relative Distinguished Name (LDAP)
RFC	Requests for Comments
SVS	Sharing Value Sets
TLS	Transport Layer Security
WSG	Web Service Gateway A web service specific proxy system.
XSD	XML Schema Definition

2. System access

2.1 Authentication & Authorization

The system must be accessed by using TLS two way authentication. The client certificate is used to identify the requesting community and is only considered valid if it was issued by “Swiss Government Root CA II”. The certificate has to be still in the validity period. You will receive a connection reset of the TCP connection if you do not provide a valid certificate or do not provide a certificate at all.

You will receive an HTTP 400 with the following soap fault if the certificate is valid, but not yet configured for access on the edge servers:

```
<env:Code>
  <env:Value>env:Sender</env:Value>
</env:Code>
<env:Reason>
  <env:Text xml:lang="en-US">Rejected by policy (from client)</env:Text>
</env:Reason>
```

A SOAP fault with the sub code “InvalidSecurity” and an HTTP result code of 401 is returned if you provide a valid certificate that is configured on the edge servers, but is not (yet) known to the system:

```
<s:Code>
  <s:Value>s:Sender</s:Value>
  <s:Subcode>
    <s:Value xmlns:a="http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-wssecurity-
secext-1.0.xsd">a:InvalidSecurity</s:Value>
  </s:Subcode>
</s:Code>
```

You will receive a SOAP fault with the sub code “FailedAuthentication” and an HTTP result code of 403 if you are authenticated successfully but are not authorized to perform the SOAP action (e.g. your community’s status is not active, see **Fehler! Verweisquelle konnte nicht gefunden werden.**):

```
<s:Code>
  <s:Value>s:Sender</s:Value>
  <s:Subcode>
    <s:Value xmlns:a="http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-wssecurity-
secext-1.0.xsd">a:FailedAuthentication</s:Value>
  </s:Subcode>
</s:Code>
```

Note that if the interface or protocol (like DSML) is designed to provide its own error handling (like DSML result codes) the error is indicated leveraging the protocol (see **Fehler! Verweisquelle konnte nicht gefunden werden.**)

2.2 Certificate Trust Chain

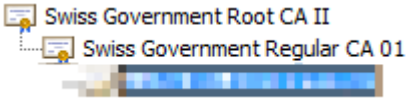
To allow mutual trust and establish a successful TLS connection you not only need the client

certificate for authentication, but you also need to ensure that you trust the EPR server certificate.

Depending on your validation method and if you do not use a commonly trusted list of root certificates (from Microsoft, Mozilla or Apple), you will need to download and install/import the necessary certificates in to your trust store. All the certificate information can be downloaded from [SwissGov-PKI] (see Rootzertifikate->Swiss Government Root CA II) or [DigiCert-RootC].

2.2.1 Client certificate

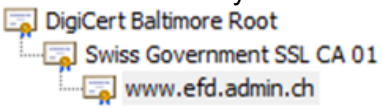
Please make sure the root and intermediate certificates for “Swiss Government Root CA II” and “Swiss Government Regular CA 01” are available in your trust store.



The client certificate ordering process is organized through the FOPH and is not part of this document.

2.2.2 Server certificate

Please make sure the root and intermediate certificates for “DigiCert Baltimore Root” and “Swiss Government SSL CA 01” are available in your trust store.



Note: Starting from 10.09.2017 the server certificates will be replaced. Swiss Government PKI will move away from the “DigiCert Baltimore Root” root certificate and will provide a completely new certificate chain. At the time of writing the new chain is not yet available. This document will be updated as soon the information comes available.

2.3 Endpoints and WSDL’s

All the necessary information for accessing the EPR services, like endpoint URLs, WSDL and Schemas are provided in [EPR-WSDL].
Currently only the acceptance environment is at hand. This document and the provided WSDL’s will be updated as soon as the production environment comes available.

3. DSML

3.1 DSML implementation

Both the Healthcare Provider Directory (HPD) and the Community Portal Index (CPI) are implemented using the standard DSML interface. Exceptions are explicitly listed in the following sections.

3.1.1 Supported elements

3.1.1.1 Non-supported DSML elements and types

The following elements are ignored:

- *DsmlMessage* (i.e. request) types *CompareRequest*, *AbandonRequest* and *ExtendedRequest, AuthRequest*
- *control* elements on all *DsmlMessage* types except the ones defined in 4.4.2.
- *xsd:anyURI* data type for the value of a *DsmlValue*

3.1.1.2 Authentication

The *"authRequest"* element of a batch request is not evaluated. The community's identity is always defined by the (TLS) client certificate of the community.

3.1.1.3 Binary values

Binary values, i.e. attributes of LDAP type Octet String, are expected to be correctly encoded as "*xsd:base64Binary"* data type (see [RFC 4648]).

3.1.1.4 Encoding (Escaping)

Values and DNs are encoded/escaped on the server (e.g. "\0d" for a CR). Note that client side escaping using the backslash character ("\") will be double escaped.

3.1.2 Search Filter

Not all DSML search filter elements are supported by the HPD services. This is mostly a limitation of the underlying LDAP implementation.

- *ApproxMatch* is implemented as *EqualityMatch* (see [RFC4511], section 4.5.1.7.6).
- *ExtensibleMatch* is not implemented (see: [RFC4517], section 4). A *searchRequest* with an extensibleMatch in the filter leads into result code 53 (= Unwilling to Perform).
- A missing or invalid filter results in result code 87 (= Filter Error)
- The number of returned search result entries is limited (see limitations in section **Fehler! Verweisquelle konnte nicht gefunden werden.**).

To perform a full search without any entry filtering, the availability check for an always present attribute is recommended (i.e. the presence check of attribute *objectClass*).

3.1.3 Distinguished names (DNs)

Distinguished names (DNs) are very important in the LDAP world because they act as a unique identification of a single directory entry. HPD defines some constraints on the DN:

- Distinguished names are case insensitive.
- Control characters are not allowed (tabs, line breaks, etc.).
- Commas (",") are only allowed to separate relative distinguished names (RDNs).
- Equality signs ("=") are only allowed to separate attribute name and value.
- Leading and trailing whitespaces will be encoded.
- The following characters are allowed but get encoded/escaped to "\<char>":
  - #
  - " (quote)
  - ;
  - \
  - +
  - <
  - >

3.1.4 Type System

The following attribute types are used (including their optional shortcuts)

- ***Directory String (DString)*****:** Refers to the *Directory String* in UTF-8 encoding
- ***Octet String (OString)*****:** A binary value (base64 encoded in HPD transactions)
- ***Printable String (PString)*****:** A limited latin character set (see [RFC4517], section 3.3.29)
- ***DN*****:** Distinguished name of another existing object in the HPD. A Directory String value.
- ***rDN:*** Relative DN of this object in the HPD. A Directory String value.
- ***OID:*** Object identifier of another directory element. A Directory String value.
- ***GeneralizedTime (GTime):*** UTC (GMT) timestamp in the format *"YYYYMMDDHHmmss.0Z"*

All types are standardized LDAP data types.

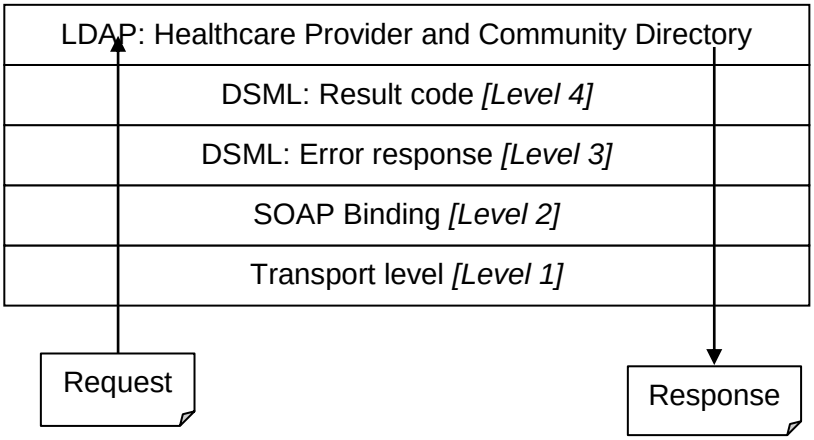
3.1.5 General attribute constraints

Mandatory attributes (= "must") have to be provided. Otherwise an object class violation occurs (result code = 65). Empty attribute values or whitespaces are treated as if no value has been specified. Optional attributes (= "may") are not required to execute the request.

3.2 Error Handling

3.2.1 General

Error handling in HPD takes place on several layers or levels of the processing stack.



The HPD service adapts the standardized errors of the different layers: HTTP Status codes, SOAP Faults, LDAP error types and result codes.

3.2.2 Level 1: Transport level

The system has not been reached at all and the error is not under the system's control.

Examples:

- Bad Endpoint URL at the client.
- Basic certificate based authentication failed (HTTP status code 401) because of an invalid chain of trust of the certificate.
- Request size is too large.

3.2.3 Level 2: SOAP Binding

The system has been reached but the SOAP protocol has been broken or some basic validation failed.

Examples:

- Malformed XML (see [W3CSOAP12] Chapter 5)
- WSDL/DSML schema violation
- Missing or unknown (authentication)
- Access not allowed to this client (authorization)
- Invalid SOAP action parameters (like unsupported request types in DSML batch)

3.2.4 Level 3: DSML request validation

The DSML batch has been processed corresponding to the specified batch processing settings but one or more <errorResponse> are returned. The requests with an errorReponse have not been executed against the directory.

Examples:

- Formal validation failed. The request could not be parsed and loaded into the system due to technical problems (like an invalid DN syntax or a non-existing DC).
- An addRquest with missing “objectClass” attribute or values.
- Object classes of the new entry do not match the allowed object classes of the selected OU.
- A mutative request (like an addRequest) in a query transaction (ITI-58).
- Connection error to the directory or database.
- Unexpected processing behaviour.

3.2.5 Level 4: LDAP execution errors

The DSML batch has been processed corresponding to the specified batch processing settings and an *xxxResponse* is returned (*xxx* matching to the executed request type).

The actual LDAP request has been executed but an error has occurred (i.e. the underlying LDAP server returned a result code <> "success").

The first detected error is returned (if multiple exist in the request) because the result code exists only once in the response.

Examples:

- Business rule validation failed. The request is structurally not allowed (like creating cross community relationships).
- Missing required attributes that are not validated by the EPR central services.
  The request execution resulted in a LDAP Schema violation (no such attribute, attribute is single valued and cannot contain multiple values).
- Data errors detected during the request execution (No such object/DN, object already exists, multi-valued attribute already contains this value.)
- Request and response limitations

3.2.6 General

Too large batch requests may lead to transfer errors. Hence it is a good practice to limit the request and response size. The following limitations exist in the EPR central services.

- All request sizes are limited to 100MByte on transport level (i.e. HTTP body).
- The maximum of returned search entries in a query transaction is 1'000 (maximum page size).
- The maximum of allowed requests in HPD feed batches is 1’000.

Please take note, that we are evaluating additional limitations to protect server resources and ensure optimal operation of the EPR central services.

3.2.7 Size limit of search requests

The query transactions for HPD and CPI do not return any search entries if the request fails on error level 4. This means that there are no search entries in the response if the LDAP result code is 4 (= size limit exceeded).

A client has to use the paged search control to get search entries if the result set is too large.

4. Healthcare Provider Directory (HPD)

The HPD interface is implemented following the IHE HPD Profile [IHE-HPD]. The interface provides three operations, of which two implement the elements of the DSML protocol (ITI-58 and ITI-59) and the third (CH:PIDD) that is defined by the EPR decree.

4.1 Batch processing

HPD ITI-58 and ITI-59 use the following behaviour for the DSML batch parameters:

- The *processing* attribute is ignored. Batch requests are always processed in sequential order.
- The *responseOrder* attribute is ignored. Batch requests are always processed in sequential order and the response elements have the same order as the original requests.
- The *onError* attribute is respected. The default is “exit” (if the attribute is not specified). With “exit” the batch requests is aborted on the first faulty request. When you request onError=”resume” all requests are executed, even if one does result in an error.

4.2 Directory schema

The HPD base distinguished name / directory root is “dc=HPD,o=BAG,c=CH”. All child elements of this node are considered a part or the HPD.

4.2.1 Versioning

Although the HPD is the master in the EPR central services, every community is free to have a local replicate of the directory. The provider information feed (ITI-59) and delta download (CH:PIDD) transactions can be used to synchronize the local replica with the master using DSML requests.

Hence it is very important that the master and the replicas use the same schema. Otherwise, requests may result in a failure because of a structural difference in the underlying directory storage.

The master directory defines the LDAP schema and all clients must follow these definitions. Incompatible replicas may not be able to synchronize with the master directory.

In the EPR central services there is no explicitly versioned schema or corresponding version query operation available on machine to machine level.

4.2.2 Standard precedence

The object class and attribute schema is based on following standards. The following descending precedence is taken if the standards contradict each other:

1. IHE CH extensions [BAG-A5]
2. IHE HPD [IHE-HPD]
3. ISO 21091:2013 [ISO-21091]
4. *inetOrgPerson* [RFC-2798]

5. *organizationalPerson* and *person* [RFC-4519]
6. *naturalPerson* [RFC-2985]

The number of attributes has been reduced to the ones mentioned in the following standards:

- IHE CH extensions [BAG-A5]
- IHE HPD [IHE-HPD]

4.2.3 Object Classes and Organsational Units

The central services support three object classes defined in the LDAP schema. Each object class can be stored in its distinct OU container (see also 4.5.3.1 objectClass attributes)

Element	Object class	Organisational Unit
Health professional	HCProfessional	HCProfessional
Health organisation	HCRegulatedOrganization	HCRegulatedOrganization
Relationships between organisations and professionals or organisations	groupOfNames	Relationship

An overview of the complete LDAP schema is shown in appendix B. A complete list of object classes, attributes and their detailed definition and description can be obtained from [EPR-HPD-Schema].

4.3 Validations

Communities are intended to manage only their own data in the directory (multitenancy) although in general all HPD entries have a public visibility. The EPR central services contains validations that ensure the correctness of the directory data. Violation of the stated validation rules lead to a response with the corresponding result code. We use only standard result codes, even for implementation specific errors. For a list of common result codes see appendix A or for a complete list of the standard LDAP result codes see [LDAP RCODE].

Please note, that if not otherwise stated, all validations on distinguished names (name and value) and attribute name or values are case insensitive.

This means that the following DNs are equal:

```
UID=COMMUNITYA:1,OU=HCProfessional,DC=HPD,O=BAG,C=CH
uid=communitya:1,ou=hcprofessional,dc=hpd,o=bag,c=ch
```

And also the following attribute value pairs are equal:

```
hcProviderStatus=Active
HCPROVIDERSTATUS=ACTIVE
hcproviderstatus=active
```

4.4 Provider information query (ITI-58)

4.4.1 Supported request types

Only *searchRequest* entries are supported in a batch for the query transaction. The whole batch will be rejected with a SOAP fault if another request type is detected.

4.4.2 Supported control types

The control values must be delivered BER encoded as base64Binary type. A sort control is shown here.

Example:

```
<batchRequest xmlns="urn:oasis:names:tc:DSML:2:0:core">
       <searchRequest dn="DC=HPD,O=BAG,C=CH"
                     .scope="wholeSubtree"
                      derefAliases="neverDerefAliases"
                      sizeLimit="100">
              <control type="1.2.840.113556.1.4.473" criticality="true">
                     <controlValue xsi:type="xsd:base64Binary">
                            MIQAAAAUMIQAAAAOBAxIY0lkZW50aWZpZXI=
                     </controlValue>
              </control>
              <filter>
                     <present name="objectClass"/>
              </filter>
      </searchRequest>
</batchRequest>
```

A bad base64Binary encoded *controlValue* returns with an “internal server error” (status code 500). The whole request is treaded as malformed and rejected completely. Hence, the control’s *criticality* is not yet taken into account. The batch request (i.e. other requests in the batch) is not executed.

4.4.2.1 Paging

To get around the limitation of 1000 entries in one search, the standard paging mechanism is available.

The paging mechanism is called by adding a pagedResultsControl to the SearchRequest, conforming to [RFC2696]. The pagedResultControl has type “1.2.840.113556.1.4.319”.

The page size and a cookie have to set to the controlValue as a BER encoded base64Binary. On the first request (first page) the cookie has to be null, at all subsequent calls the cookie has to be the one returned in the result of the previous response. If the returned cookie is null again, this means that the last page has been returned. The actual search request should not change during paging.

Example request:

```
<searchRequest dn="DC=HPD,O=BAG,C=CH" scope="wholeSubtree"
               derefAliases="neverDerefAliases">
<control type="1.2.840.113556.1.4.319" criticality="true">
  <controlValue xsi:type="xsd:base64Binary">MIQAAAAFAgEHBAA=</controlValue>
</control>
  […]
</searchRequest>
```

According to [RFC2696] the contents of the control value is BER encoded with the following format “The searchControlValue is an OCTET STRING wrapping the BER-encoded version of the following SEQUENCE”.

```
searchControlValue ::= SEQUENCE {
        size            INTEGER (0..maxInt),
                                -- requested page size from client
                                -- result set size estimate from server
        cookie          OCTET STRING
}
```

In our example the controlValue “MIQAAAAFAgEHBAA=” contains the following data:
size = 7
cookie = null (always null for the first page)

An example response with a paging control:

```
<searchResponse>
  […]
  <searchResultDone>
    <control type="1.2.840.113556.1.4.319">
      <controlValue xsi:type="xsd:base64Binary">MIQAAAF3AgEABIIBcAE-
AAABwAQAA//////TmSarNPDikDwvqZiKhY2PXDvA5FaN5PUGCKNcMEn9gnb1GcmisgUO0SyXHFWbQjwAAAAA-
BAAAAAAAAAE0CAAAcAAAABQAAAAIAAAAAAAAAAAAAAAAUAAAAEAAEAuQEAALgBAAC5AQAAAAAAAKhX15tsnU-
lAmwdwLbOjkKUAAAAABAAAAAE-
AAAAAAAAAAAAAAP////8IAAAABwAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA-
BAAAA/////0atE6ykdLw/NjMuYLLUW6dErinN8y8ohN80SY4+trYgAAAAAH8CAAAAuAEAAAm5AQAARQIAAAl-
GAgAATQIAAAh/gAACTQAAAAAAAAAAAA/////wAAAAAAAAAA/////w8AAAA-
TAAAAFAAAAEFuY2VzdG9yc19pbmRleH8CAAAAuAEAAAm5AQAAAAAAAAR/AgAAALgBAAAJuQE-
AAP///////wAA</controlValue>
    </control>
    <resultCode code="0"/>
  </searchResultDone>
</searchResponse>
```

In the above result example the decoded value is:
size = 0
cookie = <binary cookie>

The returned cookie should be treated as an opaque structure and passed exactly as received from the server back with the next paging request.

Our system does not give estimates on the search requests filter. According to the [RFC2696] this functionality is optional. So, our implementation of the ITI-58 transaction will always return zero (0) for the field “size” in the control value of the search response.

([RFC2696]*: “In the control returned to the client, the size MAY be set to the server's estimate of the total number of entries in the entire result set. Servers that cannot provide such an estimate MAY set this size to zero (0).”*)

According to [RFC2696], in the last paged search response the control value’s “cookie” field will be *null* again.

([RFC2696]: *“The cookie MUST be set to an empty value if there are no more entries to return (i.e., the page of search results returned was the last), or, if there are more entries to return, to an octet string of the server's choosing, used to resume the search.”*)

The control is ignored if the page size is larger or equal to the overall size limit of the search request as the request can be satisfied in a single page. A size limit exceeded result code (= 4) is returned if the actual response contains more entries than the server limitations allow (see also section **Fehler! Verweisquelle konnte nicht gefunden werden.**) or the client's size limit in the search request specifies.

4.4.2.2 Sorting

The Provider Information Directory Query transaction supports server side sorting. As specified by [RFC2891] you can provide a LDAP control with your search request. The concept is similar to the paging mechanism described in 4.4.2.1, except the format of the BER encoded data structure used as the control value.

Example request:

```
<searchRequest dn="DC=HPD,O=BAG,C=CH" scope="wholeSubtree"
               derefAliases="neverDerefAliases">
<control type=" 1.2.840.113556.1.4.473" criticality="true">
  <controlValue xsi:type="xsd:base64Binary">MIQAAAAUMIQAAAAOBAxIY0lkZW50aWZpZXI=</con-
trolValue>
</control>
  […]
</searchRequest>
```

There are some limitations to our LDAP implementation regarding sorting. First you can only sort on one single attribute and second you can not specify a matching rule id and are forced to leave that element empty (=null).

→ You will receive a "12: Unavailable Critical Extension" if you provide more than one field in the SortKeyList sequence (control value).

→ You will receive a "12: Unavailable Critical Extension" if you provide a MatchingRuleId in the control value.

4.4.2.2.1 Behaviour

As it is impossible to provide a MatchingRuleId defining a localized ordering rule like French:Switzerland or German:Switzerland, the sorting is done in a language independent manner accordingly.

This mean that in all orderings, neither the phonetic resemblance nor word stems have an influence on sorting.

Our experiments showed the following sorting behaviour:

Directory String

- The sorting is done alphabetically, ascending or descending, depending on the reverseOrder Boolean specified in the control.
- Numbers are before letters.
- Lowercase letters are before uppercase letters.
- Lowercase and uppercase letters are kept together.
- Letters without accents are before letters with accents.
- Letters with and without accents are kept together.
- The accent ordering within the same letter is different to an ordering in Excel.

- Special characters from completely different cultures show up at the end.

Example

SortDescription-Asc	SortDescription-Desc
en:01	en:ｶbcdefg
en:0bcdefg	en:力bcdefg
en:9abcdefg	en:zz
en:aaaaaaa	en:Zaaaaaa
en:aAaaaaa	en:z
en:abcdefg	en:ýbcdefg
en:ABCDEFG	en:Ýbcdefg
en:àbcdefg	en:ÿbcdefg
en:Ábcdefg	en:waaaaaa
en:âbcdefg	en:vaaaaaa
en:Âbcdefg	en:ùbcdefg
en:zzaaaaa	en:977
en:ZZaaaaa	en:97
en:ｶbcdefg	en:9 7
en:ｶ bcdefg	en:0bcdefg

Octet String (binaries)

- The sorting seems to be done according the Unicode value of the letter, ascending or descending, depending on the reverseOrder Boolean specified in the control.
- Numbers are before letters.
- Uppercase letters are before lowercase letters.
- Uppercase and lowercase letters are not kept together. First all uppercase letters, then all lowercase letters.
- Letters without accents are before letters with accents.
- Letters with and without accents are not kept together. First all letters without accents, then all letters with accent.

Example

SortDescription-Asc (binary)	Original Text	SortDescription-Desc (binary)	Original Text
QUJjZGVm	ABcdef	w6RiY2RlZg==	äbcdef
QWJiZGVm	Abbdef	w6BiY2RlZg==	àbcdef
QWJjZGVm	Abcdef	w4RiY2RlZg==	Äbcdef
QkJjZGVm	Bbcdef	w4BiY2RlZg==	Àbcdef
YWJiZGVm	abbdef	YWJjZGVm	abcdef
YWJjZGVm	abcdef	YWJiZGVm	abbdef
w4BiY2RlZg==	Àbcdef	QkJjZGVm	Bbcdef
w4RiY2RlZg==	Äbcdef	QWJjZGVm	Abcdef
w6BiY2RlZg==	àbcdef	QWJiZGVm	Abbdef
w6RiY2RlZg==	äbcdef	QUJjZGVm	ABcdef

Generalized Time

- Sorting is not possible. The LDAP System returns the error code 12:
  "An error occured while executing SearchRequest (request id='queryRequest valid', result code='UnavailableCriticalExtension') ... problem 5010 (UNAVAIL_EXTENSION)"

DN

- Sorting is not possible. The LDAP System returns the error code 12:
  "An error occured while executing SearchRequest (request id='queryRequest valid', result code='UnavailableCriticalExtension') ... problem 5010 (UNAVAIL_EXTENSION)"

4.4.3 Filter

The filter element in a search request is mandatory. A client generated dummy filter (like a presence check for *objectClass*) must be provided. Otherwise the request results in an LDAP *errorReponse*.

The filter is evaluated structurally. Filters with unknown or undefined attributes result in an LDAP response code 16 (“No such attribute”).

4.4.4 Attribute selection

All entities (except operational) attributes will be returned if there is no explicit attribute projection is provided in the search.

Only attributes explicitly listed in the documented LDAP schema (see section 4.2) can be projected.

4.5 Provider information feed (ITI-59)

4.5.1 Supported request types

Only *addRequest*, *modifyRequest*, *modDnRequest* and *delRequest* entries are supported in a batch for the feed transaction. The whole batch will be rejected with a SOAP fault if another request type is detected.

4.5.2 Distinguished names

The complete distinguished name represent the primary key of an entry in the LDAP. To allow multiple tenants to add and edit entries without conflicts, the following rules are enforced on all operations that manipulate distinguished names.

The distinguished name must be syntactically correct (e.g. no equals “=” or commas “,”).
→ Violations lead to a response with result code 34: Invalid DN Syntax.

The correct rDN key must be used, that corresponds to the requested object class (as specified in chapter 4.2).
→ Violations lead to the result code 64: Naming Violation.

The distinguished name must be prefixed with the assigned “community prefix” from the CPI attribute “shcIssuerName” (section 5, Community Portal Index (CPI)).
The rDN value format is

```
rdnValue    : = <prefix>:<id>“
prefix      : = CPI.RdnPrefix
id          : = <any valid character>
```

→ If you send requests with a prefix other than the one assigned to you, a response with the result code 50: Insufficient access rights will be returned.

Example, the following add request from a community with the prefix “CommunityA”:

```
<addRequest dn="uid=CommunityC:1,OU=HCRegulatedOrganiza-
tion,DC=HPD,O=BAG,C=ch">
…
</addRequest>
```

Leads to the addResponse with the result code 50: Insufficient access rights:

```
<addResponse>
   <resultCode code="50"/>
</addResponse>
```

4.5.3 Attribute validation

In this chapter we provide information about the technically enforced validations on attribute values. According to underlying standards such as [IHE-HPD] or [ISO 21091] there are more format restrictions, but only the ones below are enforced in the EPR central services.

The rules are applied in all requests that directly or indirectly alter the mentioned attributes.

4.5.3.1 objectClass attributes

Entries in the directory organizational units (HcProfessional, HcRegulatedOrganization and Relationship) must fulfil the following constraints. These formal constraint will be validated for all mutative requests. Take note, that the optional object classes in the table below are inferred automatically (from the inheritance chain defined in the schema) if the caller omits those. But the caller is allowed to explicitly provide the complete inheritance chain if he wishes to do so. The only exception to this is the class “naturalPerson” which is auxiliary and optional on the HcProfessional.

OU (Entity type)	Required object classes	Optional inherited object classes	Optional auxiliary object classes
HcProfessional	HpdProvider HcProfessional	top inetOrgPerson person organizationalPerson	naturalPerson
HcRegulatedOrganization	HpdProvider HcRegulatedOrganization	top organization	
Relationship	groupOfNames	top	

→ All add requests that omit the required object classes, provide not allowed object classes or add entries to an incorrect organizational unit will lead to result code 19: Constraint violation.
→ All modify requests that try to remove required object classes or provide not allowed object classes will lead to result code 19: Constraint violation.

4.5.3.2 Read-only and operational attributes

For all attributes that are not writable by the caller, but are calculated by the system, it is expected that all add or modify requests omit these attributes.

For all requests that try to add or modify one or more of the following attributes.
→ Violations lead to 19: Constraint Violation

```
hpdProvider.memberOf
top.createTimestamp
top.modifyTimestamp
```

4.5.3.3 Distinguished name references

The rules outlined in section 4.5.2 are also enforced when specifying a DN-reference by issuing an add or modify request (you can only reference entries of your own prefix).

The following table gives overview about the affected attributes of type “DN” and additional rules that apply.

Attribute	Remarks
groupOfNames.owner	Only organizational provider can be referenced (OU=HCRegulatedOrganization) or community (OU=CHCommunity).[1]
groupOfNames.member	
HCProfessional.HcPracticeLocation	
HCRegulatedOrganization.ClinicalInformationContact	
HPDProvider.memberOf	Calculated inverse attribute of groupOfNames.member. Cannot be manipulated.

[1] For building a tree of individual and organizational providers it does not make sense to have an individual provider referenced by groupOfNames.owner. It is therefore technically enforced that only references to organizations can be added or modified.
→ Violations will lead to 19: Constraint Violation

4.5.3.4 Metadata attributes

Attributes of this type are validated against a specific value set in the metadata index. The format must be provided in the following format:

```
MdiCodeValue      : = BAG:<CodeSystem>:<Code>
CodeSystem        : = OID of the  code system
Code              : = Code
```

→ All attribute values that do not correspond to the defined format, will lead to a result code 21: Invalid attribute syntax

Attribute	Value set id
HCProfessional.HcProfession	2.16.756.5.30.1.127.3.10.1
HCRegulatedOrganization.HcSpecialisation and HCProfessional.HcSpecialisation	2.16.756.5.30.1.127.3.10.1.18
HCRegulatedOrganization.businessCategory	2.16.756.5.30.1.127.3.10.1.11

For modifications on the above attributes each value is validated against the active version of the value set.
→ A 19: Constraint violation will be returned if the code system and code combination is not found.

4.5.3.5 Status attributes

The status attribute, defined on *HPDProvider.hpdProviderStatus*, is validated according to the IHE HPD profile [IHE-HPD]. This ensures all individual and organizational provider entries have a valid status.

Provider type	Allowed status
Individual provider (HCProfessional)	Active Inactive Retired Deceased
Organizational Provider (HCRegulatedOrganization)	Active Inactive

→ Violations lead to the result code 19: Constraint violation.

4.5.3.6 Gender attribute

The gender attribute, defined on naturalPerson, is validated according to the Swiss National Extensions and [RFC2985]. This ensures all individual provider entries have a valid gender.

Provider type	Allowed status
Individual provider (HCProfessional)	m (male) f (female)

→ Violations lead to the result code 19: Constraint violation.

4.5.4 Referential integrity

For all attributes of type “DN” (see 4.2 Directory schema) the following referential integrity behaviour can be expected.

Consider element *A* referencing element *B* through attribute “ClinicalContactInformation” as an example for easier explanation.

If you delete element *B*, the following will happen. The value of *B* in the attribute *A.ClinicalContactInformation* will be deleted automatically. If *A.ClinicalContactInformation* contained only one value before the deletion of B, it will be empty/undefined. Otherwise *A.ClinicalContactInformation* will contain one value less, in this case the value “*B*”.

If you rename the element *B* with a modDNRequest to a new name *C*, *A.ClinicalContactInformation* will be automatically updated with the new name *C*.

4.5.5 Request specifics

The following chapters describe behaviour that is specific to the implementation of the central service HPD. All not documented below can be expected to adhere to standard DSML/LDAP behaviour.

4.5.5.1 ModDN request

ModDN requests will be refused if the DSML attribute *newSuperior* is set, as it is not allowed to move elements around in the DIT.

In ModDN requests only **relative** DN’s like “newrdn="uid=CommunityC:00000001009"” are allowed in the attribute *newRdn*. If the **full** DN path (like *“newrdn="uid=CommunityC:00000001009,OU=HCRegulatedOrganization,DC=HPD,O=BAG,C=ch"”*) is set, it leads to the resultCode 34 with the errorMessage *“Only RDNs are allowed as Attribute 'newrdn'*

value. Detected a full DN: 'uid=CommunityC:00000001009,OU=HCRegulatedOrganization,DC=HPD,O=BAG,C=ch'".

ModDN requests will be refused if the OU part of the DN contains an inexistent organization unit.

E.g. the request with the DN *"dn="uid=CommunityC:00000001099,OU=HCRegulatedOrganization,DC=HPD,O=BAG,C=ch""* will work whereas the request with the DN *"dn="uid=CommunityC:00000001099,OU=HCNotExisting,DC=HPD,O=BAG,C=ch""* will fail with the resultCode 50 and the errorMessage *"Entry can only be manipulated inside a valid OU. Check DN of requested entry: 'uid=CommunityC:00000001099,OU=HCNotExisting,DC=HPD,O=BAG,C=ch'."*

4.5.5.2 Add request

Additions to groupOfNames entries under OU=Relationship are validated to ensure that if the attribute owner contains an OU=CHCommunity, the member attribute only can contain OU=HCRegulatedOrganizations.

→ All additions not conforming to this rule will result in code 19: Constraint violation

The owner attribute is mandatory and single valued. Multiple additions will result in code 20: Attribute or value exists, no additions will result in code 19: Constraint violation.

4.5.5.3 Modify request

Modifications on groupOfNames entries under OU=Relationship are validated to ensure that only add or delete modifications can be performed.

→ All replace modifications will result in code 53: Unwilling to perform.

Modifications on groupOfNames entries under OU=Relationship are validated to ensure that if the attribute owner contains an OU=CHCommunity, the member attribute only can contain OU=HCRegulatedOrganizations.

→ All modifications not conforming to this rule will result in code 19: Constraint violation

The owner attribute is mandatory and single valued. Additions without prior delete will result in code 20: Attribute or value exists, delete without following adding will result in code 19: Constraint violation.

4.5.5.4 Delete request

To avoid orphaned relationship entries the system validates for each organization to delete that there is no owner reference of a relationship. When deleting entries of object class “HcRegulatedOrganization” you need to ensure that the elements are not referenced as a groupOfName.owner.

→ If the delete request concerns a HcRegulatedOrganization and the entry is referenced by one or more groupOfNames.owner you receive a result code 19: Constraint Violation.

4.6 Provider information delta download (CH:PIDD)

4.6.1 General

The provider information delta download transaction is used to synchronize a local replica of the directory with the master directory by fetching all changes at the master during a certain time span (at DSML request level).

Your own local changes which have already been synchronized back to the master directory using the feed operation may be of no interest for the client anymore. That's why a client can filter his own requests from the actual synchronization data with an additional PIDD parameter.

The client can use the DSML requests from the PIDD response and execute them against his local replica. Only successful DSML requests (resultCode = 0) from the feed operation appear in the PIDD.

The client himself has to keep track about the state of his replica, i.e. which requests from the PIDD have already been synchronized to the local replica.

The feed request execution time (server side) will act as a kind of directory version. Feed requests that have successfully been executed against the master directory appear immediately in the PIDD even if other requests in the same batch failed or have not been executed yet.

PIDD time values are always in UTC.

4.6.2 PIDD response

The PIDD response is a chronological list of DSML requests. The requests are grouped in batch requests. The *authRequest* of each of these batch requests indicates the responsible community for the original DSML request (CPI → *shcIssuerName* attribute, see **Fehler! Verweisquelle konnte nicht gefunden werden.**). The requestID of the original DSML requests is overwritten with the UTC execution timestamp of the request at the master directory (ISO 8601 format). A client that synchronizes without explicit *toDate* can use the last requestID timestamp as the new *fromDate* for the next synchronization run.

Example:

```
<downloadResponse>
  <batchRequest onError="resume">
    <authRequest principal="community1"/>
    <addRequest requestID="2018-03-12Z15:20:30.1234568Z"> ... </addRequest>
    <addRequest requestID="2018-03-12Z15:20:30.7765831Z"> ... </addRequest>
    <addRequest requestID="2018-03-12Z15:20:30.9692847Z"> ... </addRequest>
  </batchRequest>
  <batchRequest onError="resume">
    <authRequest principal="community2"/>
    <addRequest requestID="2018-03-15Z18:11:46.8745478Z"> ... </addRequest>
    <delRequest requestID="2018-03-15Z18:11:46.8745552Z"> ... </delRequest>
    <modifyRequest requestID="2018-03-15Z18:11:46.8745791Z"> ... </modifyRequest>
  </batchRequest>
</downloadResponse>
```

4.6.3 Time resolution

The time resolution for the execution timestamp at the master directory is on 7th fractional seconds precision. Requests for PIDD data with a higher precision for the time range will get rounded (rounding to nearest 7th precision using half to even). This may result in rounding issues. It's not recommended to use a higher precision for the execution timestamp at the client than the master uses.

4.6.4 Batch settings

The DSML batches returned in the PIDD transaction always have the same batch settings:

- **responseOrder:** sequential (= DSML default)
- **processing:** sequential (= DSML default)
- **onError:** resume

5. Community Portal Index (CPI)

The CPI is a Swiss specific implementation. The interface provides one operation that implements the elements of the DSML protocol (CH:CPI)

5.1 Directory Schema

The CPI base distinguished name / directory root is “dc=CPI,o=BAG,c=CH”. All child elements of this node are considered a part or the CPI.

5.1.1 Versioning

Although the CPI is considered the master in the EPR central services, every community or vendor is free to have a local replicate of the directory. For synchronisation only the community information query (CH:CPI) can be used.

In the EPR central services there is no explicitly versioned schema or corresponding version query operation available on machine to machine level.

5.1.2 Standard precedence

The object class and attribute schema is based on the requirements of the Federal Office of Public Health, eHealth Suisse and software vendors:

1. IHE CH extensions [BAG-A5]

5.1.3 Object Classes and Organsational Units

The central services offer five object classes defined in the LDAP schema.

Element	Object class	Organisational Unit
Community	CHCommunity	CHCommunity
Initiating Gateway	CHInitiatingGateway	CHGateway
Responding Gateway	CHRespondingGateway	CHGateway
Authorization Decision Gateway	CHAuthorizationDecision-Gateway	CHGateway
Assertion Provider	CHAssertionProvider	CHGateway

An overview of the complete LDAP schema is shown in appendix B. A complete list of object classes, attributes and their detailed definition and description can be obtained from [EPR-CPI-Schema].

5.1.4 Gateway references and naming conventions

Each community has a set of gateway information for the inter-community communication. The semantical and technical information about the gateways and their functionality is not part of this document. Only the information structure is described further.

Each community of object class “CHCommunity” has attributes (e.g. shcXcaInitiatingGateway, see [EPR-CPI-Schema] Column “Datentyp=DN”) that reference the corresponding gateway, assertion provider or authorization decision elements in the organisational unit

“CHGateway”. Furthermore, each gateway element is prefixed with the shcIssuerName of its community.

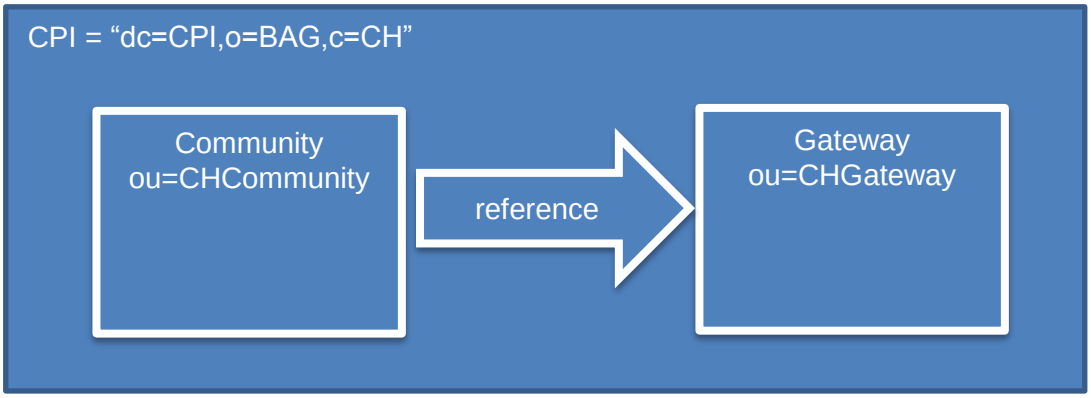
CHCommunity DN reference	Naming convention
shcXcaInitiatingGateway	uid=<shcIssuerName>:XcaInitiatingGateway
shcXcaRespondingGateway	uid=<shcIssuerName>:XcaRespondingGateway
shcXcpdInitiatingGateway	uid=<shcIssuerName>:XcpdInitiatingGateway
shcXcpdRespondingGateway	uid=<shcIssuerName>:XcpdRespondingGateway
shcAuthorizationDecisionProvider	uid=<shcIssuerName>:AuthorizationDecisionProvider
shcAuthorizationDecisionConsumer	uid=<shcIssuerName>:AuthorizationDecisionConsumer
shcAssertionProviderIssuerCertificate	uid=<shcIssuerName>:AssertionProviderIssuerCertificate

5.2 Community information query (CH:CPI)

The community portal index is implemented using a DSML interface. It uses the same DSML searchRequest protocol as it is used for HPD search requests ((see 4.4 “Provider information query (ITI-58)”). The only difference is the use of different SOAP target and operation namespaces (see [EPR-WSDL]).

The only DSML element supported is the “*searchRequest”* on the CPI root or one its child elements. This means the CPI interface is read-only from a machine to machine perspective. The data can only be manipulated by the Federal Bureau of Public Health.

As mentioned in chapter 5.1.3, the community is structured in two separate organisational units underneath “dc=CPI,o=BAG,c=CH”.



You can query all community information by issuing a search request on the organisational unit “OU=CHCommunity,DC=CPI,O=BAG,C=ch” or by using the object class “CHCommunity” in a filter.

For all gateway information, the organisational unit “OU=CHGateway,DC=CPI,O=BAG,C=ch” can be queried or alternatively you could construct an object class filter containing all the object class values used in that OU.

6. To find the gateway information of a given community you can traverse the distinguished name reference of that community to its gateway elements or you can use the attribute shcIssuerName to filter the gateway elements; you could filter on the distinguished name only retrieving element that begin with '<shcIssuerName>:'. This would allow you to find all gateways of a given community without traversing the distinguished name reference attributes.Metadata Index (MDI)

6.1 General

The Metadata Index is implemented with the SVS transaction ITI-48 (Retrieve Value Set) and ITI-60 (RetrieveMultiple Value Set) with the SOAP 1.2 and HTTP Binding.

6.2 Retrieve Value Set (ITI-48)

6.2.1 Error scenarios and behaviour

Following situation will lead to a SOAP fault:

- Missing elements in the SOAP body (e.g. *RetrieveValueSetRequest* or *ValueSet* element).
  Missing or misspelled *id* attribute on *ValueSet* element.
  Unknown value set id
  (*Note:* conforming to IHE SVS fault code → *"NAV"*)
  Unknown value set version
  (*Note:* conforming to IHE SVS fault code → *"VERUNK"*)
- Unknown or undefined language for a requested value set id and/or version
  (Note: this behaviour is not specified by IHE SVS → *"LANGUNK"*)

Instead of setting directly the SOAP fault code to the specified IHE SVS fault code, the sub code is set. The top level fault code is always "Sender" which conforms to SOAP 1.2 standard (see [SOAP12], chapter 5.4.6).

So, MDI fault sub codes in ITI-48 are:

Code	Reason text	Description
NAV	Unknown value set	IHE standard
VERUNK	Version unknown	IHE standard
LANGUNK	(Concept)Language '{language}' not supported.	CH extension

The reason text is always in *"en-US"*, there's no multi language support in the error message.

6.2.2 Caching of the responses

According to the IHE SVS profile, the response data *cacheExpirationHint* is optional.

This cache hint is not supported by the current implementation (neither the SOAP nor the HTTP binding have currently support for it).

6.3 Retrieve Multiple Value Set (ITI-60)

6.3.1 Request behaviour

Following filter behaviour is currently implemented for retrieving multiple value sets:

6.3.1.1 Equal filter

A case-sensitive equal filter on the corresponding property.

6.3.2 Contains filter

A case-insensitive contains filter on the corresponding property. This behaviour differs from the IHE SVS definition: POSIX regular expressions are not supported.

6.3.2.1 Date filter

For filtering on date range two filter elements are provided. One to filter on the upper and one to filter on the lower end of the time interval. The date must be provided in xml date format. It will be silently ignored by the system if an additional time value is provided.

6.3.2.2 Parameter list

From the following parameters, at least one must be specified. Otherwise the system will return a SOAP fault with the fault code “Sender” and no specific sub code.

Element	Description
ID	An equal filter on *ValueSet.ID*.
DisplayNameContains	A case sensitive contains filter on *ValueSet.displayName*.
SourceContains	A case sensitive contains filter on *ValueSet.source*.
PurposeContains	A case sensitive contains filter on *ValueSet.purpose*.
DefinitionContains	A case sensitive contains filter on *ValueSet.definition*.
GroupContains	A case sensitive contains filter on *ValueSet.Group.displayName*.
GroupOID	An equal filter on *ValueSet.Group.ID*.
EffectiveDateBefore	Before or equal on *ValueSet.effectiveDate*. If a time is provided
EffectiveDateAfter	Equal or after on *ValueSet.effectiveDate*
ExpirationDateBefore	Before or equal on *ValueSet.effectiveDate*. If a time is provided
ExpirationDateAfter	Equal or after on *ValueSet.expirationDate*
CreationDateBefore	Before or equal on *ValueSet.expirationDate*. If a time is provided
CreationDateAfter	Equal or after on *ValueSet.creationDate*
RevisionDateBefore	Before or equal on *ValueSet.revisionDate*. If a time is provided
RevisionDateAfter	Equal or after on *ValueSet.revisionDate*

Element	Description
Format	This parameter is ignored.

6.3.3 Response behaviour

Because there is no selection of a specific language (in contrast to the *“Retrieve Value Set”* transaction) and the IHE SVS allows only one ConceptList element per matched value set, the resulting concept display names will always be in English language.

Appendix

A.LDAP result codes

Standard LDAP result codes are returned by the EPR central services. The following table contains an extract of them explicitly mentioned in this interface documentation.

Code	Description
2	*Protocoll error* Basic protocol standards are violated. E.g. • modDN request is missing the newRDN
16	*No such attribute* Attribute is not defined on the entry's object class.
19	*Constraint violation* Different server side enforced constraints were violated. E.g. • add to single valued attribute • non-existing MDI code • not allowed object class • invalid rDN format • not allowed references (wrong type) • invalid HPD provider status format
21	*Invalid attribute syntax* The attribute syntax was wrong. E.g. • MDI code format error
32	*No such object* Entry does not exist in the directory.
50	*Insufficient access rights* Modifications outside of the allowed organizational units. Modifications outside of the assigned community domain (prefix).
53	*Unwilling to perform* The request has a valid syntax but makes no sense or does not conform the intended use of the service. E.g. • Search request without a filter • A request is not fully specified (Add is missing the DN)
65	*Object class violation* Missing required fields on an add request. Missing specific attribute values that are required on the entry. E.g. • hcIdentifier constraints • Gender constraints • Owner constaints
68	*Entry already exists* The DN of an add request already exists in the directory.

Code	Description
87	*Filter error* The filter is not valid: E.g. • Logical And with just one operand •

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

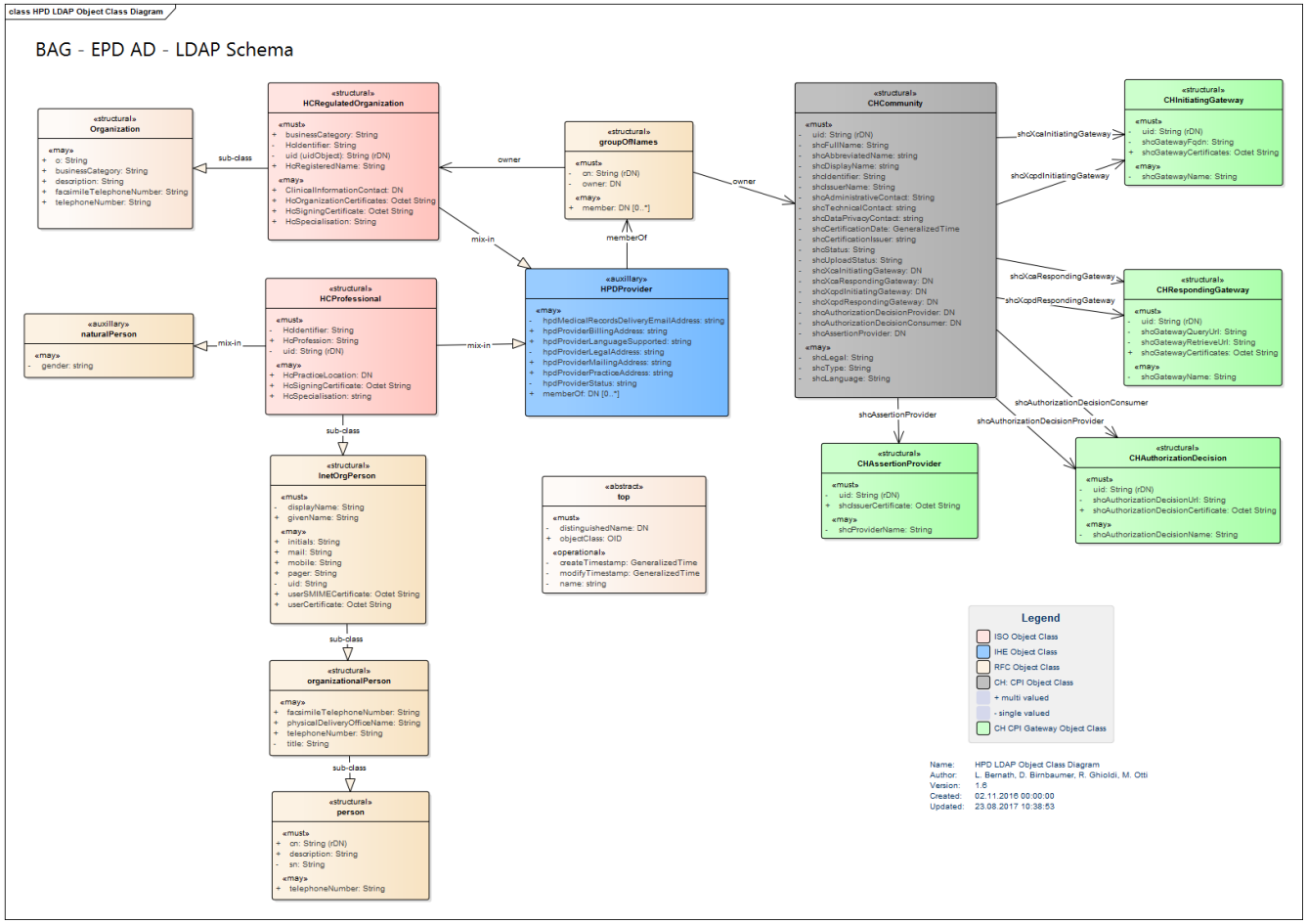
Swiss Confederation

Federal Department of Finance FDF

Federal Office of Information Technology, Systems, and Telecommunication FOITT

PRO-IEW-EWM

B.LDAP Schema Overview



C. Interface Changelog

Version 0.13.x

- HPD
  - If ModifyDN.NewRdn is missing: Not the whole batch is rejected. Further, result code 2 ("Protocol error") is returned instead of 67 ("Not Allowed on RDN").

Version 0.14.x

- HPD
  - *hcIdentifier* of hpdProvider class has changed to multi-valued attribute. Validation for organizations to have at least one attribute value with *"RefData:OID:"* prefix.
- CPI
  - New object classes for community gateway information: CHInitiatingGateway, CHRespondingGateway, CHAuthorizationDecisionGateway, CHAssertionProvider.
  - New and changed attributes for CHCommunity object class.
  - New OU=CHGateway to store community gateway information