eHealth Exchange™

FHIR API Directories

Technical Overview

FHIR R4 Directory Access

- Email administrator@ehealthexchange.org to get access to the HAPI-based directories:
  - For existing FHIR API users, ask to have your API key migrated to the HAPI directories. You can continue to access the legacy directories, as needed.
  - For organizations that have not accessed the directory FHIR API in the past, ask for a FHIR API key to access the HAPI directories.
- Provide feedback on the HAPI directories:
  - Email administrator@ehealthexchange.org for technical issues or concerns

HAPI Directory – FHIR Implementation Guides (IGs)

eHealth Exchange Directories

- The Base FHIR R4 IG and eHealth Exchange FHIR R4 IG are at the bottom of the technical specifications page under the Directory Implementation Guides section. Navigate to:
  https://ehealthexchange.org/testing-program/technical-specifications

- There is no IG documentation for the STU3 API for the FHIR directories which documents FHIR capabilities such as search parameters, read operations, etc. The STU3 API under the FHIR directories generally conforms to the HL7 FHIR R4 capabilities listed below, as it's an API into a FHIR R4 directory.
  - RESTful API: https://hl7.org/fhir/http.html
  - FHIR Read: https://hl7.org/fhir/http.html#read
  - Generalized search capabilities (see "parameters for all resources" and "search result parameters" under the Summary Table): https://www.hl7.org/fhir/search.html
  - Search parameters for an FHIR Organization resource: https://hl7.org/fhir/organization.html#search

HAPI Directory – FHIR Implementation Guides (IGs)

Carequality Directories

- For eHealth Exchange participants that have opted-in to connect to Carequality via the eHealth Exchange, the Carequality directory IGs are published under https://carequality.org/resources
- Typically, Carequality publishes two directory IGs: the current IG and a draft IG for the next IG release.

QHIN directories for TEFCA

- For eHealth Exchange participants that have opted-in to connect to TEFCA via the eHealth Exchange:
  - The QHIN directories follow the RCE directory service IGs
  - The RCE directory service IGs are published under https://rce.sequoiaproject.org/tefca-and-rce-resources

HAPI Directory APIs – 2 API Choices

FHIR Client API

- Access the directory with a FHIR client using a FHIR API key provided by Sequoia technical support – email administrator@ehealthexchange.org for a FHIR API key
  - Provides access to two APIs for the eHealth Exchange directories:
    - **Argonaut STU3 FHIR** (same as the legacy directory offering)
    - **FHIR R4** APIs (recommended)
  - Typically provides read-only access – no update or create operations
  - Carequality subscribers and TEFCA subscribers can update their API key to obtain read-only access to the Carequality clone directories and the QHIN directories maintained by the eHealth Exchange.

Note: The UDDI API (SOAP API) was retired on 8/16/2024

HAPI Directories and Hub endpoints

FHIR Client API and Hub endpoints

- Unlike the legacy directories, using the FHIR APIs, there are no longer separate directories for direct endpoints and Hub endpoints.
- To obtain Hub endpoints using the FHIR APIs, use the FHIR operation $hub-aware. For example:
  - For all FHIR R4 entries with Hub endpoints:
    - https://<Directory-FQDN/fhir/Organization/**$hub-aware**
  - For a single FHIR R4 entry with Hub endpoints:
    - https://<Directory-FQDN>/fhir/Organization/2.16.840.1.113883/**$hub-aware**

eHealth Exchange Directory

Endpoint options & inactivation / deletion handling

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eHealth Exchange **Validation** Directory - endpoint options

Note: Email administrator@ehealthexchange.org for the proper “VAL-HOSTNAME”

FHIR R4 API

- Direct endpoints: https://VAL-HOSTNAME/fhir/Organization?_apiKey=<INSERT_API_KEY>&_format=json
- Hub endpoints: https://VAL-HOSTNAME/fhir/Organization/$hub-aware?_apiKey=<INSERT_API_KEY>&_format=json

Argonaut STU3 API

- Direct endpoints: https://VAL-HOSTNAME/fhir-pre-stu3/Organization?_apiKey=<INSERT_API_KEY>&_format=xml
- Hub endpoints: https://VAL-HOSTNAME/fhir-pre-stu3/Organization/$hub-aware?_apiKey=<INSERT_API_KEY>&_format=xml

Notes:

- Non-production eHealth Exchange testing is typically done using information provided by the eHealth Exchange Validation (VAL) directory.
- The Validation Hub synchronizes with the eHealth Exchange Validation (VAL) directory once every 24 hours.

eHealth Exchange **Production** Directory - endpoint options

Note: Email administrator@ehealthexchange.org for the proper “PROD-HOSTNAME”

FHIR R4 API

- Direct endpoints: https://PROD-HOSTNAME/fhir/Organization?_apiKey=<INSERT_API_KEY>&_format=json
- Hub endpoints: https://PROD-HOSTNAME/fhir/Organization/$hub-aware?_apiKey=<INSERT_API_KEY>&_format=json

Argonaut STU3 API

- Direct endpoints: https://PROD-HOSTNAME/fhir-pre-stu3/Organization?_apiKey=<INSERT_API_KEY>&_format=xml
- Hub endpoints: https://PROD-HOSTNAME/fhir-pre-stu3/Organization/$hub-aware?_apiKey=<INSERT_API_KEY>&_format=xml

Note:

- The Production (PROD) Hub synchronizes with the eHealth Exchange Production (PROD) directory once every 24 hours.

Change in functionality for the eHx directories – Subparticipant entries are logically deleted

Under the eHx directories for the eHx network:

- Participant entries are inactivated by setting “active=false”. An inactive entry should **not** be consumed by directory clients. If an inactive entry has its administrative status set to terminated then the participant is no longer with the eHealth Exchange.
- A Subparticipant entry is logically deleted using HTTP DELETE and can no longer be found using a directory search for Organization entries. When a Participant entry is inactivated and terminated, then all the associated Subparticipant entries are logically deleted.
- Logically deleted entries can be discovered by querying with a $status-changes operation, with an optional date range and “deleted=true” parameter.
- If the “deleted=true” option is used, then results will only be returned if the last state of a directory entry is deleted within the timeframe specified by the query. For example:
  - If a directory entry is not deleted on 3/1, is deleted on 3/15 and is re-activated on 3/20:
    - The directory entry will be included in the results if the end date for the query is 3/16.
    - If the end date for the query is 3/21, then it will not be included in the results, because the entry was re-activated and is no longer deleted within that timeframe.
- **NOTE: Under the QHIN and RCE directories, all entries are typically inactivated and not logically deleted.**

Change in functionality for eHx directories – Subparticipant entries are logically deleted

- A simple FHIR R4 search query example using $status-changes is:
  - https://VAL-HOSTNAME/fhir/Organization/$status-changes
- A FHIR R4 search query that uses $status-changes with a timeframe and the “deleted=true” option:
  - https://VAL-HOSTNAME/fhir/Organization/$status-changes?deleted=true&start=2023-03-01T20:00:00&end=2023-03-16T23:59:59
- The response to the $status-changes query is a FHIR List. An example of the response content is

```
<List>
    <status value="current"/>
    <mode value="changes"/>
    <date value="2023-05-18T17:05:01+00:00"/>
    <entry>
        <flag>
            <coding>
                <system value="http://terminology.hl7.org/CodeSystem/iso-21089-lifecycle"/>
                <code value="deprecate"/>
            </coding>
        </flag>
        <date value="2023-05-03T22:44:49+00:00"/>
        <item>
            <identifier>
                <system value="urn:ietf:rfc:3986"/>
                <value value="urn:oid:2.16.840.1.113883.3.3703"/>
            </identifier>
        </item>
    </entry>
```

  - As per the example, the code of “deprecate” indicates the entry has been deleted.
  - The XPath for the HCID of the deleted entry is: /List/entry/item/identifier/value/@value

eHealth Exchange Carequality Clone Directories

Endpoint options

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Carequality Clone Directories

- The eHealth Exchange has made copies of the Carequality Stage and Carequality PROD directories which are called the Carequality clone directories.
- The Carequality clone directories are accessible to any participant that has opted-in (subscribed) to connect to Carequality through the eHealth Exchange.
- The Carequality clone directory content is synchronized with the Carequality directories once every 24 hours.

Carequality Stage Clone Directory - endpoint options

Note: Email administrator@ehealthexchange.org for the proper “CQ-STAGE-CLONE” and “CQ-PROD-CLONE” hostname.

FHIR R4 API

- Direct endpoints: https://CQ-STAGE-CLONE-HOSTNAME/fhir/Organization?_apiKey=<INSERT_API_KEY>&_format=json
- Hub endpoints: https://CQ-STAGE-CLONE-HOSTNAME/fhir/Organization/$hub-aware?_apiKey=<INSERT_API_KEY>&_format=json

Argonaut STU3 API – **not supported**

Notes:

- Non-production Carequality testing is typically done using information provided by the Carequality STAGE directory.
- The Validation Hub synchronizes with the Carequality Stage directory once every 24 hours.

Carequality PROD Clone Directory - endpoint options

FHIR R4 API

- Direct endpoints: https://CQ-PROD-CLONE/fhir/Organization?_apiKey=<INSERT_API_KEY>&_format=json
- Hub endpoints: https://CQ-PROD-CLONE/fhir/Organization/$hub-aware?_apiKey=<INSERT_API_KEY>&_format=json

Argonaut STU3 API – **not supported**

Notes:

- The production Hub synchronizes with the Carequality PROD directory once every 24 hours.

eHealth Exchange QHIN Directory

Endpoint options & custom functionality

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eHx QHIN Stage Directory - endpoint options

Note: Email administrator@ehealthexchange.org for the proper “QHIN-STAGE” hostname and “QHIN-VAL-HUB” hostname and port.

FHIR R4 API

- Direct endpoints for QHINs (for the QHIN Hub to responder connection only):
  https://QHIN-STAGE/fhir/Organization?_apiKey=%3cINSERT_API_KEY%3e&_format=json&type=https://sequoiaproject.org/fhir/sphd/CodeSystem/OrganizationType%7CQHIN
- Hub endpoints for queries to QHINs:
  https://QHIN-STAGE/fhir/Organization/$hub-aware?_apiKey=<INSERT_API_KEY>&_format=json&type=https://sequoiaproject.org/fhir/sphd/CodeSystem/OrganizationType%7CQHIN
- Directed Query to the HCID of external QHIN participants or subparticipants:

Cross Gateway Patient Discovery
https://QHIN-VAL-HUB:PORT/ehx/1.0.0/iti55/2.0?_eHxHubRouteTo=<HCID of target RG>
Cross Gateway Query
https://QHIN-VAL-HUB:PORT/ehx/1.0.0/iti38/3.0?_eHxHubRouteTo=<HCID of target RG>
Cross Gateway Retrieve
https://QHIN-VAL-HUB:PORT/ehx/1.0.0/iti39/3.0?_eHxHubRouteTo=<HCID of target RG>

eHx QHIN PROD Directory - endpoint options

Note: Email administrator@ehealthexchange.org for the proper “QHIN-PROD” hostname and “QHIN-PROD-HUB” hostname and port.

FHIR R4 API

- Direct endpoints for QHINs (for the QHIN Hub to responder connection only): https://QHIN-PROD/fhir/Organization?_apiKey=<INSERT_API_KEY>&_format=json&type=https://sequoiaproject.org/fhir/sphd/CodeSystem/OrganizationType%7CQHIN
- Hub endpoints for queries to QHINs: https://QHIN-PROD/fhir/Organization/$hub-aware?_apiKey=%3cINSERT_API_KEY%3e&_format=json&type=https://sequoiaproject.org/fhir/sphd/CodeSystem/OrganizationType%7CQHIN
- Directed Query to the HCID of external QHIN participants or subparticipants:

Cross Gateway Patient Discovery
https://QHIN-PROD-HUB:PORT/ehx/1.0.0/iti55/2.0?_eHxHubRouteTo=<HCID of target RG>
Cross Gateway Query
https://QHIN-PROD-HUB:PORT/ehx/1.0.0/iti38/3.0?_eHxHubRouteTo=<HCID of target RG>
Cross Gateway Retrieve
https://QHIN-PROD-HUB:PORT/ehx/1.0.0/iti39/3.0?_eHxHubRouteTo=<HCID of target RG>

eHx QHIN Directories – additional options

FHIR R4 API

- Capability Statement:
  - Stage: https://QHIN-STAGE/fhir/metadata
  - PROD: https://QHIN-PROD/fhir/metadata
- Significant custom operations besides $hub-aware:
  - $org-hierarchy:
    - Returns the hierarchy rooted at the requested instance. Retrieves all organizations in the hierarchy tree starting from the specified organization and filters them based on the provided search parameters. The filtered organizations are returned as a searchset bundle. The operation requires hapi.sequoia.hierarchy.enabled to be set to true.
  - $all:
    - Returns all organizations from the directory cache as a searchset bundle. Retrieves the complete cached snapshot of organizations without any filtering. If the cache is not yet populated, it will be initialized on first access. The cache contains all organizations in the directory along with their hierarchical relationships and is refreshed asynchronously. This operation provides significantly faster retrieval than standard search for full directory dumps but returns potentially stale data based on when the cache was last refreshed.

Directory API Tips and Tricks

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Best practices when querying the eHealth Exchange Directory

- Query with an “active=true” parameter
  - Directory entries with “active=false” are unapproved or temporarily unavailable and not ready to query
  - Unlike the legacy directories, if you don’t specify a value for “active“, then the default is not “active=true”. Entries will be returned with active set to true and false if the active parameter is not specified.

- Query for Participant entries if you don’t want to retrieve Subparticipant entries
  - Query parameter/value for Participant entries: type=https://sequoiaproject.org/fhir/sphd/CodeSystem/OrganizationType%7CParticipant
    - Note: %7C is an URL encoded pipe character (“|”)
  - NOTE: Subparticipant entries typically represent provider locations such as a hospital or clinic. They may be used for “geofencing” requests and they also helps clinicians determine whether they should query a participant, by providing the name of a hospital, clinic or doctor’s office. Subparticipant entries do not currently provide endpoints to make a connection, but it is very likely that they will in the future.
  - There are **over 70,000 entries** in the production directory, as of January 2026 but **only 327** represent Participant entries.

Best practices when querying the eHealth Exchange Directory

- Directory paging highlights
  - HAPI has a paging feature which adheres to the paging behavior specified by FHIR R4 – see http://hl7.org/fhir/R4/search.html#count
  - The directory is currently set to a default page size of 500, so by default, 500 records will be returned for a single response. You can return less records in a response by setting the _count parameter to a value lower than 500.
  - The maximum page size is 1000, so you cannot increase the page size beyond 1000 using the _count parameter.

Best practices when querying the eHealth Exchange Directory

- Query for directory entries that you manage or a participant's entries
  - The org-managing-org element defines the participant that manages a set of directory entries. The search parameter name is "managingOrg" and additional parameter filters may be used. Here are some examples:
  - All directory entries managed by the participant Health Gorilla:
    - https://PROD-HOSTNAME/fhir/Organization/$hub-aware?_apiKey={{PROD_HAPI_API_KEY}}&_format=json&active=true&_count=200&managingOrg=1.3.6.1.4.1.52618.1
  - All Health Gorilla managed directory entries that have been updated since the beginning of this year:
    - https://PROD-HOSTNAME/fhir/Organization/$hub-aware?_apiKey={{PROD_HAPI_API_KEY}}&_format=json&active=true&managingOrg=1.3.6.1.4.1.52618.1&_lastUpdated=ge2024-01-01T00:00:00%2B00:00
- Find the hierarchy of all directory entries below a certain entry
  - Use the custom $org-hierarchy operation
  - For example, the hierarchy of all entries for Health Gorilla:
    - https://PROD-HOSTNAME/fhir/Organization/1.3.6.1.4.1.52618.1/$org-hierarchy?_apiKey={{PROD_HAPI_API_KEY}}
  - CAUTION: This custom operation does not accept any additional parameter filters, such as "active" or "_lastUpdated".

Best practices when querying the eHealth Exchange Directory

- Don’t forget that Hub endpoints are needed to query another participant, so you need to use the custom $hub-aware operation.
- For example, this query will return the first 500 entries in the directory and provide Hub endpoints:

  https://PROD-HOSTNAME/fhir/Organization/$hub-aware?_apiKey=<INSERT_API_KEY>&_format=json

- Note: the _count parameter is not specified in the query above, so the default paging size is 500 records.

Best practices when querying the eHealth Exchange Directory - paging

- Directory paging
  - The directories have a paging feature which adheres to the paging behavior specified by FHIR R4 – see http://hl7.org/fhir/R4/search.html#count
  - The directory is currently set to a default page size of 500, so by default, 500 records will be returned for a single response. You can return less records in a response by setting the _count parameter to a value lower than 500.
  - Currently, the maximum page size is less than all the records in the directory, so _count cannot be increased to retrieve all directory records in a single request. **You need to use paging to retrieve all directory records.**

Best practices when querying the eHealth Exchange Directory - paging

- Directory paging example:
  - First request to the directory returns 1,000 records, using the following query:
  - https://PROD-HOSTNAME/fhir/Organization?_format=json&_count=1000&_apiKey={{PROD_HAPI_API_KEY}}
  - In the response to the first request (see below), use the URL provided by “next” and add the _apiKey parameter in your next request. Continue making requests to the directory in this manner until the response does not provide a “next”.


```
{
    "resourceType": "Bundle",
    "id": "fe352b82-3474-4d54-b245-826f89de73c0",
    "meta": {
        "lastUpdated": "2024-09-17T22:43:55.331+00:00"
    },
    "type": "searchset",
    "link": [
        {
            "relation": "self",
            "url": "https://[redacted]/fhir/Organization?_count=1000&_format=json"
        },
        {
            "relation": "next",
            "url": "https://[redacted]/fhir?_getpages=fe352b82-3474-4d54-b245-826f89de73c0&_getpagesoffset=1000&_count=1000&_format=json&_pretty=true&_bundletype=searchset"
        }
    ],
    "entry": [
        {
```

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- Rollout of new HAPI directories and retirement of legacy directories
- Legacy directory retirement