CommonWell Health Alliance Specification Services (Part 1 of 2)

Version 2.11

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Revision History – Summary of Changes

Legend

Revisions with Track Changes (redlining) on have not yet been approved.

Revisions highlighted in grey have been approved but are not yet in Production.

V2.11 – Published January 30, 2019

- Moved Appendix H, Use Case Specification, to a separate document.
- Documentation Correction
  - In section 1, Introduction, clarified (per Alliance's legal authority) that the two separate documents (Use Cases & Services) comprise the CommonWell Health Alliance Specification.
  - Corrected link for CommonWellMetaDataCodes to the CommonWell Community.
  - In section 2.2.3, Cross-Enterprise User Assertion (XUA), updated a paragraph that indicated Edge Systems were to request a SAML token from CommonWell and indicated they are to generate it instead.
  - In section 7.3, Federated Authorization, updated claims for "nbf" and "exp" to remove "OPTIONAL" since they are required.
  - Appendix F, updated section F.2, CHA Broker Timeout Settings, to correct Document Retrieve Timeout to 30 seconds for both Integration and Production.
- CC101, Updated Spec to define Facility (parent/child) support
  - Added section 8.4.14, Facility.
  - In section 8.6.4, Patient, added a Resource for facilities, updated a code sample, and added a few implementation notes.
  - In section 8.7.6.2, Adding a Local Patient Record, updated the Sample Request for Providing Facility Information.
  - In section 8.7.6.3, Updating a Local Patient Record, removed the Sample Request for Providing Facility ID.
  - In section 8.7.7.1, Retrieving Network Links, updated the Sample Response for One Level 1 Link with Facility Information.
  - Updated section 9.7, Facility Mapping using Patient Identity Feeds (PIXv2.x).
- CC69, Update Spec to define FHIR Gateway support
  - In section 2.2.2, Cross-Community Access (XCA), added FHIR transaction and specification references.
  - In section 2.3.2, Fast Healthcare Interoperability Resources (FHIR), updated implementation note.
  - In section 6.1, Design Goals & Assumptions, added FHIR to the XCA Responding Gateway services reference.
  - In section 7.1, Transport Security, added "XCA" to existing references to the Organization's Responding Gateway.
  - Added section 7.1.2, OAuth2 for Authentication.
  - In section 10.4, Document Query, replaced graphic with one that included FHIR reference, and added FHIR transaction to #4.
  - In section 10.6, Document Retrieve, replaced graphic with one that included FHIR reference.
  - Added section 10.6.1, Retrieval of a document from a FHIR responding gateway.
  - Added section 10.6.2, XCA to FHIR and FHIR to XCA.
  - Added Appendix H, FHIR Gateway Mappings.

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V2.10 – Published February 18, 2018

- CC100, Documentation Changes (Remove RelayHealth mentions)
  - In section 8.6.3, Organization, changed code example assigner from “RelayHealth” to “Healthcare Company.”
  - In Appendix F, CommonWell Health Alliance Performance Targets and Timeout Settings, changed Performance Targets label from “RelayHealth (CommonWell Service Provider)” to “CommonWell Service Provider.”
- CC12, Update Spec to define API for Re-enrollment
  - In section 8.7.5.1, Unenrolling a Person, indicated how to re-enroll a person.
  - In Appendix H, section 1.5.6, Un-enroll Person use case, indicated how to re-enroll a person.
- CC98, Patient Role and Purpose of Use
  - Appendix C.6, Patient Role and Purpose of Use Codes:
    - Added Patient Access Role and Patient Access Purpose of Use.
    - Added Insurance Specialist Role and Coverage Purpose of Use.
    - Updated link to HITSP – Clinical Document and Message Terminology Component (C80).
- CC41, Commercial Services Certificate Handling
  - Updated all references of SHA-1 to SHA-256.

V2.9 - Published January 30, 2017

- CC96, Radiology Image Exchange
  - Added section 2.2.4 Cross Community Access for Imaging (XCA-I).
  - Updated section 6.1 Design Goals and Assumptions.
  - Updated Responding Gateway references to include Responding Imaging Gateway.
  - Updated Cross-Community Access (XCA) to include Cross-Community Access for Imaging (XCA-I).
  - Updated IHE Technical Framework references to IHE IT Infrastructure and Radiology Technical Frameworks.
  - Updated section 10.1 IHE Roles.
  - Updated section 10.2 Synchronous and Asynchronous Exchange.
  - Added section 10.7 Image Retrieval.
  - Updated 11.1 Normative References
  - Added IHE Radiology Technical Framework to Appendix E CommonWell Document Metadata.
  - Appendix E, CommonWell Document Metadata:
    - Updated section E.1 classCode.
    - Updated section E.3 eventCodeList.
    - Updated section E.4 formatCode.
    - Updated section E.7 typeCode.
    - Updated section E.9 title.
  - Appendix F, CommonWell Health Alliance Performance Targets and Timeout Settings:
    - Updated section F.1 Performance Targets.
    - Updated section F.2 CHA Broker Timeout Settings for Integration and Production.
  - Updated Appendix G, REST-based Document Query and Retrieve.
- CC87, Support Facility Org Management
  - In section 7.3, Federated Authentication, added claims for Facility ID and Facility Name to the SAML security tokens.
  - In section 8.7.6.2, Adding a Local Patient Record, added Sample Request: Providing Facility Id.
  - In section 8.7.6.3, Updating a Local Patient Record, added Sample Request: Providing a Facility Id.

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  - In section 8.7.7.1, Retrieving Network Links, added Sample Response: One Level 1 Link with Facility Information.
  - Added section 9.7, Facility Mapping using Patient Identity Feeds (PIXv2.x).
  - Appendix H, added section 8.6, Scenario 4 – As an Edge System user, I can create relationships between a parent organization and facililties that are associated with the parent.
- CC91, Documentation Changes: Update FHIR spec
  - Added section identifier-entryUUID in section G.3 General Approach for Contained versus Linked Resources.

V2.8 – Published November 7, 2016

- CC97, Bundled Documentation Changes
  - In section 8.7.6.2, Adding a Local Patient Record, enhanced sample to better illustrate Shared ID Link.
  - In section 2.2.2, Cross-Community Access (XCA), removed a phrase that indicated we currently support document provision from responding gateways via REST/FHIR.
  - In section 7.4, SAML in SOAP-based Transactions, corrected a broken URL.
  - In section 7.4, added better samples of Bearer and Holder of Key (HoK).
- CC93, Merging of Technical Specification and Use Case Specification, added Appendix H.
- CC92, Supported TLS Version, modified sections 7.1, Transport Security, and 9.1, Design Principles and Assumptions, to indicate only TLS version 1.2 is supported (removed references to SSL and TLS versions 1.0 and 1.1).

V2.7 – Published September 21, 2016

- CC95, Radiology Report Exchange, updated the following:
  - Section 10.4.3, Query Parameters.
  - Section 10.4.3-2, Minimal XCA Metadata set 1.
  - Section 11.1, Normative References.
  - Appendix E, CommonWell Document Metadata:
    - Added IHE Radiology Technical Framework, Volume 2 to source list.
    - Updated CommonWellDocumentMetadataCodes.xml.
    - Updated section E.1, classCode.
    - Updated section E.3, eventCodeList.
    - Updated section E.4, formatCode.
    - Updated section E.7, typeCode.
    - Added section E.9, title.
    - Added section E.10, referenceIdList.
  - Appendix F, CommonWell Health Alliance Performance Targets and Timeout Settings.
- CC94, Network Linking Proxy Support, updated section 8.7.7.2.
- Use Case Approval
  - Appendix H, section 6.10, Patient-Directed Link Management.
  - Appendix H, section 9.6, As a patient, I can find and consume documents via a connected Portal web application.

V2.6 – Published June 13, 2016

- CC75, Post Acute Correlated Linking (REST) and Shared ID Link (formerly CC76)

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- In section 8.7.6.2 Adding a local patient record, added further description to the patient identifier parameter.

- CC72, Post-Acute Correlated Linking HL7
  - Added new section 9.6, Dynamic Creation of Correlated Links Using Patient Identity Feeds (PIXv2.x)
- CC78, Patient Self-Enrollment via Tethered Portal
  - Added Appendix C.6, Patient Role and Purpose of Use Codes.
- CC64, Additional Format Codes for C-CDA R2.1 support
  - The XML document was updated on 2/23/2016, and an XML comment was added for this change control number.

V2.5 – Published January 26, 2016

- CC67, Added OPTIONAL section 8.7.1.5 for Checking for Possible Patient Matches Prior to Enrollment.

V2.4 – Published August 25, 2015

- CC62, Spec Clarification for Patient Feed
  - In section D.2 REST-based Historical Feed, added clarification that the REST-based historical feed uses a different endpoint from the one used for ongoing patient administration events.
- CC56, Additional Format Codes for C-CDA R2.0 support
  - In section E.4 CommonWell Metadata Document formatCode, replaced "currently there is no formal consensus" language with a reference and link to the CommonWellDocumentMetadata Codes XML document. The XML document was updated on 5/20/2015 by George Cole, and an XML comment was added for this change control number.

V2.3 – Published February 20, 2015

- CC59, Documentation Changes
  - In section 8.7.6.2 Adding a Local Patient Record, removed the patientId portion of the URL template. Also in this section, added *identifier* with *key* and *system* as required parameters.
  - In section 8.7.6.3 Updating a Local Patient Record, added the URL template section that was removed from section 8.7.6.2 so that it reflects requirements for only updating, not adding, a Local Patient Record. Also in this section, added *identifier* with *key* and *system* as required parameters.
  - In section 8.7.1.5 Add a new Person, the sample request was updated to remove the *label* and *assigner* parameters from the sample response since they are not required and were not in the sample request.
  - In the following property sections, the *_links* property was corrected by changing *array* to *_links*:
    - 8.6.4 Patient
    - 8.6.5 PatientLink
    - 8.6.6 Person
    - 8.6.7 Picture
    - 8.6.8 NetworkLink
  - In section 7.3 Federated Authentication, the reserved and private spec claim types for JWT were added for clarity.
  - In section 7.5 JSON Web Token (JWT) for REST-based services, the example of the payload of the JWT token was was changed to remove *urn:oid:* from the OrgId. While the previous syntax was not incorrect, it is also not necessary and could cause confusion.

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V2.2 – Published December 16, 2014

- CC49, Document Query Metadata
    - Added new section: 10.4.3.2 Document Query Metadata.
    - Reorganize text in section 10 so that all of 10.5 Error Responses follows 10.4.3.2.

V2.1 – Published November 20, 2014

- CC51, Add REST-based Document Query and Retrieve
    - In section 2.2.2 Cross-Community Access (XCA), added support of REST-based document query and retrieve, revised diagram, and added a reference to Appendix G.
    - In section 7.4 SAML in SOAP-based Transactions, added support for Holder-of-Key.
    - Added section 8.4.1 Links.
    - Added section 8.4.2 Link Object.
    - In section 8.6.9 Visit, revised array type to links.
    - Added section 8.6.10 DocumentReference.
    - Added section 8.7.8 Document Query and Retrieve.
    - Added section 8.7.8.1 Find Documents.
    - Added section 8.7.8.2 Retrieve Document.
    - In section 10.4.1 XDS Affinity Domain Option, clarified requirements for support of On-Demand documents.
    - Added section 10.4.2 On-Demand Document Support.
    - Added Appendix G, REST-based Document Query and Retrieve.

V2.0 – Published October 21, 2014

- Removed "Pilot" from file name
- Changed version number to signify major change of moving to CSA.
- Accepted all Bundle #1 changes.
- CC52, Response Code for NetworkLinks for Patient not linked to Person
    - Added Sample Response: Patient not linked to Person to section 8.7.7.1.
- CC33, CommonWell policy regarding Stable & On-Demand Documents
    - Revised section 2.2.2
- CC36, Add MSH 5&6 Validation on PIX service
    - Added message constraints for MSH-5 & MSH-6 to section 9.2.
- CC50, Policy for API Backwards compatibilities
    - Added API versioning
- CC46, Patient Merge support
    - Added Patient Merge via REST

V1.17 – Published June 4, 2014

- Replaced icon with logo and adjusted spacing on cover page.
- CC38, Security Rules for Tokens
    - Modified security rules for tokens

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V1.16 – Published February 21, 2014

- Final approved version (legal, marketing, board, STIG)

V1.15 – Published January 28, 2014

- CC2, Demographic Fields for Patient Search
    - Resolved which demographics are required for local patient search.
- CC3, Local Patient Link from Person
    - Added a link relation to the Person resource for acquiring the PatientLink component related to that Person.
- CC7, Update PatientLink to Support LOLA1
    - Updated PatientLink component of the Person resource to provide presumptive matches (LOLA1).
- Accepted all changes in the document that had been tracked previously as we finalize for HIMSS.

V1.14 – Published October 24, 2013

- Added Appendix E, Upload of Historical Patient Identity Data.
- Updated person resource to allow for lookup of local patients and updated a workflow diagram (section B.4) in Appendix B, Person Enrollment Workflow Scenarios.

V1.13 – Published October 2, 2013

- CC9, Add Appendix describing Patient Identity Historic upload
    - Added Appendix E, Upload of Historical Patient Identity Data.
- CC3, Local Patient Link from Person
    - Updated person resource to allow for lookup of local patients and updated a workflow diagram (section B.4) in Appendix B, Person Enrollment Workflow Scenarios.

V1.12 – Published August 27, 2013

- Updated to add Person search based on strong identifier and Enrollment workflow appendix.

V1.11 – Published August 12, 2013

- Updated REST APIs to remove asynchronous processing transactions.
- Revised Patient search and added link relations to find Persons related to Patient.

V1.10 – Published July 15, 2013

- Added enroll property to Person resource and supporting operation to unenroll person.
- Added error codes to PIX v2 section.

V1.9 – Published July 12, 2013

- Revised to account for Person enrollment change to remove constraint on strong ID.
- Renamed RemoteLink resource to NetworkLink to clarify intent.

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- Provided additional content (text and sequence diagrams) for REST-based protocol operations.

V1.8 – Published July 11, 2013

- No detailed information available.

V1.7 – Published July 1, 2013

- Standardized version number between Use Case Spec and Services Spec.

V1.6 – Published June 30, 2013

- Added overview of document sharing and patient identity management.
- For REST API, removed profile link relation, JSON object wrapping, and relocated personSearch URI to root (no longer associated with Person resource).

V1.5 – Published June 28, 2013

- No detailed information available.

V1.4 – Published June 16, 2013

- Updated Document Query & Retrieval and supplemented REST API reference with detail on link relations.

V1.3 – Published June 14, 2013

- Update to include PIX Query and additional detail on CHA Broker.
- Removed REST resource definitions that will not be implemented for pilot release.

V1.2 – Published May 24, 2013

- No detailed information available.

V1.1 – Published May 24, 2013

- No detailed information available.

V1.0 – Published May 21, 2013

- Initial version published to this site.

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Abstract

This document describes a set of functional and administrative web services supporting a vendor-neutral system for locating and retrieving relevant clinical data for persons across heterogeneous settings of care.

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1 Introduction

The CommonWell Health Alliance Specification (hereinafter the "Specification" or "specification") is comprised of Services (Part 1 of 2) and Use Cases (Part 2 of 2), collectively the "specification", and defines the approved specifications and detailed technical and interoperability requirements for a compliant implementation of the services offered by the Alliance, that may be consumed by healthcare information system providers for the purpose of exchanging healthcare information over the internet.

1.1 Intended Audience

The audience for this specification consists of those responsible for designing and building software systems that will use the CommonWell services. This specification provides a detailed description of the services and how they should be used.

2 Architecture

The services described in this specification establish a common infrastructure to enable health document sharing. The architecture is based on centralized Patient discovery and matching adjudication services. CommonWell also provides document query and retrieval services that incorporate a brokered service acting against a federated network of document registries and repositories.

CommonWell will support a prior version of an API for **at least one year** from the date on which the next major version goes into general release.

2.1 Design Goals and Assumptions

The CommonWell services have the following primary design goals and assumptions:

- Leverage existing standards.
- Provide a centralized service for Patient discovery and record location.
- Provide a brokered service for document query and retrieval.
- Utilize a federated security model for authentication and authorization.
- Audit transactions occurring within the CommonWell service boundary.

The CommonWell services will NOT provide the following:

- Will NOT provide centralized document registry or repository services.
- Will NOT provide a centralized ATNA auditing service; systems leveraging the CommonWell services (hereafter referred to as *Edge Systems*) are responsible for auditing events within their respective application domains.

2.2 Integrating the Health Enterprise (IHE) Profiles

The CommonWell services defined in this specification support IHE Integration Profiles as described in the following sections.

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2.2.1 Patient Identifier Cross-Referencing (PIX)

The Patient Identifier Cross-Referencing (PIX) (http://wiki.ihe.net/index.php?title=Patient_Identifier_Cross-Referencing) integration profile supports the cross-referencing of Patient Identifiers from multiple Patient Identifier Domains by:

- Transmitting Patient Identity information from an identity source to a Patient Identifier Cross-reference Manager.
- Providing the ability to access the list(s) of cross-referenced Patient Identifiers via a query/ response transaction.

The CommonWell service represents an implementation of this profile by establishing a centralized Patient Identifier Cross-reference Manager. An Edge System acts as Patient Identity Source in the context of this profile by providing a Patient Identity Feed to the CommonWell Patient Identifier Cross-reference Manager.

See Section 8.7.7.1 for Implementation details for the CommonWell Patient Identifier Cross Referencing interfaces.

See Appendix F for PIX performance targets agreed upon by the CommonWell Health Alliance.

2.2.2 Cross-Community Access (XCA)

The Cross-Community Access (XCA) integration profile supports the means to query and retrieve patient-relevant medical data held by other communities. A *community* is defined as a coupling of facilities/enterprises that have agreed to work together using a common set of policies for the purpose of sharing health information.

CommonWell represents an XCA community insofar as registered organizations have agreed to share health information. The CommonWell Health Alliance Broker (CHA Broker) service, described in section 10, provides a brokered service for **FindDocuments Registry Stored Query/Cross Gateway Query** and **Retrieve Document Set/Cross Gateway Retrieve** transactions as defined in IHE ITI-18, ITI-38, ITI-39 and ITI-43. The CHA Broker will support receiving both XDS.b (ITI-18 and ITI-43) and XCA (ITI-38 and ITI-39) forms of these transactions as specified in the IHE specifications. All communication from the CHA Broker to member responding gateways will be through the XCA query and retrieve transactions. CommonWell also supports REST-based document query and retrieve based on HL7 FHIR resources and their related transactions.

CommonWell member organizations that want to respond to document query & retrieval requests MUST register their respective XCA/FHIR Responding Gateway services. In addition to supporting the required query and retrieve XCA transactions (ITI-38 and ITI-39) or FHIR transactions (DocumentReference and Binary), the member responding gateway may also support one or both of two IHE options: On-Demand Documents and Persistence of Retrieved Documents. As a Document Consumer, Edge Systems MUST include the On-Demand Document option as specified in the IHE ITI On-Demand Documents Supplement; this option is necessary in order to ensure complete retrieval of all patient documentation.

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Currently, CommonWell supports the following versions of the IHE specifications for each of these transactions and options:

- XCA specifications:
  - Transaction overview: Integration Profiles, publication date 10/25/2013, Version 10.1 (http://www.ihe.net/uploadedFiles/Documents/ITI/IHE_ITI_TF_Vol1.pdf)
  - ITI-18 specification: Transactions Part A, publication date 9/27/2013, Version 10.0 (http://www.ihe.net/uploadedFiles/Documents/ITI/IHE_ITI_TF_Vol2a.pdf)
  - ITI-38, ITI-39 and ITI-43 specifications: Transactions Part B, publication date 9/27/2013, Version 10 (http://www.ihe.net/uploadedFiles/Documents/ITI/IHE_ITI_TF_Vol2b.pdf)
- FHIR specifications:
  - DSTU2
    - Argonaut Data Query Implementation Guide
    - Resource DocumentReference v1.0.2
    - Binary: Resource Binary v1.0.2
  - STU3
    - US Core DocumentReference Profile
    - Document Reference: Resource DocumentReference v3.0.1
    - Binary : Resource Binary v3.0.1
- On-Demand Documents option: On-Demand Documents, publication date 10/25/2013, Version 1.3 (http://www.ihe.net/uploadedFiles/Documents/ITI/IHE_ITI_Suppl_On_Demand_Documents.pdf)
- Persistence of Retrieved Documents:
  - Transaction overview: Integration Profiles, publication date 10/25/2013, Version 10.1 (http://www.ihe.net/uploadedFiles/Documents/ITI/IHE_ITI_TF_Vol1.pdf)
  - XDS-SD specification: Cross-Transaction Specifications and Content Specifications, publication date 9/27/2013, Version 10.0 (http://www.ihe.net/uploadedFiles/Documents/ITI/IHE_ITI_TF_Vol3.pdf)

CommonWell also has agreements on the set of coding systems and values to be used for document metadata. Additional information on approved metadata can be found in Appendix E of this document.

See Appendix F for CHA Broker and member responding gateway performance targets agreed upon by the CommonWell Health Alliance and current service timeouts.

See Appendix G for details on REST-based document query and retrieve operations and mappings to the IHE XDS profile.

2.2.3 Cross-Enterprise User Assertion (XUA)

The Cross-Enterprise User Assertion Profile (XUA) provides a means to communicate identity information about an authenticated principal (user, application, system) in transactions that cross enterprise boundaries.

The transactions between Edge Systems and CommonWell will use an authorization framework based on Identity Federation standards. These standards support user directories distributed among the various Edge Systems.

As part of the CommonWell-brokered document query and retrieval workflow detailed in this specification, Edge Systems will generate the SAML 2.0 Token and include this token in the SOAP header of the SOAP-based messages exchanged as specified in the Cross-Community Access (XCA) integration profile.

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2.2.4 Cross-Community Access for Imaging (XCA-I)

The Cross-Community Access for Imaging (XCA-I) integration profile builds on XCA and supports the means to retrieve DICOM imaging held by other communities.

The CommonWell Health Alliance Broker (CHA Broker) service, provides a brokered service for **Retrieve Imaging Document Set/Cross Gateway Retrieve Imaging Document Set** transactions as defined in IHE RAD-69 and RAD-75. The CHA Broker will support receiving both XDS-I.b (RAD-69) and XCA-I (RAD-75) forms of these transactions as specified in the IHE specifications. All communication from the CHA Broker to member responding imaging gateways will be through the XCA-I retrieve transaction.

Image Exchange uses the transactions described in section 2.2.2 to query and retrieve Image Manifests as defined in XDS-I. The Image Manifest is a DICOM Key Object Selection file, which provides the unique identifiers (SOP Instance UIDs) and retrieval information for a set of images (or other DICOM instances). Once the Image Manifest has been retrieved, an Edge System can use the contained information to retrieve specific images.

CommonWell member organizations that want to respond to Image Exchange retrieval requests MUST register their respective XCA-I Responding Imaging Gateway services.

CommonWell member organizations that want to support Image Exchange by making Image Manifests available in document query & retrieval requests should ensure that the images and image retrieve locations referenced in the Image Manifests are CommonWell –accessible (either through the community's own Responding Imaging Gateway, or another community's Responding Imaging Gateway).

Currently, CommonWell supports the following versions of the IHE specifications for each of these transactions and options:

- XDS-I specifications:
  - Profile overview: Integration Profiles, publication date 7/29/2016, Version 15.0 (https://www.ihe.net/uploadedFiles/Documents/Radiology/IHE_RAD_TF_Vol1.pdf)
  - RAD-68, RAD-69 specifications: Transactions (continued), publication date 7/29/2016, Version 15.0 (https://www.ihe.net/uploadedFiles/Documents/Radiology/IHE_RAD_TF_Vol3.pdf)
- XCA-I specifications:
  - Profile overview: Integration Profiles, publication date 7/29/2016, Version 15.0 (https://www.ihe.net/uploadedFiles/Documents/Radiology/IHE_RAD_TF_Vol1.pdf)
  - RAD-75 specification: Transactions (continued), publication date 7/29/2016, Version 15.0 (https://www.ihe.net/uploadedFiles/Documents/Radiology/IHE_RAD_TF_Vol3.pdf)

See Appendix F for CHA Broker and member responding imaging gateway performance targets agreed upon by the CommonWell Health Alliance and current service timeouts.

2.3 CommonWell REST-based Services

In addition to the IHE-defined SOAP transactions described above, CommonWell also provides REST services which support workflows facilitating patient management, Patient Record matching, Person Enrollment and Patient discovery. These workflows are enhanced and supported by verification policies and the use of verifiable "strong identifiers" like driver's licenses and state-issued identification cards.

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2.3.1 Resource Definitions

Following the REST architectural style, the application protocol operations defined in Section 8.6.10 of this specification are executed by manipulating the underlying resource representations. Link relations included in the resource representations provide the mechanism for clients to transition the state of a resource in an application workflow.

2.3.2 Fast Healthcare Interoperability Resources (FHIR)

Fast Healthcare Interoperability Resources (FHIR) defines a set of resources for use in exchanging information about the healthcare process. In accordance with the FHIR license, this specification represents a derivative specification and a REST-based implementation and extension of particular FHIR resource definitions.

FHIR resource definitions are still in draft status. However, FHIR is sponsored by HL7 and is derived from both the collective experience of the HL7 membership and wide community feedback from the development and application of a spectrum of healthcare interoperability solutions.

The front end REST based Services are coded to the v0.08 HL7 FHIR specification.

2.3.3 Link Relations

To support the hypermedia constraint, link relations associated with resource representations will use the format defined in the Hypertext Application Language (HAL) media type. HAL provides a set of conventions for expressing hyperlinks to related resources, and thus avoids the necessity to create a custom media type for the resources defined in this specification.

2.3.4 Resource Format

The supported format for resource representations is JavaScript Object Notation (JSON).

2.3.5 Performance

CommonWell Health Alliance agreed upon performance targets for the REST services are outlined in Appendix F.

3 Conventions used in this document

The keywords "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC-2119 [RFC2119] (http://www.ietf.org/rfc/rfc2119.txt).

In this document, these words will appear with that interpretation only when in ALL CAPS. Lower case uses of these words are not to be interpreted as carrying RFC-2119 significance.

4 Glossary of Terms

This section defines commonly used terms.

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Object Identifier (OID)
An OID is a standard identification mechanism for naming any type of object, concept or "thing" with a globally unambiguous, persistent name.

Organization
A healthcare system that interacts with the CommonWell services as a provider of Patient Identity information and as a consumer of the CommonWell Patient discovery and record location services. This term is used interchangeably with *Community.*

- An Organization's Edge System acts as a source of Patient Record data to CommonWell.
- An Organization's Responding Gateway maintains publicly available service endpoint(s) for query and retrieval of clinical data related to Patients maintained by the Organization.
- An Organization may represent a single health care facility or a Health Information Exchange (HIE) entity.

Edge System
An Edge System is any healthcare information system that is capable of interacting with the CommonWell services. This includes systems that will submit Patient Identity data, can query for Patient Record locations and associated visits, and will perform document query and retrieval.

Visit
A Visit represents an encounter between an individual and a participating Organization for the purpose of providing patient service(s) or assessing the health status of a patient.

Local Patient Record
In the context of interactions between an Edge System and CommonWell, this describes a Patient Record that exists in the local Edge System. This may or may not include encounter information that may be used to assist in match adjudication.

Remote Patient Record
In the context of interactions between a *local* Edge System and CommonWell, this describes a Patient Record that exists in an Organization to which the Edge System does not belong.

CommonWell Patient Record
A record stored within CommonWell of Patient demographic, identity and visit information unique to the care setting(s) associated with an Organization.

CommonWell Patient Identifier
The CommonWell Patient Identifier is an object identifier (OID) that represents a unique and unambiguous name for a Patient Record.

The CommonWell Patient Identifier is created by the CommonWell system when processing a Patient Add operation in the course of a Patient Identity Feed transaction and is stored with a CommonWell Patient Record as its Identifier.

To obtain the CommonWell Patient Identifier associated with a Local Patient Record, an Edge System can query CommonWell using the PIX Query transaction or can query CommonWell directly using the REST-based resource representation for a Patient.

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This identifier is essential for certain key CommonWell workflows – for example, the CommonWell Patient Identifier MUST be used to refer to a Patient in requests for documents and document metadata as described in the Document Query and Retrieval workflow.

Person Enrollment

Person Enrollment is the workflow by which an individual may be registered in the CommonWell system. In order to enroll, an individual MUST provide key demographic information to the CommonWell system and MAY also provide valid authoritative identifiers. This is an active engagement of the individual authorizing the use of their demographic information in the CommonWell system for matching purposes.

CommonWell Person Record

The CommonWell Person Record is an individual known outside the context of an individual Organization. A Person Record contains general demographic information and may also include one or more validated authoritative identifiers (stored as hashed values). This record is created in the CommonWell system by the Person Enrollment workflow.

As a pre-condition for use of CommonWell record discovery and data location services, a Patient Record MUST be related to a Person Record.

CommonWell Person Identifier

This globally-unique identifier is created during an Enrollment activity and is associated with a CommonWell Person Record. An individual will be assigned, at most, one CommonWell Person Identifier. That is, an individual whose Visits and Patient Records have been back-loaded to CommonWell does not have an associated CommonWell Person Identifier or Person Record until that individual has been enrolled in CommonWell.

Patient Link

A Patient Link represents a relationship between a Person and a Patient Record. The existence of a Patient Link implies the acquisition of patient consent to establish the link. The level of confidence of this link is represented by its Level of Link Assurance (LOLA) value.

Network Link

A Network Link represents a transitive relationship between Patient Records which reference the same Person within CommonWell. The level of confidence of this link is represented by the Level of Link Assurance (LOLA) value.

Level of Link Assurance (LOLA)

LOLA refers to an integer value expressing CommonWell's level of confidence in a Network Link (the relationship between Patient Records across Organizational boundaries). These links will, in most cases, carry a LOLA level of 1, 2, or 3. A level 0 link is established only after a patient's explicit denial of the existence of a link between his or her Person and a given Patient entity.

> **Level 0**: Identifies a false-positive match between a Local Patient Record and a Remote Patient Record. This level is can only be established by user interaction, downgrading a higher LOLA (e.g., a registration clerk confirms with an individual that a presumptive LOLA 1 network link does NOT refer to the same person; the clerk then initiates a command message from the Edge System to CommonWell to demote the Level 1 network link between the two Patient Records). Once a Network Link is demoted to LOLA 0, the Remote Patient Record referenced by that link will no longer appear in the Local Patient Record's list of Network Links in any Edge System.

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Level 1: Established by CommonWell's probabilistic matching algorithm, this identifies a presumptive match between a Local Patient Record and a Remote Patient Record. Network Links with LOLA 1 cannot be used for document query and retrieval. Edge System users may either validate this as a match (promoting the network link to LOLA 2) or confirm this is a false positive (demoting the network link to LOLA 0).

Level 2: Identifies a network relationship between Patient Records that has been validated using demographic information. Validation MUST be confirmed by an authorized user of an Edge System (e.g., a registration clerk verifies with an individual that his or her street address in the Local Patient Record is the same as the one found in a Remote Patient Record; the clerk then initiates a command message from the Edge System to CommonWell to create the Level 2 link between the two Patient Records). This is a virtual transitive link established from one Patient entity to another through a shared Person.

A network link MUST be LOLA 2 or higher for document query and retrieval.

Level 3: Identifies a network relationship between Patient Records that has been validated using demographic information and an authoritative ID.

Level 4 (not yet implemented): Identifies a network relationship between Patient Records that has been validated using biometric data.

5 Patient Identity Management

The document sharing model used by CommonWell requires that Edge Systems acting as document consumers resolve Patient Identity prior to querying for documents. To facilitate Patient discovery and identity resolution, CommonWell provides a central service for Edge Systems to register Patient Identity and associated visit information to enable Patient discovery across the network of CommonWell Organizations.

5.1 Design Goals and Assumptions

The following are goals and assumptions for the CommonWell Patient Identity management service:

- CommonWell provides REST-based and PIX v2.x services for Patient Identity feed and query transaction processing.
- CommonWell will assign a globally unique Patient Identifier for each registered patient.
- CommonWell will not provide the CommonWell Identifier to a document registry.
- The Edge System acting as a Patient Identity Source is providing Patient Identity event notifications to both CommonWell PIX and the Edge System's document registry (which is known to CommonWell via the Edge System's Organization configuration).
- Edge Systems are NOT required to provide the CommonWell Identifier to a document registry.
- The process for communicating Patient Identity event notifications is outside the scope of this specification.
- The authoritative local Patient Identifier supplied by the Edge System to CommonWell MUST be the same as the one provided to the Edge System's document registry.
- In terms of the IHE specifications, CommonWell represents a Patient Identifier Cross-reference Domain.
- CommonWell will NOT provide PIX update notifications.
- CommonWell does NOT represent an XDS Affinity Domain.
- CommonWell does NOT replace an enterprise Master Patient Index (eMPI).

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The CommonWell Identifier is not an XDS Affinity Domain Patient ID (XAD-PID). An XAD-PID is a Patient Identifier assigning authority which provides a single unique identifier for each patient for which documents are registered in the document registry. CommonWell does not represent an XDS Affinity Domain to the extent it is not providing document registration services and is not constrained by the XAD-PID Change Management (XPID) profile. The local Patient Identifier supplied to CommonWell by an Edge System may, in fact, be an XAD-PID. It remains the responsibility of the Edge System to ensure that any changes to the authoritative identifier for a patient in its Organization is communicated to CommonWell and that it remain synchronized with the Edge System's associated document registry.

6 Document Sharing

The CommonWell Health Alliance Broker (CHA Broker) provides centralized discovery and retrieval services capable of brokering transactions among a federated system of document registries and repositories.

6.1 Design Goals and Assumptions

The following are the goals and assumptions for the CommonWell document query and retrieval services.

- Edge Systems, acting as document consumers, do not need to contact each community that may hold documents for a targeted patient.
- The CHA Broker WILL support the ITI-18, ITI-38, ITI-39 and ITI-43 transactions.
- The CHA Broker WILL support the RAD-69 and RAD-75 transactions.
- CommonWell Organizations MUST register their respective XCA/FHIR Responding Gateway services.
- CommonWell Organizations that support Image Exchange MUST register their respective XCA-I Responding Imaging Gateway services.
- CommonWell will NOT act as a document registry or repository.
- The CHA Broker will audit all transactions within the broker service itself ONLY.
- The CHA Broker will NOT act as an enterprise-wide audit repository.
- Edge Systems are responsible for auditing their own transactions.

7 API Security

7.1 Transport Security

All message exchanges between CommonWell and Edge Systems MUST be secured using TLS.

7.1.1 X.509 Certificates for Authentication and Signing

X.509 Certificates are used for authentication of all transactions described in this specification (including authenticating to the MLLP-based CommonWell Patient Identity Management service). In addition, SAML/JWT authorization tokens included in HTTP-based transactions should be signed using an X.509 Certificate.

Requests sent from an Edge System to CommonWell MUST use an X.509 Certificate maintained by the Edge System for authentication and for digitally signing the SAML/JWT authorization token included in the request. An Organization may use the same certificate for both authentication and signing or a different certificate for each.

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The Organization provides the associated public key(s) to CommonWell as part of the Organization registration process.

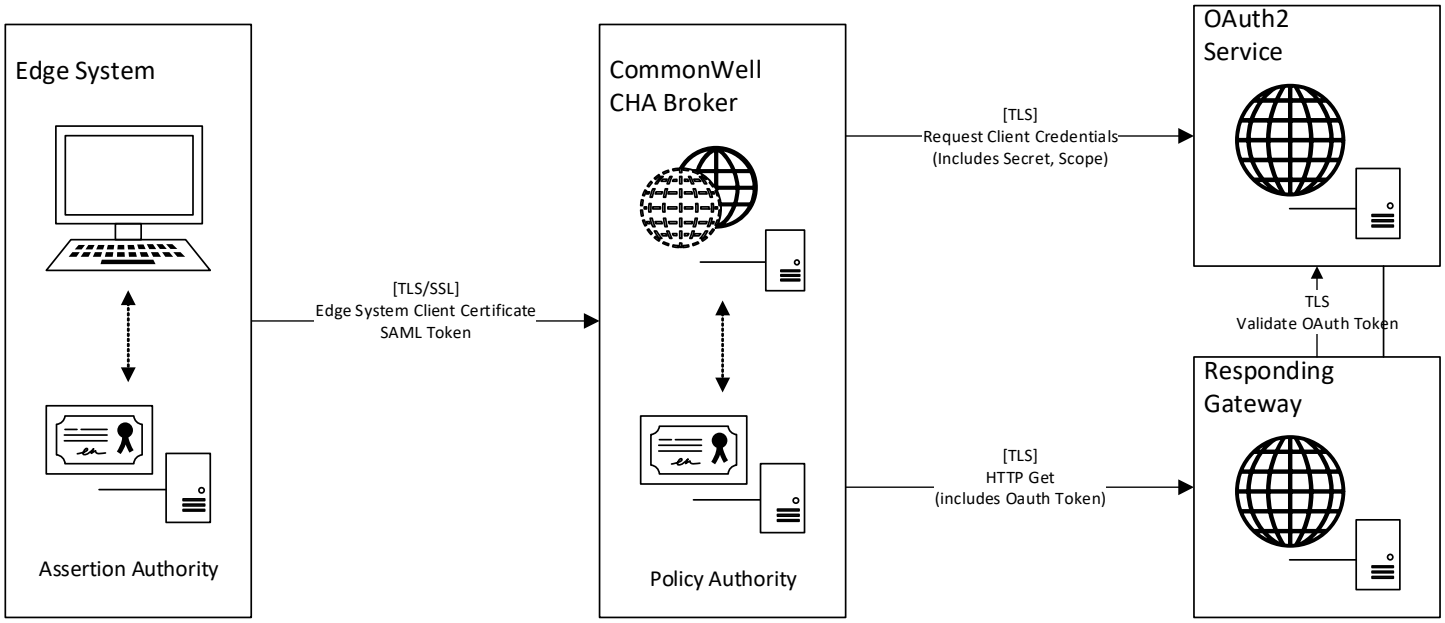
Requests sent from CommonWell to an Organization's XCA Responding Gateway (or Responding Imaging Gateway) will include an X.509 Certificate maintained by CommonWell for client authentication. CommonWell will also sign SAML tokens presented to an Organization's XCA Responding Gateway (or Responding Imaging Gateway) using the same X.509 Certificate. CommonWell will provide the public key of this certificate to an Organization as part of the registration process.

7.1.2 OAuth2 for Authentication and Authorization of FHIR requests to Responding Gateways

Requests sent from CommonWell to an Organization's FHIR Responding Gateway will first get a token from an Organization's OAuth2 authorization server according to the Client Credentials Grant flow. This token will be presented to the to the Organization's FHIR Responding Gateway.

The OAuth2 server will be provided and maintained by the Organization. CommonWell's Management Portal will be used to configure the location, secret, and scopes for this OAuth server.

Authentication and Authorization in a FHIR Transaction



7.2 Certificate Requirements

All Client~~/SSL~~ Certificates MUST meet or exceed the following criteria:

7.2.1 Key Sizes

- The CA shall utilize the SHA-256 algorithm for certificate signatures.
- All keys shall be at least 2048 bit (RSA).

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7.2.2 Certificate Authority

The organization's certificate MUST be issued by a mutually trusted, WebTrust-certified Certificate Authority.

7.3 Federated Authentication

This section defines the exchange of metadata used to characterize the initiator of a request to the CommonWell server.

As a pre-condition to initiating a request to the CommonWell server, an Edge System MUST determine if a local user is authorized to perform a given function using the CommonWell services. If the request is authorized, the initiating Edge System attaches the user-centric assertions to the request. CommonWell receives the request with the understanding that the Edge System has locally authorized the user to make the request. An Edge System SHOULD audit all local authentication requests in accordance with ATNA.

For SOAP-based requests, the Edge System must convey the locally-authenticated user attributes and authorizations using SAML 2.0 assertions. The Edge System MUST issue, at minimum, one new token for each user session.

For REST-based requests, the Edge System will use a JSON Web Token (JWT). The Edge System MUST issue, at minimum, one new token for each user session.

For both SAML assertions and JSON Web Tokens, the expiration timestamp must be specified and digitally signed to prevent manipulation. The expiration timestamp MUST be set to no greater than eight (8) hours after generation to prevent reuse of the token. In SAML, the Expires element exists in the Timestamp element of the security header. In JWT, the expiration time is specified in the exp claim.

The claims included in the SAML security tokens are listed below:

Name	Type	Description
Subject ID	string	The name of the user as required by HIPAA Privacy Disclosure Accounting.
Subject Organization	string	In plain text, the organization that the user belongs to as required by HIPAA Privacy Disclosure Accounting.
Subject Role	Code	The SNOMED CT value representing the role that the user is playing when making the request.
Purpose of Use	Code	The coded representation of the reason for the request.
Organization ID	string	A unique identifier for the organization that the user is representing in performing this transaction. The organization ID

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Name	Type	Description
		may be an Object Identifier (OID), or it may be a URL assigned to that organization.
National Provider Identifier	string	OPTIONAL: A National Provider Identifier (NPI) is a unique 10-digit identification number issued to healthcare providers in the United States by the Centers for Medicare and Medicaid Services (CMS).

The claims included in the JWT security tokens are listed below:

Name	Type	Description
“aud” (Audience)	string	The value for the audience claim must be *urn:commonwellalliance.org*.
“nbf” (Not Before)	integer	The ”nbf” (not before) claim identifies the time before which the JWT MUST NOT be accepted for processing. The processing of the “nbf” claim requires that the current date/time MUST be after or equal to the not-before date/time listed in the “nbf” claim. Its value MUST be a number containing an IntDate value.
“exp” (Expiration Time)	integer	The “exp” (expiration time) claim identifies the expiration time on or after which the JWT MUST NOT be accepted for processing. The processing of the “exp” claim requires that the current date/time MUST be before the expiration date/time listed in the “exp” claim. Its value MUST be a number containing an IntDate value (epoch datetime). The duration between the “exp” and the “nbf” claims cannot be more than eight (8) hours.
urn:oasis:names:tc:xspa:1.0:subject:organization-id	string	This is a private JWT claim to indicate the organization ID. The value in this claim is used to get the certificate in order to validate the signature on the token.
Facility ID	string	OPTIONAL: A unique identifier for the facility that the user is representing when performing the transaction. The facility wil be an Object Identifier (OID).

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Name	Type	Description
		NOTE: This should only be used for organizations that are utilizing the facility model for managing organization hierarchies. If the facility ID is provided in the claims for the request, validation of the facility will be done during authentication. If the facility is invalid or inactive, the request will be failed with a corresponding error message.
Facility Name	string	OPTIONAL: In plain text the name of the facility that the user is representing when performing the transaction. NOTE: This should be used for organizations that are utilizing the facility model for managing organizations.

7.4 SAML in SOAP-based Transactions

SOAP-based service security is based on the NHIN Authorization Framework 3.0 (https://www.healthit.gov/sites/default/files/nhin-authorization-framework-production-specification-v3.0-1.pdf) (with exceptions noted below). When making SOAP-based requests to CommonWell, an Edge System MUST include the locally-authenticated user attributes and authorization claims described above (7.3 Federated Authentication) in the SAML token's attribute statement.

When brokering SOAP-based requests to an Edge System's responding gateway (or responding imaging gateway), CommonWell will package the claims submitted by the originating Edge System in the SAML token used in the request from CommonWell to the responding gateway (or responding imaging gateway) identified by CommonWell as the destination for the brokered request. CommonWell will present a SAML token to the destination responding gateway using either a Bearer or Holder-of-Key subject confirmation; the subject confirmation method for the responding gateway is specified as part of the Organization registration process.

The implementation of the CommonWell SOAP-based services has additional constraints for use of SAML tokens:

- CommonWell currently supports the Bearer and Holder-of-Key subject confirmation methods for incoming SOAP requests.
- CommonWell DOES NOT support the Sender-Vouches subject confirmation method.
- For brokered requests sent from CommonWell to an Edge System responding gateway (or responding imaging gateway), the responding gateway (or responding imaging gateway) MUST accept either the Bearer or Holder-of-Key subject confirmation method.

The following is an example of the Bearer token.

```
<s:Envelope xmlns:a="http://www.w3.org/2005/08/addressing" xmlns:u="http://docs.oasis-
open.org/wss/2004/01/oasis-200401-wss-wssecurity-utility-1.0.xsd" xmlns:s="http://www.w3.org/2003/05/soap-
envelope">
  <s:Header>
```


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```
    <a:Action s:mustUnderstand="1">urn:ihe:iti:2007:RegistryStoredQuery</a:Action>
    <a:MessageID>urn:uuid:3965b675-51d9-40b8-aef6-8c400fdeeb6c</a:MessageID>
    <a:ReplyTo>
      <a:Address>http://www.w3.org/2005/08/addressing/anonymous</a:Address>
    </a:ReplyTo>
    <a:To s:mustUnderstand="1">https://integration.chabroker.api.commonwellalliance.org/StoredQuery.svc</a:To>
    <o:Security s:mustUnderstand="1" xmlns:o="http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-
wssecurity-secext-1.0.xsd">
      <u:Timestamp u:Id="_0">
        <u:Created>2016-08-24T15:28:20.266Z</u:Created>
        <u:Expires>2016-08-24T15:33:20.266Z</u:Expires>
      </u:Timestamp>
      <Assertion ID="_3f092082-0b05-44b6-9133-2cd08e5ce25b" IssueInstant="2016-08-24T15:28:20.250Z"
Version="2.0" xmlns="urn:oasis:names:tc:SAML:2.0:assertion">
        <Issuer>self</Issuer>
        <Signature xmlns="http://www.w3.org/2000/09/xmldsig#">
          <SignedInfo>
            <CanonicalizationMethod Algorithm="http://www.w3.org/2001/10/xml-exc-c14n#" />
            <SignatureMethod Algorithm="http://www.w3.org/2001/04/xmldsig-more#rsa-sha256" />
            <Reference URI="#_3f092082-0b05-44b6-9133-2cd08e5ce25b">
              <Transforms>
                <Transform Algorithm="http://www.w3.org/2000/09/xmldsig#enveloped-signature" />
                <Transform Algorithm="http://www.w3.org/2001/10/xml-exc-c14n#" />
              </Transforms>
              <DigestMethod Algorithm="http://www.w3.org/2001/04/xmlenc#sha256" />
              <DigestValue>enC6a/JhXXMHHIEFKI+gBuPehTWMuWDf0oHanVvJUiU=</DigestValue>
            </Reference>
          </SignedInfo>

<SignatureValue>Dj6Y3ti8+OJf7moYeF4xvjdTqyFsNQgu6ARSUJraNwvJrJp4iJZsXLX95cK8KNVifNxsw7JZqRh2X1Ert6...</Signature
Value>
          <KeyInfo>
            <X509Data>

<X509Certificate>MIIF5TCCBM2gAwIBAgIJAOhxCyOqljX9MA0GCSqGSIb3DQEBCwUAMIHGMQswCQYDVQQGEw...</X509Certificate>
            </X509Data>
          </KeyInfo>
        </Signature>
        <Subject>
          <SubjectConfirmation Method="urn:oasis:names:tc:SAML:2.0:cm:bearer" />
        </Subject>
        <Conditions NotBefore="2016-08-24T15:27:20.250Z" NotOnOrAfter="2016-08-24T16:58:20.250Z">
          <AudienceRestriction>
            <Audience>urn:commonwellalliance.org</Audience>
          </AudienceRestriction>
        </Conditions>
        <AttributeStatement>
          <Attribute Name="urn:oasis:names:tc:xacml:1.0:subject:subject-id">
            <AttributeValue>John Doe</AttributeValue>
          </Attribute>
          <Attribute Name="urn:oasis:names:tc:xpsa:1.0:subject:organization">
            <AttributeValue>Saint Andrews Medical Center</AttributeValue>
          </Attribute>
          <Attribute Name="urn:oasis:names:tc:xspa:1.0:subject:organization-id">
            <AttributeValue>2.16.840.1.113883.3.8.456.7897.1</AttributeValue>
          </Attribute>
          <Attribute Name="urn:oasis:names:tc:xacml:2.0:subject:role">
            <AttributeValue>
              <Role xsi:type="CE" code="CE" codeSystem="2.16.840.1.113883.6.96" codeSystemName="SNOMED_CT"
displayName="Pharmacist" xmlns="urn:hl7-org:v3" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" />
            </AttributeValue>
          </Attribute>
          <Attribute Name="urn:oasis:names:tc:xspa:1.0:subject:purposeofuse">
            <AttributeValue>
              <PurposeOfUse xsi:type="CE" code="TREATMENT" codeSystem="2.16.840.1.113883.3.18.7.1"
codeSystemName="nhin-purpose" displayName="Treatment" xmlns="urn:hl7-org:v3"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" />
```


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```
            </AttributeValue>
          </Attribute>
        </AttributeStatement>
      </Assertion>
    </o:Security>
  </s:Header>
  <s:Body xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:xsd="http://www.w3.org/2001/XMLSchema">
    <AdhocQueryRequest xmlns="urn:oasis:names:tc:ebxml-regrep:xsd:query:3.0">
      <ResponseOption returnType="LeafClass" returnComposedObjects="true" />
      <AdhocQuery id="urn:uuid:14d4debf-8f97-4251-9a74-a90016b0af0d" xmlns="urn:oasis:names:tc:ebxml-
regrep:xsd:rim:3.0">
        <Slot name="$XDSDocumentEntryPatientId">
          <ValueList>
            <Value>7819798^^^URN:OID:2.16.840.1.113883.3.8.456.7897.1</Value>
          </ValueList>
        </Slot>
        <Slot name="$XDSDocumentEntryStatus">
          <ValueList>
            <Value>('urn:oasis:names:tc:ebxml-regrep:StatusType:Approved')</Value>
          </ValueList>
        </Slot>
        <Slot name="$XDSDocumentEntryType">
          <ValueList>
            <Value>('urn:uuid:7edca82f-054d-47f2-a032-9b2a5b5186c1','urn:uuid:34268e47-fdf5-41a6-ba33-
82133c465248')</Value>
          </ValueList>
        </Slot>
      </AdhocQuery>
    </AdhocQueryRequest>
  </s:Body>
</s:Envelope>
```


The following is an example of the Holder of Key token.


```
<?xml version='1.0' encoding='UTF-8'?>
<soapenv:Envelope xmlns:soapenv="http://www.w3.org/2003/05/soap-envelope">
   <soapenv:Header xmlns:wsa="http://www.w3.org/2005/08/addressing">
      <wsse:Security xmlns:wsse="http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-wssecurity-secext-
1.0.xsd">
         <saml2:Assertion xmlns:saml2="urn:oasis:names:tc:SAML:2.0:assertion"
xmlns:xs="http://www.w3.org/2001/XMLSchema" xmlns:xenc="http://www.w3.org/2001/04/xmlenc#"
xmlns:exc14n="http://www.w3.org/2001/10/xml-exc-c14n#" xmlns:ds="http://www.w3.org/2000/09/xmldsig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" ID="a4f3464a-7dd4-41f7-907b-b0cb5dbb3fb7"
IssueInstant="2016-07-19T13:22:34Z" Version="2.0">
            <saml2:Issuer Format="urn:oasis:names:tc:SAML:2.0:nameid-format:X509SubjectName">CN = GeoTrust DV SSL
CA - G3, OU = Domain Validated SSL, O = GeoTrust Inc., C = US</saml2:Issuer>
            <Signature xmlns="http://www.w3.org/2000/09/xmldsig#">
               <SignedInfo>
                  <CanonicalizationMethod Algorithm="http://www.w3.org/2001/10/xml-exc-c14n#" />
                  <SignatureMethod Algorithm="http://www.w3.org/2001/04/xmldsig-more#rsa-sha256" />
                  <Reference URI="#a4f3464a-7dd4-41f7-907b-b0cb5dbb3fb7">
                     <Transforms>
                        <Transform Algorithm="http://www.w3.org/2000/09/xmldsig#enveloped-signature" />
                        <Transform Algorithm="http://www.w3.org/2001/10/xml-exc-c14n#" />
                     </Transforms>
                     <DigestMethod Algorithm="http://www.w3.org/2001/04/xmlenc#sha256" />
                     <DigestValue>/F4X2QjBNlZ93sIbQtWMyMvt0r4=</DigestValue>
                  </Reference>
               </SignedInfo>
               <SignatureValue>auoc4jmzjMHqTGD8/8MwMvpus3ssYF7HgtFOGVQAXCaINQ/hwxZhdaNUcApjqvWSj7FU2Reim5Wy
SP05hXiXDKd8brAm/lUCAgOG9ygFfff2Ed4cbBQOJESXmoYi6afau0YMCIKlC21ebCaZBwYImRY9
jggd/W74PsfDMKdgiMQraHwo8WxuvF5z1...</SignatureValue>
               <KeyInfo>
                  <X509Data>
```


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```
   <X509Certificate>MIIF6DCCBNCgAwIBAgIQGwE2jlspNVoOpo7hwdAIozANBgkqhkiG9w0BAQsFADBmMQswCQYDVQQG
EwJVUzEWMBQGA1UEChMNR2VvVHJ1c3QgSW5jLjEdMBsGA1UECxMURG9tYWluIFZhbGlkYXRlZCBT
U0wxIDAeBgNVBAMTF0dlb1RydXN0IERWIFNTTCBDQSAtIEczMB4XDTE2MDYwODAwMDAwMFoXDTE3
MDYwODIzNTk1OVowNDEyMDAGA1UEAwwpaGl...</X509Certificate>
                  </X509Data>
               </KeyInfo>
            </Signature>
            <saml2:Subject>
               <saml2:SubjectConfirmation Method="urn:oasis:names:tc:SAML:2.0:cm:bearer" />
            </saml2:Subject>
            <saml2:Conditions NotBefore="2016-07-19T12:22:34Z" NotOnOrAfter="2016-07-19T14:22:34Z">
               <saml2:AudienceRestriction>
                  <saml2:Audience>urn:commonwellalliance.org</saml2:Audience>
               </saml2:AudienceRestriction>
            </saml2:Conditions>
            <saml2:AuthnStatement AuthnInstant="2016-07-19T13:22:34Z">
               <saml2:SubjectLocality Address="localhost" DNSName="ShinnyClient" />
               <saml2:AuthnContext>

   <saml2:AuthnContextClassRef>urn:oasis:names:tc:SAML:2.0:ac:classes:X509</saml2:AuthnContextClassRef>
               </saml2:AuthnContext>
            </saml2:AuthnStatement>
            <saml2:AttributeStatement>
               <saml2:Attribute Name="urn:oasis:names:tc:xspa:1.0:subject:subject-id">
                  <saml2:AttributeValue>John Doe</saml2:AttributeValue>
               </saml2:Attribute>
               <saml2:Attribute Name="urn:oasis:names:tc:xpsa:1.0:subject:organization">
                  <saml2:AttributeValue>Saint Andrews Medical Center</saml2:AttributeValue>
               </saml2:Attribute>
               <saml2:Attribute Name="urn:oasis:names:tc:xspa:1.0:subject:organization-id">
                  <saml2:AttributeValue>2.16.840.1.113883.3.8.456.7897.1</saml2:AttributeValue>
               </saml2:Attribute>
               <saml2:Attribute Name="urn:nhin:names:saml:homeCommunityId">
                  <saml2:AttributeValue>urn:oid:2.16.840.1.113883.3.8.456.7897.1</saml2:AttributeValue>
               </saml2:Attribute>
               <saml2:Attribute Name="urn:oasis:names:tc:xacml:2.0:subject:role">
                  <saml2:AttributeValue>
                     <Role xmlns="urn:hl7-org:v3" code="112247003" codeSystem="2.16.840.1.113883.6.96"
codeSystemName="SNOMED_CT" displayName="Medical doctor" xsi:type="CE" />
                  </saml2:AttributeValue>
               </saml2:Attribute>
               <saml2:Attribute Name="urn:oasis:names:tc:xspa:1.0:subject:purposeofuse">
                  <saml2:AttributeValue>
                     <PurposeOfUse xmlns="urn:hl7-org:v3" code="TREATMENT" codeSystem="2.16.840.1.113883.18.7.1"
codeSystemName="nhin-purpose" displayName="Treatment" type="CE" />
                  </saml2:AttributeValue>
               </saml2:Attribute>
            </saml2:AttributeStatement>
         </saml2:Assertion>
      </wsse:Security>
      <wsa:To
soapenv:mustUnderstand="true">https://integration.chabroker.api.commonwellalliance.org/StoredQuery.svc</wsa:To>
      <wsa:ReplyTo soapenv:mustUnderstand="true">
         <wsa:Address>http://www.w3.org/2005/08/addressing/anonymous</wsa:Address>
      </wsa:ReplyTo>
      <wsa:MessageID soapenv:mustUnderstand="true">urn:uuid:2139562c-2134-3c1e-cf6c-00155d004f8f</wsa:MessageID>
      <wsa:Action soapenv:mustUnderstand="true">urn:ihe:iti:2007:RegistryStoredQuery</wsa:Action>
   </soapenv:Header>
   <soapenv:Body>
      <query:AdhocQueryRequest xmlns:query="urn:oasis:names:tc:ebxml-regrep:xsd:query:3.0"
xmlns:rim="urn:oasis:names:tc:ebxml-regrep:xsd:rim:3.0">
         <query:ResponseOption returnComposedObjects="true" returnType="LeafClass" />
         <rim:AdhocQuery id="urn:uuid:14d4debf-8f97-4251-9a74-a90016b0af0d">
            <rim:Slot name="$XDSDocumentEntryPatientId">
               <rim:ValueList>
                  <rim:Value>'7819798^^^&amp;2.16.840.1.113883.3.8.456.7897.1&amp;ISO'</rim:Value>
```


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```
            </rim:ValueList>
         </rim:Slot>
         <rim:Slot name="$XDSDocumentEntryStatus">
            <rim:ValueList>
               <rim:Value>('urn:oasis:names:tc:ebxml-regrep:StatusType:Approved')</rim:Value>
            </rim:ValueList>
         </rim:Slot>
         <rim:Slot name="$XDSDocumentEntryCreationTimeFrom">
            <rim:ValueList>
               <rim:Value>20110721</rim:Value>
            </rim:ValueList>
         </rim:Slot>
         <rim:Slot name="$XDSDocumentEntryCreationTimeTo">
            <rim:ValueList>
               <rim:Value>20160720</rim:Value>
            </rim:ValueList>
         </rim:Slot>
         <rim:Slot name="$XDSDocumentEntryType">
            <rim:ValueList>
               <rim:Value>('urn:uuid:7edca82f-054d-47f2-a032-9b2a5b5186c1','urn:uuid:34268e47-fdf5-41a6-ba33-
82133c465248')</rim:Value>
            </rim:ValueList>
         </rim:Slot>
      </rim:AdhocQuery>
   </query:AdhocQueryRequest>
 </soapenv:Body>
</soapenv:Envelope>
```

7.5 JSON Web Token (JWT) for REST-based services

When making REST-based requests to the CommonWell server, an Edge System MUST include authorization claims in the form of a JWT bearer token in the *Authorization* HTTP Header of the request.

JSON Web Token (http://tools.ietf.org/html/draft-ietf-oauth-json-web-token-08) (JWT) is a compact URL-safe means of representing and transferring claims from an Edge System to the CommonWell server. The claims in a JWT are encoded as a JavaScript Object Notation (JSON) object and added to the payload of a JSON Web Signature (JWS) structure. The JWT is digitally signed and encrypted. Below is an example of a request with a message authentication code (MAC) encrypted, base64url encoded JWT token in the HTTP *Authorization* header.

The following is an example of the payload of the JWT token. Note that the names of the claims observe the same convention described in the NHIN authorization framework.

```
{
  "iss": "self",
  "aud": "urn:commonwellalliance.org",
  "nbf": 1380560162,
  "exp": 1380560455,
  "urn:oasis:names:tc:xacml:2.0:subject:role": "112247003",
  "urn:oasis:names:tc:xspa:1.0:subject:subject-id": "Geoffrey Geiger",
  "urn:oasis:names:tc:xspa:1.0:subject:organization": "St. Barnabas Hospital",
  "urn:oasis:names:tc:xspa:1.0:subject:organization-id": "2.16.840.1.113883.4",
  "urn:oasis:names:tc:xspa:1.0:subject:purposeofuse": "TREATMENT",
  "urn:oasis:names:tc:xspa:2.0:subject:npi": "1770589525"
}
```

Sample Request

The following example shows the encoded JWT inserted as a bearer token in the HTTP Authorization header.

```
GET https://rest.api.commonwellalliance.org/v1/person/c21cc31d-6c57-442b-8e76-5de498903334 HTTP/1.1
```


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```
Host: rest.api.commonwellalliance.org
Authorization: Bearer eyJhbGciOiJSU0.WnDYvpIAeZ72deHxz3roJDXQyhxx0wKaM.fiK51VwhsxJ-siBMR-YFiA
```

8 REST API Reference

8.1 Service Root URL

The Service Root URL is the address where all of the resources defined by this interface are found.

https://rest.api.commonwellalliance.org/

Each resource type defined in this specification has a manager (or "entity set") that lives at the address "/[name]" where the name is the name of the resource type in lowercase. For instance, the resource manager for the type "Person" will live at:

https://rest.api.commonwellalliance.org/v1/person

All logical operations are defined relative to this service root URL. Note, this means that, given the address of any one resource, the correct address for all the other resources may be determined.

All URLs (and ids that form part of the URL) defined by this specification are case sensitive.

8.2 Versioning

The version of this specification and the resources associated with the CommonWell services is indicated by a subdomain name of the Service Root URL. As shown in Section 8.1, version 1 of the CommonWell services is indicated by the subdomain “v1.” Subsequent versions of these services, if and when they are released, will be identified by updating the subdomain accordingly (e.g., “v2”, “v3”, and so on).

8.3 Data Types

This specification defines a set of types that are used as resource values. There are two categories of data type: primitive types, represented in JavaScript Object Notation (JSON) [RFC4627], and complex types, which are re-usable combinations of data elements. This section defines how data-types are represented and handled as JSON representations.

8.3.1 Primitive Types

The following table summarizes the primitive types used in this specification. These types are defined as JSON representations with additional constraints marked in bold. JSON is a text format for the serialization of structured data. It is derived from the object literals of JavaScript as defined in the ECMAScript Programming Language Standard, Third Edition [ECMA].

Name	JavaScript Data Type	Description
base64Binary	string	A string, base64 encoded (RFC 4648) (http://tools.ietf.org/html/rfc4648).

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Name	JavaScript Data Type	Description
boolean	boolean	Values can be either true or false (**0 and 1 are not valid values**).
integer	number	A signed 32-bit integer (for larger values, use decimal).
decimal	number	A rational number. Note: for implementations, do not use an IEEE type floating point type, instead use something that works like a true decimal, with inbuilt precision (e.g. Java BigDecimal).
string	string	A string is a sequence of zero or more Unicode characters, wrapped in double quotes, using backslash escapes. A character is represented as a single character string. **Note that strings SHALL not exceed 1MB in size.**
uri	string	A Uniform Resource Identifier Reference. It can be absolute or relative and may have an optional fragment identifier (RFC 3986) (http://tools.ietf.org/html/rfc3986).
date	string	A date expressed per ISO 8601 in the form "YYYY-MM-DD" where: *YYYY* indicates the year *MM* indicates the month *DD* indicates the day
dateTime	string	A UTC date and time expressed per ISO 8601 in the form "YYYY-MM-DDThh:mm:ssZ" where: *YYYY* indicates the year *MM* indicates the month *DD* indicates the day *T* indicates the start of the required time section *hh* indicates the hour *mm* indicates the minute *ss* indicates the second (**optional**) *Z* indicates a zero UTC offset

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8.3.2 Simple Restrictions

Name	Base Type	Description
oid	uri	An OID represented as a URI (RFC 3001) (http://www.ietf.org/rfc/rfc3001.txt): urn:oid:1.2.3.4.5
uuid	uri	A UUID, represented as a URI (RFC 4122) (http://www.ietf.org/rfc/rfc4122.txt): urn:uuid:a5afddf4-e880-459b-876e-e4591b0acc11
code	string	A string which has at least one character and no leading or trailing whitespace, and where there is no whitespace other than single spaces in the contents. regex: [^\s]+([\s]+[^\s]+)*
id	string	A whole number in the range 0 to 2^64-1 (optionally represented in hex), a uuid, an oid, or any other combination of lowercase letters, numerals, "-" and ".", with a length limit of 36 characters. regex: [a-z0-9\-\.]{1,36}

8.4 Complex Types

8.4.1 Links

An object whose property names are link relation types (as defined by RFC5988) and values are an array of Link Objects. The subject resource of these links is the Resource Object of which the containing "links" object is a property.

8.4.2 Link Object

A Link Object represents a hyperlink from the containing resource to a URI.

Name	Type	Control	Description
href	uri	1…1	Required. A URI (RFC3986) or a URI Template (RFC6570). If the value is a URI Template, the Link Object SHOULD have a "template" attribute whose value is true.
templated	boolean	0…1	Optional. This value SHOULD be true when the Link Object's *href* property is a URI Template. Default value is false.
type	string	0…1	Optional. The type of resource.

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8.4.3 Address

A postal address.

Name	Type	Control	Description
use	code	0…1	The use of this address. See Address Use Codes for allowed values.
line	string	0…*	The street address.
city	string	0…1	The city.
state	string	0…1	The state.
zip	string	1…1	The postal code.
country	string	0…1	The country.
period	Period	0…1	Time period when address was/is in use.

8.4.4 Attachment

Contains or references attachments which may contain additional data content defined in other formats. A common use of this is to include images or reports in some report format such as PDF. In this specification, it may also be used for an identifying photograph of a patient.

Name	Type	Control	Description
contentType	code	1…1	Mime type of the content with charset, etc.
data	base64Binary	0…1	The actual data of the attachment.
url	uri	0…1	An alternative location where the data can be accessed.
size	integer	0…1	The number of bytes of data that make up this attachment.
hash	base64Binary	0…1	The calculated hash of the data using SHA-256. Represented using base64.

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Name	Type	Control	Description
title	string	0…1	A label or set of text to display in place of the data.

8.4.5 Coding

A representation of a concept using a symbol from a defined "code system," which may be an enumeration, a list of codes, a full terminology, such as SNOMED-CT or LOINC, or a formal ontology.

Name	Type	Control	Description
system	uri	0…1	Identity of the terminology system.
code	code	0…1	Symbol in syntax defined by the system.
display	string	0…1	Representation defined by the system.

The system is a Uniform Resource Identifier (URI) that references the enumeration, terminology or ontology that defines the code. The URI may be an OID (urn:oid:) or a UUID (urn:uuid:), a specially-defined URI from the named systems list, a URL that references a definition of the system, or any other URI that uniquely identifies the definitions. OIDs and UUIDs may be registered in the HL7 OID registry and should be if the content is shared or exchanged across institutional boundaries.

If present, the code must be a syntactically correct symbol as defined by the system. In some code systems, such as SNOMED-CT, the code may be an expression composed of other codes. Note that codes are case sensitive unless specified otherwise by the code system. The display is a text representation of the code defined by the system and can be used to display the meaning of the code by an application that is not aware of the system.

A listing of the FHIR-based codes used in this specification is provided in the appendix titled Terminology Bindings.

8.4.6 CodeableConcept

A CodeableConcept represents a field that is usually defined by formal reference to one or more terminologies or ontologies but may also be defined by the provision of text. This is a common pattern in healthcare data.

Name	Type	Control	Description
coding	Coding	0…*	Code defined by a terminology system.
text	string	0…1	Plain text representation of the concept.
primary	idref	0…1	The code chosen directly by the user.

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Each "coding" is a representation of the concept using a symbol from a defined "code system," which may be an enumeration, a list of codes, a full terminology, such as SNOMED-CT or LOINC, or a formal ontology. The concept may be coded multiple times in different code systems (or even multiple times in the same code systems, where multiple forms are possible, such as with SNOMED-CT). The different codings may have slightly different granularity due to the differences in the definitions of the underlying codes. The ordering of codings within a CodeableConcept is undefined.

8.4.7 Contact

A variety of technology-mediated contact details for a person or organization, including telephone, email, etc.

Name	Type	Control	Description
use	Code	0…1	Identifies the context for the address. See Contact Use Codes for allowed values.
system	Code	0…1	What kind of contact this is -= what communications system is required to make use of the contact. See Contact System Codes for allowed values.
value	string	0…1	The actual contact details, in a form that is meaningful to the designated communication system (i.e., phone number or email address).
period	Period	0…1	Time period when the contact was/is in use.

8.4.8 Demographics

The demographic details for a Person.

Name	Type	Control	Description
identifier	Identifier	0…*	Identifier for a natural person. Used for identification of the person him/herself, such as driver’s license, national or social security numbers, etc.
name	HumanName	1…*	A name associated with the individual.
telecom	Contact	0…*	A contact detail for the individual.
gender	Coding	1…1	Gender for administrative purposes. The gender of a person used for administrative purposes. See Administrative Gender Codes.
birthDate	dateTime	1…1	The birth date for the individual.

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Name	Type	Control	Description
address	Address	1…*	One or more addresses for the individual.
photo	Picture	0…*	Image of the person.

8.4.9 EnrollmentSummary

A summary of a Person's enrollment status.

Name	Type	Control	Description
dateEnrolled	dateTime	1…1	The date a Person was enrolled.
enroller	string	1…1	The name of the Organization that enrolled the Person.
dateUnenrolled	dateTime	0…1	The date a Person was unenrolled.
unenroller	string	0…1	The name of the Organization that unenrolled the Person.

8.4.10 HumanName

A name of a Person with text, parts and usage information.

Names may be changed or repudiated. People may have different names in different contexts. Names may be divided into parts of different type that have variable significance depending on context, though the division into parts does not always matter. With personal names, the different parts may or may not be imbued with some implicit meaning; various cultures associate different importance with the name parts and the degree to which systems must care about name parts around the world varies widely.

Name	Type	Control	Description
use	Code	0…1	The use of this name. See Name Use Codes for allowed values.
text	string	0…1	Text representation of the full name.
family	string	1…*	Family name (called 'Surname').
given	string	1…*	Given names (not always 'first'). Includes middle names.

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Name	Type	Control	Description
prefix	string	0…*	Parts that come before the name.
suffix	string	0…*	Parts that come after the name.
period	Period	0…1	Time period when name was/is in use.

8.4.11 Identifier

An identifier intended for use external to the FHIR protocol. As an external identifier, it may be changed or retired due to human or system process and errors.

Name	Type	Control	Description
use	Code	0…1	The use of this identifier. See Identifier Use Codes for allowed values.
label	string	0…1	Description of identifier.
system	uri	0…1	The namespace for the identifier.
key	string	1…1	The unique value of the identifier.
period	Period	0…1	Time period when identifier was valid for use.
assigner	string	0…1	Name of Organization that issued identifier.

A CommonWell Person Identifier, generated by the CommonWell server in a Person Add transaction, will have the following values:

Name	Value
use	official
label	CommonWell Person Identifier
system	urn:oid:2.16.840.1.113883.3.3330.47[1]

[1] 2.16.840.1.113883.3.3330.47 is the CommonWell Person Identifier Assigning Authority OID.

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key	*[Person ID]*
assigner	CommonWell Health Alliance

8.4.12 Period

A time period defined by a start and end time.

Name	Type	Control	Description
start	dateTime	0…1	The start of the period. The boundary is inclusive.
end	dateTime	0…1	The end of the period. If the high is missing, it means that the period is ongoing.

8.4.13 Practitioner

The demographic information and role for an individual involved in the provisioning of healthcare.

Name	Type	Control	Description
name	HumanName	1…*	A name associated with the individual.
role	CodeableConcept	0…1	The role a person plays representing an organization, e.g., doctor, nurse, pharmacist. See Practitioner Role Codes for the list of allowed values.

Implementation Note

This FHIR specification defines a Practitioner as a resource. In this specification, a Practitioner ONLY has meaning within the context of a patient visit and so it is defined herein as a value type identifying the participants in a Visit. In other words, a Practitioner in this implementation is NOT addressable as a resource.

8.4.14 Facility

A Facility represents location under the parent provider organization.

Name	Type	Control	Description
id	string	1…1	The OID representing the facility.
name	string	1…1	The name of the facility.

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Name	Type	Control	Description
address	Address	1…1	The address of the facility.

8.5 Codes and Terminologies

This specification includes by reference the codes and terminologies defined in the FHIR specification. See http://www.hl7.org/implement/standards/fhir/terminologies.htm. A subset of the codes used in this implementation is provided in the appendix titled Terminology Bindings.

8.5.1 Codes Registry

For resource properties with type *"code,"* the property is bound to a code list -- a list of defined codes or the binding references some external standard that defines the set of valid codes that can be used.

See http://www.hl7.org/implement/standards/fhir/terminologies-codes.htm for FHIR code lists.

8.5.2 Named Systems

Well-known URIs (e.g., http://snomed.info) that may be used in the system property of the Identifier, Coding, or CodeableConcept data types. URIs defined in the HL7 FHIR specification (see http://www.hl7.org/implement/standards/fhir/terminologies-systems.htm) must be used in preference to other identifying mechanisms such as OIDs.

CommonWell may define additional URIs for concepts not listed in the FHIR specification.

8.6 Resources

8.6.1 Error

A read-only representation of error information.

Name	Type	Control	Description
message	string	1…1	A description of the error.
code	int	1…1	The CommonWell error code.
reference	string	1…1	A transaction identifier.
help	uri	0…1	For client errors, the URL to a CommonWell web page providing more information about the error

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Name	Type	Control	Description
			and suggestions for how the consumer can resolve it.

```
{
   "message": "Patient consent policy forbids access to this resource.",
   "code": 1245,
   "reference": "f57236f0-d4ad-11e2-8b8b-0800200c9a66",
   "help": {"href": "http://rest.api.commonwellalliance.org/help/#consent"}
}
```

8.6.2 Link

A resource supporting merging Patient Records within a specified Organization.

Name	Type	Control	Description
other	Resource	1..1	The other patient resource that the link refers to.
type	Code	1..1	The type of link between this patient resource and another patient resource. (see http://hl7.org/fhir/link-type for values). This value MUST be "replace".

```
{
  "link":
      {
        "other": {
          "reference": "patient/1234%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/"
        },
        "type": "replace"
      }
}
```

8.6.3 Organization

Based on the FHIR formal definition of an Organization resource (http://www.hl7.org/implement/standards/fhir/organization-definitions.htm), a CommonWell Organization represents an institution, corporation, department, community group, practice group, or other organization participating as an initiator or responder in the workflows supported by the CommonWell services.

```
{
   "_links": "link relations",
   "name": ["St. Barnabas Hospital"],
   "identifier": [{
      "use": "official",
      "label": "St. Barnabas Organization Identifier",
      "key": "urn:oid:2.16.840.1.113883.3.271.123",
      "system": "urn:ietf:rfc:3986",
      "assigner": "Healthcare Company"}],
   "address": [{
      "zip": "60612",
      "state":  "Il",
```


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```
      "line": ["8123 Hawthorne Ave."],
      "city": "Chicago"}],
   "telecom": [{
      "system": "phone",
      "value": "708-555-1234",
      "use": "work"},
      {
      "system": "email",
      "value": "admin@sbh.org",
      "use": "work"}]
}
```

Link Relations

An Organization resource may contain the reserved *_links* property, a collection of links available to the Edge System against this Organization resource given its current state.

Link	Description
self	Reference to this organization representation.

8.6.4 Patient

Based on the FHIR formal definition of a Patient resource (http://www.hl7.org/implement/standards/fhir/patient-definitions.htm), a patient is a person who is receiving care.

The patient resource covers all "Subjects of Care" inclusive of health-related care events where the focus is not on curative activities. This would include examples in care such as within social services or pregnancies.

Name	Type	Control	Description
_links	_links		A reserved property for presenting the link relations for this resource.
link	Link	0…*	Zero or more patients linked to this resource within the provider Organization.
active	boolean	0…1	Whether this Patient Record is active (in use).
identifier	Identifier	1…*	One or more identifiers for this patient.
provider	Organization	0…1	The resource reference to the organization managing the patient.
details	Demographics	1…1	Patient demographic details.

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Name	Type	Control	Description
facilities	Facility	0…*	Zero or more facilities associated with the patient. This property will only be populated if the parent provider organization supports facilities.


```
{
   "_links": "link relations",
   "active": true,
   "provider": {
      "type": "Organization",
      "reference": "https://rest.api.commonwellalliance.org/v1/org/2.16.840.1.113883.3.4/",
      "display": "Oswego Health System"},
    "facilities": [{
      "id":"urn:oid:2.16.840.1.113883.3.4.11",
      "name":"Fremont Uptown Clinic",
      "address": {
        "line":[2500 N. Fremont St.],
        "city":"Chicago",
        "state":"IL",
        "zip":"60610"},
      "id":" urn:oid:2.16.840.1.113883.3.4.12",
      "name":"Bleaker Downtown Care",
      "address": {
        "line":[1500 Bleaker Blvd.],
        "city":"Chicago",
        "state":"IL",
        "zip":"60610"}],
   "identifier": [{
      "use": "internal",
      "label": "Oswego MRN",
      "key": "9876",
      "system": "urn:oid:2.16.840.1.113883.3.4",
      "assigner": "Oswego Health System"}],
   "details": {
      "name": [{
        "given": ["Frank"],
        "family": ["Nolan"]}],
      "address": [{
        "zip": "60610",
        "state":  "Il",
        "line": ["511 Oswego St"],
        "city": "Chicago"}],
      "gender": {
        "system": "http://hl7.org/fhir/vs/administrative-gender",
        "code": "M"},
      "birthDate": "1945-09-24",
      "photo": {
        "type": "Picture",
        "reference":
"https://rest.api.commonwellalliance.org/v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.
3.4%26ISO/photo/1"}}
}

}
```


Link Relations

A Patient resource contains the reserved *_links* property, a collection of links available to the Edge System against this Patient resource given its current state.

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Link	Description
self	Reference to this patient representation.
networkLink	For retrieving remote links associated with the patient. This will only appear if the Patient is linked to a Person.
person	If Patient is linked to a Person, the URL for the linked Person resource.
personMatch	If Patient is NOT linked to a Person, this retrieves a list of 0..*n* Person Records that match the Patient demographics.
upgrade	In the context of a PatientMatch response, the URL to POST a PatientLink.
downgrade	In the context of a PatientMatch response, the URL for removing this Patient from the search results for the associated Person.

Upgrade and downgrade link relations are ONLY provided in response to a PatientMatch request from a Person resource.

When creating or updating a patient with facility information, only a collection of one facility is required, which is the facility at which the patient is currently being seen. Only the facility ID and name are required as part of those requests.

When retrieving a patient, all facilities are provided back in the response.

8.6.5 PatientLink

Within the context of a Person resource, a PatientLink represents a confirmed relationship to a Patient Record.

Name	Type	Control	Description
_links	_links		A reserved property for presenting the link relations for this resource.
assuranceLevel	int	1…1	The associated LOLA (2, 3 or 4) representing the confirmation of the relationship. **Read-only.**
patient	uri	1…1	The URL for the associated Patient resource.
identifier	Identifier	0…1	The strong identifier establishing the relationship between the person and the patient.

```
{
   "_links": "link relations",
   "assuranceLevel": 3,
   "patient":
"https://rest.api.commonwellalliance.org/v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.
3.4%26ISO"},
```


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```
   "identifier": {
      "use": "official",
      "label": "Illinois Driver’s License",
      "system": "urn:oid:2.16.840.1.113883.4.3.17",
      "assigner": "Illinois DMV"}
}
```

Link Relations

A PatientLink resource contains the reserved *_links* property, a collection of links available to the Edge System against this PatientLink resource.

Link	Action
self	Reference to the PatientLink resource itself.

8.6.6 Person

The Person resource represents a natural person independent of a specific healthcare context.

Name	Type	Control	Description
_links	_links		A reserved property for presenting the link relations for this resource.
enrolled	boolean	1…1	Indicates if the Person is enrolled in CommonWell. **Read-only**.
enrollmentSummary	enrollmentSummary	1…1	The enrollment summary for the Person.
details	Demographics	1…1	Demographic details for the person.

```
{
   "_links": "link relations",
   "enrolled": true,
   "enrollmentSummary": {
         "dateEnrolled": "2013-11-24",
         "enroller": "Oswego"
   },
   "details": {
      "name": [{
         "given": ["Frank"],
         "family": ["Nolan"]}],
      "address": [{
         "line": ["511 Oswego St"],
         "city": "Chicago",
         "state":  "Il",
         "zip": "60610"}],
      "gender": {
         "system": "http://hl7.org/fhir/vs/administrative-gender",
         "code": "M"},
      "birthDate": "1945-09-24",
      "identifier": [{
         "use": "official",
         "label": "Illinois Driver’s License",
```


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```
        "system": "urn:oid:2.16.840.1.113883.4.3.17",
        "assigner": "Illinois DMV"}]
    }
}
```

Link Relations

A Person resource contains the reserved *_links* property, a collection of links available to the Edge System against this Patient resource.

Link	Description
self	Reference to this person representation.
unenroll	Unenrolls a Person from CommonWell. This action removes all associated Patient Links but still allows a Person to appear in search results.
patientLink	The list of patientLinks. This is constrained to ONLY include the linked patients associated with Organization identified in the calling context.
patientMatch	Retrieves a list of 0..*n* Local Patient Records that match the Person demographics. The results are filtered based on the Organization identified in the authorization context of the request. ONLY Patient Records that are NOT linked to the Person are included in the results of the query.

8.6.7 Picture

Based on the FHIR formal definition of a Picture resource (http://www.hl7.org/implement/standards/fhir/ohttp:/www.hl7.org/implement/standards/fhir/picture.htm), this an image used in healthcare. For the purposes of this implementation, a picture MAY be used to resolve the identity of an individual.

Name	Type	Control	Description
_links	_links		A reserved property for presenting the link relations for this resource.
subject	Resource	1…1	The Person or Patient resource presented in the picture.
dateTime	dateTime	0…1	When the image was taken.
height	int	0…1	Height of the image.
width	int	0…1	Width of the image.

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Name	Type	Control	Description
bits	int	0…1	Number of bits of color (2..32).
content	Attachment	1…1	Actual picture data.


```
{
   "_links": "link relations",
   "content": {
      "data": "R0lGODlhfgCRAPcAAAA...",
      "contentType": "image/gif"},
   "dateTime": "2009-09-03",
   "height": "145",
   "subject": {
      "type": "Patient",
      "reference":
"https://rest.api.commonwellalliance.org/v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.
3.4%26ISO"},
   "bits": "8",
   "width": "126"
}
```


Link Relations

A Picture resource may contain the reserved *_links* property, a collection of links available to the Edge System against this Picture resource given its current state.

Link	Description
self	Reference to this picture representation.

8.6.8 NetworkLink

Within the context of a Patient resource, a NetworkLink represents a link relationship to a Remote Patient Record.

Name	Type	Control	Description
_links	_links		A reserved property for presenting the link relations for this resource.
assuranceLevel	int	1…1	The link assurance level of the relationship to the remote Patient Record (1, 2, 3, 4). This property is read-only.
linkedPatient	Patient	1…1	The Patient associated with the linked Remote Patient Record.

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Name	Type	Control	Description
visit	Visit	0…*	Recent visits for the linked patient.


```
{
   "_links": "link relations",
   "assuranceLevel": "2",
   "linkedPatient": {
   "identifier": [{
      "use": "internal",
      "label": "Oswego MRN",
      "key": "9876",
      "system": "urn:oid:2.16.840.1.113883.3.4",
      "assigner": "Oswego Health System"}],
      "details": {
         "name": [{
            "given": ["Frank"],
            "family": ["Nolan"]}],
         "address": [{
            "zip": "60610",
            "state":  "Il",
            "line": ["511 Oswego St"],
            "country": "USA",
            "city": "Metropolis"}],
         "gender": {
            "system": "http://hl7.org/fhir/vs/administrative-gender",
            "code": "M"},
         "birthDate": "1945-09-24",
         "photo": {
            "type": "Picture",
            "reference":
"https://rest.api.commonwellalliance.org/v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.
3.4%26ISO/photo/1"}},
      "active": true,
      "provider": {
         "type": "Organization",
         "reference": "https://rest.api.commonwellalliance.org/v1/org/2.16.840.1.113883.3.4/"}},
   "visit": [{
      "class": "inpatient",
      "date": {
         "start": "2012-05-29",
         "end": "2012-05-30"},
      "location": "St. Barnabas Hospital",
      "reason": "appendectomy",
      "participant": [{
         "details": {
            "name": [{
               "given": ["Jeffrey"],
               "family": ["Geiger"],
               "suffix": ["MD"]}]}}]
   }]
}
```


Link Relations

The link relations associated with a NetworkLink representation depend on the state of the NetworkLink as described by the LOLA.

Link	Action
self	Reference to the NetworkLink resource itself.

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Link	Action
upgrade	Promotes LOLA from 1 to 2.
downgrade	Demotes LOLA from 1 or 2 to 0; the patient will no longer appear in search results.

8.6.9 Visit

Based on the (http://www.hl7.org/implement/standards/fhir/visit-definitions.htm), this represents an interaction between a patient and healthcare participants for the purpose of providing patient services or assessing the health status of a patient.

Name	Type	Control	Description
_links	_links		A reserved property for presenting the link relations for this resource.
subject	Patient	1…1	Patient that was present at the visit.
class	Code	1…1	Inpatient, Outpatient, etc.
date	Period	1…1	Period during which the visit took place.
location	string	0…1	The name of the location where the visit occurred.
reason	string	0…1	Reason the visit took place.
participant	Practitioner	0…*	Healthcare providers present at the visit.

```
{
   "_links": "link relations",
   "type": "Patient",
   "reference":
"https://rest.api.commonwellalliance.org/v1/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO",
   "class": "inpatient",
   "date": {
      "start": "2012-05-29",
      "end": "2012-05-30"},
   "location": "St. Barnabas Hospital",
   "reason": "appendectomy",
   "participant": [{
      "details": {
         "name": [{
            "given": ["Jeffrey"],
            "family": ["Geiger"],
            "suffix": ["MD"]}]
```


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```
    }}]
}
```

Link Relations

A Visit resource may contain the reserved *_links* property, a collection of links available to the Edge System against this Visit resource given its current state.

Link	Description
self	Reference to this visit representation.

8.6.10 DocumentReference

Based on the FHIR DSTU 1 DocumentReference resource (http://www.hl7.org/implement/standards/fhir/documentreference.html), this represents a reference to a document.

Name	Type	Control	Description
_links	_links		A reserved property for presenting the link relations for this resource.
masterIdentifier	Identifier	1..1	Master Version Specific Identifier
identifier	Identifier	0..*	Other identifiers for the document
subject	Patient | Practitioner | Group | Device	1..1	Who|what is the subject of the document
type	CodeableConcept	1..1	What kind of document this is (LOINC if possible)
class	CodeableConcept	0..1	Categorization of Document
author	Practitioner | Device | Patient | RelatedPerson	1..*	Who and/or what authored the document
custodian	Organization	0..1	Org that maintains the document

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Name	Type	Control	Description
policyManager	uri	0..1	Manages access policies for the document
authenticator	Practitioner | Organization	0..1	Who/What authenticated the document
created	dateTime	0..1	Document creation time
indexed	instant	1..1	When this document reference was created
status	code	1..1	current | superceded | entered in error
docStatus	CodeableConcept	0..1	preliminary | final | appended | amended | entered in error
relatesTo	Element	0..*	Relationships to other documents
code	code	1..1	replaces | transforms | signs | appends
target	DocumentReference	1..1	Target of the relationship
description	string	0..1	Human-readable description (title)
confidentiality	CodeableConcept	0..*	Sensitivity of source document
primaryLanguage	code	0..1	The marked primary language for the document
mimeType	code	1..1	Mime type, + maybe character encoding
format	uri	0..*	Format/content rules for the document

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Name	Type	Control	Description
size	integer	0..1	Size of the document in bytes
hash	base64Binary	0..1	Base64 representation of SHA-256
location	uri	0..1	Where to access the document
service	Element	0..1	If access is not fully described by location
type	CodeableConcept	1..1	Type of service (i.e. XDS.b)
address	string	0..1	Where service is located (usually a URL)
parameter	Element	0..*	Service call parameters
name	string	1..1	Parameter name in service call
value	string	0..1	Parameter value for the name
context	Element	0..1	Clinical context of document
event	CodeableConcept	0..*	Main Clinical Acts Documented
period	Period	0..1	Time of service that is being documented
facilityType	CodeableConcept	0..1	Kind of facility where patient was seen

```
{
   "_links": "link relations",
   "resourceType": "DocumentReference",
   "text": {
      "status": "generated",
```


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```
      "div": "<div>!-- Snipped for Brevity --></div>"
   },
   "contained": [
      {
         "resourceType": "Practitioner",
         "id": "a1",
         "name": {
            "family": [
               "Dopplemeyer"
            ],
            "given": [
               "Sherry"
            ]
         },
         "telecom": [
            {
               "system": "email",
               "value": "john.doe@healthcare.example.org"
            }
         ],
         "organization": {
            "display": "Cleveland Clinic"
         },
         "role": [
            {
               "text": "Primary Surgeon"
            }
         ],
         "specialty": [
            {
               "text": "Orthopedic"
            }
         ]
      },
      {
         "resourceType": "Practitioner",
         "id": "a2",
         "name": {
            "family": [
               "Smitty"
            ],
            "given": [
               "Gerald"
            ]
         },
         "telecom": [
            {
               "system": "email",
               "value": "john.doe@healthcare.example.org"
            }
         ],
         "organization": {
            "display": "Cleveland Clinic"
         },
         "role": [
            {
               "text": "Attending"
            }
         ],
         "specialty": [
            {
               "text": "Orthopedic"
            }
         ]
      }
   ],
   "masterIdentifier": {
```


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```
      "system": "urn:ietf:rfc:3986",
      "value": "urn:oid:1.3.6.1.4.1.21367.2005.3.7"
   },
   "subject": {
      "reference": "Patient/xcda"
   },
   "type": {
      "coding": [
         {
            "system": "http://loinc.org",
            "code": "34108-1",
            "display": "Outpatient Note"
         }
      ]
   },
   "author": [
      {
         "reference": "#a1"
      },
      {
         "reference": "#a2"
      }
   ],
   "created": "2005-12-24T09:35:00+11:00",
   "indexed": "2005-12-24T09:43:41+11:00",
   "status": "current",
   "description": "Physical",
   "confidentiality": [
      {
         "coding": [
            {
               "system": "http://ihe.net/xds/connectathon/confidentialityCodes",
               "code": "1.3.6.1.4.1.21367.2006.7.101",
               "display": "Clinical-Staff"
            }
         ]
      }
   ],
   "primaryLanguage": "en-US",
   "mimeType": "application/hl7-v3+xml",
   "size": 3654,
   "hash": "2jmj7l5rSw0yVb/vlWAYkK/YBwk=",
   "location": "http://example.org/xds/mhd/Binary/07a6483f-732b-461e-86b6-edb665c45510",
   "context": {
      "event": [
         {
            "coding": [
               {
                  "system": "http://ihe.net/xds/connectathon/eventCodes",
                  "code": "T-D8200",
                  "display": "Arm"
               }
            ]
         }
      ],
      "period": {
         "start": "2004-12-23T08:00:00",
         "end": "2004-12-23T08:01:00"
      },
      "facilityType": {
         "coding": [
            {
               "system": "http://www.ihe.net/xds/connectathon/healthcareFacilityTypeCodes",
               "code": "Outpatient",
               "display": "Outpatient"
            }
         ]
```


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```
        }
    }
}
```

Link Relations

A DocumentReference resource may contain the reserved *_links* property, a collection of links available to the Edge System given its current state.

Link	Description
self	Reference to this DocumentReference representation.

8.7 Protocol Operations

The following sections describe the application protocol operations available for each of the various resources defined in this specification.

8.7.1 Person Enrollment

The following sequence diagram illustrates the key interactions between an Edge System and CommonWell in the Person Enrollment workflow.

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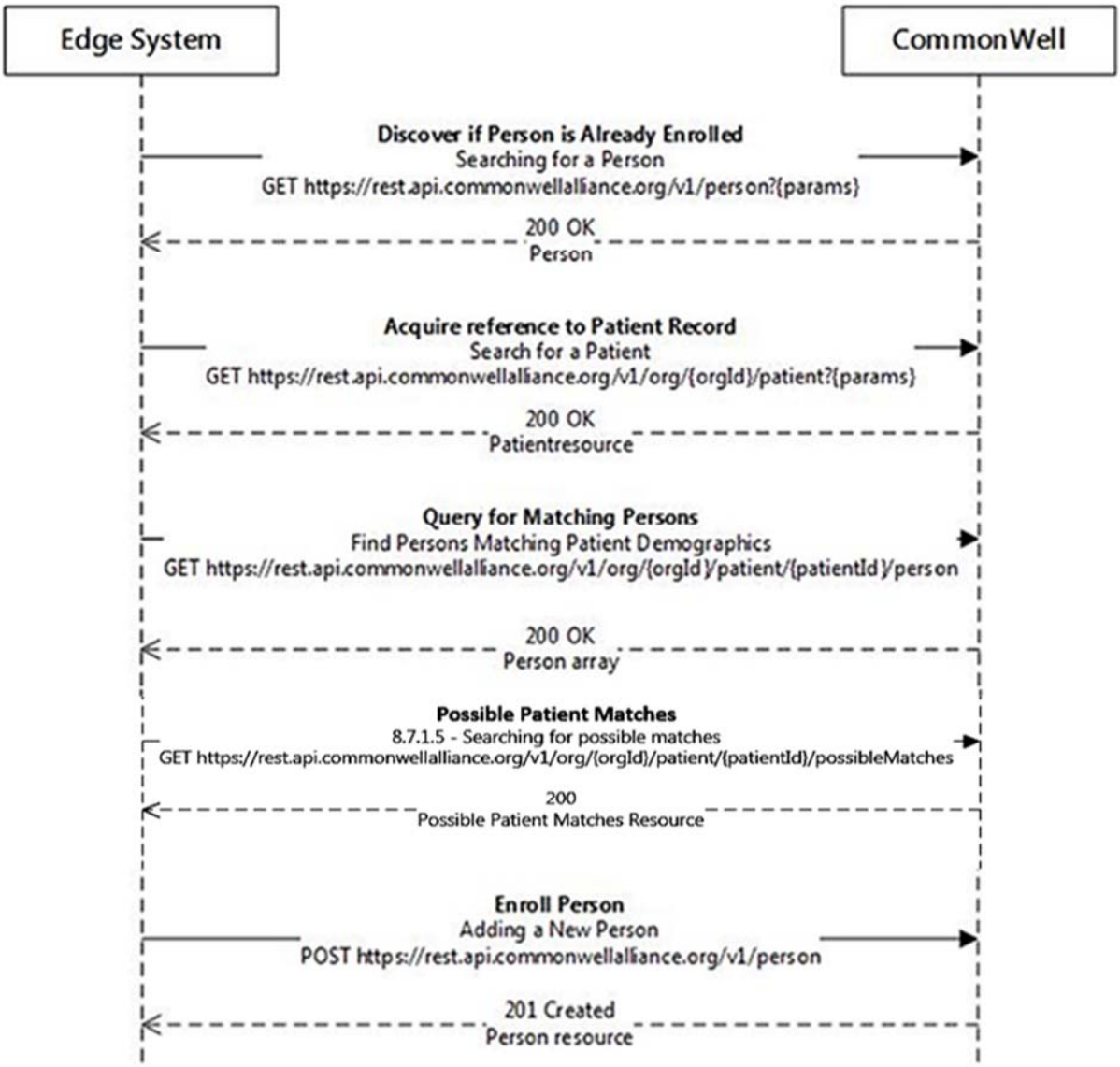

8.7.1.1 Search for a Person

GET https://rest.api.commonwellalliance.org/v1/person?{*parameters*}

An Edge System can search for an existing Person based on a strong identifier. The query parameters are provided in a query string as name-value pairs.

Parameters

- key (required)
- system (required)

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Sample Request: Search for Person

```
GET https://rest.api.commonwellalliance.org/v1/person?key=12345ABCD&system=urn%3Aoid%3A2.16.840.1.113883.4.3.17
HTTP/1.1
Host: rest.api.commonwellalliance.org
Authorization: Bearer mF_9.B5f-4.1JqM
```

The CommonWell server returns the Person Records matching the search criteria.

Sample Response: Person Found

```
HTTP/1.1 200 OK
Content-Length: 174
Content-Type: application/hal+json; charset=utf-8
Date: Wed, 06 Mar 2013 21:12:04 GMT

{
   "_links": {
      "self": {"href": "v1/person?key=12345ABD&system=urn:oid:2.16.840.1.113883.4.3.17"}},
   "message": "CommonWell found one Person matching your search criteria.",
   "_embedded": {
      "person": [{
         "_links": {
            "self": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-5de498903334"},
            "unenroll": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-5de498903334/unenroll"},
            "patientLink": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-5de498903334/patientLink"},
            "patientMatch": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-
5de498903334/patientMatch?orgId='2.16.840.1.113883.4.3.17'"}},
         "enrolled": true,
         "enrollmentSummary": {
            "dateEnrolled": "2013-11-24",
            "enroller": "Oswego"
         },
         "details": {
            "name": [{
               "given": ["Frank"],
               "family": ["Nolan"]}],
            "address": [{
               "line": ["511 Oswego St"],
               "city": "Chicago",
               "state":  "Il",
               "zip": "60610"}],
            "gender": {
               "system": "http://hl7.org/fhir/vs/administrative-gender",
               "code": "M"},
            "birthDate": "1945-09-24"}}
      ]}
}
```

8.7.1.2 Retrieve Patient Links

GET https://rest.api.commonwellalliance.org/v1/person/{*personId*}/patientLink?orgid={*orgId*}/

An Edge System can request the PatientLinks to a known Person. The results of that query will be limited to only those PatientLinks associated with Patients in the Organization the Edge System user is authorized to view.

The Organization MAY be specified in the optional *orgId* query parameter of the request. If this is not included, the CommonWell server will use the Organization Identifier provided in the authorization token.

Sample Request: Retrieve Patient Link without Organization Identifier

```
GET https://rest.api.commonwellalliance.org/v1/person/c21cc31d-6c57-442b-8e76-5de498903334/patientLink HTTP/1.1
```


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```
Host: rest.api.commonwellalliance.org
Authorization: Bearer mF_9.B5f-4.1JqM
```

When the *orgId* query is not included, the CommonWell server uses the Organization Identifier provided in the authorization token to locate the Patient Links associated with Patients within that organization.

Sample Response: One Patient Link

```
HTTP/1.1 200 OK
Content-Type: application/hal+json; charset=UTF-8
Date: Wed, 06 Feb 2013 20:54:44 GMT

{
  "_links": {
   "self": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-
5de498903334/patientLink?orgId='2.16.840.1.113883.4.3.17'"}},
  "_embedded": {
    "patientLink": [
      {
        "_links": {
          "self": {"href": "v1/person/c21cc31d-6c57-442b-8e76-5de498903334/patientLink/1"}},
        "assuranceLevel": "3",
        "patient":
"https://rest.api.commonwellalliance.org/v1/org/2.16.840.1.113883.4.3.17/patient/9876%5E%5E%5E%262.16.840.1.1138
83.3.4%26ISO"}]
}}
```

The *self* link returned in the response will always include the *orgId* query parameter.

Sample Response: No Patient Links

```
HTTP/1.1 200 OK
Content-Type: application/hal+json; charset=UTF-8
Date: Wed, 06 Feb 2013 20:54:44 GMT

{
    "_links": {
      "self": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-
5de498903334/patientLink?orgId='2.16.840.1.113883.4.3.17'"}},
    "_embedded": {
        "patientLink": []
}}}
```

Sample Request: Search for Patient Links Using Organization Identifier

This example shows the same request using the *orgId* query parameter specifying the organization.

```
GET https://rest.api.commonwellalliance.org/v1/person/c21cc31d-6c57-442b-8e76-
5de498903334/patientLink?orgId='2.16.840.1.113883.4.3.17' HTTP/1.1
Host: rest.api.commonwellalliance.org
Authorization: Bearer mF_9.B5f-4.1JqM
```

Sample Response: Authorization Error

If the user does not have access to the Patient Links in the Organization specified in the *orgId* input parameter, the CommonWell server returns an access denied response.

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```
HTTP/1.1 403 Forbidden
Content-Length: 64
Content-Type: application/json; charset=utf-8
Date: Wed, 06 Mar 2013 21:12:04 GMT

{
   "message": "You are not authorized to view patient links associated with the specified Organization.",
   "code": XXXX,
   "help": {"href": "http://rest.api.commonwellalliance.org/help/#patientLink"}
}
```

8.7.1.3 Find Persons Matching Patient Demographics

GET https://rest.api.commonwellalliance.org/v1/org/{orgId}/patient/{patient*id*}/person

Given a known patient, an Edge System may query CommonWell for persons matching the demographic data of the Patient resource.

Sample Request

```
GET https://rest.api.commonwellalliance.org/v1/org/2.16.840.1.113883.3.4/patient/1ba10b15-0885-48f3-9e70-
e9418f42f605/person HTTP/1.1
Host: rest.api.commonwellalliance.org
Authorization: Bearer mF_9.B5f-4.1JqM
```

If the Person Record exists, the CommonWell server returns the Person Record matching the search criteria.

Sample Response: Person Found

```
HTTP/1.1 200 OK
Content-Length: 1774
Content-Type: application/hal+json; charset=utf-8
Date: Wed, 06 Mar 2013 21:12:04 GMT

{
   "_links": {
      "self": {"href":
"/v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/person"}},
   "message": "CommonWell found one Person matching your search criteria.",
   "_embedded": {
      "person": [{
         "_links": {
            "self": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-5de498903334"},
            "unenroll": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-5de498903334/unenroll"},
            "patientLink": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-5de498903334/patientLink"},
            "patientMatch": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-
5de498903334/patientMatch?orgId='2.16.840.1.113883.4.3.17'"}},
         "enrolled": true,
         "enrollmentSummary": {
             "dateEnrolled": "2013-11-24",
             "enroller": "Oswego"
         },
         "details": {
            "name": [{
               "given": ["Frank"],
               "family": ["Nolan"]}],
            "address": [{
               "line": ["511 Oswego St"],
               "city": "Chicago",
               "state":  "Il",
               "zip": "60610"}],
```


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```
            "gender": {
               "system": "http://hl7.org/fhir/vs/administrative-gender",
               "code": "M"},
            "birthDate": "1945-09-24"}}
      ]}
}
```

The key value of a strong identifier is stored in CommonWell as a hashed value for use in search algorithms and never returned in search or get operations.

Alternatively, if no match is found the CommonWell server returns an empty result set. In the context of a Person Enrollment workflow, this would signal to the Edge System that it should create a new Person Record.

Sample Response: Person Not Found

```
HTTP/1.1 200 OK
Content-Length: 100
Content-Type: application/hal+json; charset=utf-8
Date: Wed, 06 Mar 2013 21:12:04 GMT

{
   "_links": {
      "self": {"href":
"/v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/person"}},
   "message": "No match on demographic information.",
   "_embedded": {
      "person": []
   }
}
```

In this case, the *message* property of the response provides the reason the search failed to find a Person matching the search criteria.

8.7.1.4 Resolving Partial Matches

In the Person Enrollment workflow, Edge Systems MUST be capable of handling search results that include partial matches. Partial matches may result for different reasons, including:

- A person who has multiple addresses
- A person who has moved to another address
- A person who has been issued a new strong identifier (e.g., a new driver's license)

As a result, the CommonWell Person search operation may locate Person Records that match on the provided demographic information and/or the strong identifier. In the event of a match based on the strong identifier only, the CommonWell server provides a description of the result in the *message* property.

Sample Response: Strong Identifier Match

```
HTTP/1.1 200 OK
Content-Length: 1774
Content-Type: application/hal+json; charset=utf-8
Date: Wed, 06 Mar 2013 21:12:04 GMT

{
   "_links": {
```


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```
      "self": {"href":
"/v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/person"}},
   "message": "CommonWell found a person with a different zip code: you MUST verify this is the same person and,
if necessary, update the person's information as needed.",
   "_embedded": {
      "person": [{
         "_links": {
            "self": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-5de498903334"},
            "unenroll": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-5de498903334/unenroll"},
            "patientLink": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-5de498903334/patientLink"},
            "patientMatch": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-
5de498903334/patientMatch?orgId='2.16.840.1.113883.4.3.17'"}},
         "enrolled": true,
         "enrollmentSummary": {
             "dateEnrolled": "2013-11-24",
             "enroller": "Oswego"
         },
         "details": {
            "address": [{
               "line": ["511 Oswego St"],
               "city": "Chicago",
               "state":  "Il",
               "zip": "60610",
               "period": {
                  "start": "1994-04-12"}],
            "name": [{
               "given": ["Frank"],
               "family": ["Nolan"]}],
            "gender": {
               "system": "http://hl7.org/fhir/vs/administrative-gender",
               "code": "M"},
            "birthDate": "1945-09-24"}}]}
}
```


In this example, the Person in CommonWell has a single address with an Illinois zip code. In addition, the *period* property indicates that the address is current (there is no *end* value) and that he has lived there since 1994.

The user of the Edge System should verify that the individual has a second address in Florida and then update the Person Record to add that address. Once the Edge System has captured the additional address information, the Edge System sends the update to the CommonWell server using the *update* link relation provided in the embedded Person resource.

After the addition of the new address has completed successfully, the Edge System may query again for a match. In this example, this will return a response showing a complete match based on the new Florida address.

Sample Response: Person Found


```
HTTP/1.1 200 OK
Content-Length: 1774
Content-Type: application/hal+json; charset=utf-8
Date: Wed, 06 Mar 2013 21:12:04 GMT

{
   "_links": {
      "self": {"href":
"/v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/person"}},
   "message": "CommonWell found one Person matching your search criteria.",
   "_embedded": {
      "person": [{
      "_links": {
         "self": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-5de498903334"},
         "unenroll": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-5de498903334/unenroll"}},
```


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```
        "patientLink": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-5de498903334/patientLink"},
        "patientMatch": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-
5de498903334/patientMatch?orgId='2.16.840.1.113883.4.3.17'"}},
      "enrolled": true,
      "enrollmentSummary": {
          "dateEnrolled": "2013-11-24",
         "enroller": "Oswego"
      },
      "details": {
         "address": [{
            "line": ["511 Oswego St"],
            "city": "Chicago",
            "state":  "Il",
            "zip": "60610"},
            {
            "line": ["4423 46th Ave.", "Apt. 16B"],
            "city": "Tampa",
            "state":  "Fl",
            "zip": "33663",
            "period": {
               "start": "2013-01-07"}}],
         "name": [{
            "given": ["Frank"],
            "family": ["Nolan"]}],
         "gender": {
            "system": "http://hl7.org/fhir/vs/administrative-gender",
            "code": "M"},
         "birthDate": "1945-09-24"}}
      ]}
}
```


8.7.1.5 Checking for Possible Patient Matches Prior to Enrollment

GET https://rest.api.commonwellalliance.org/v1/org/{orgId}/patient/{patientId}/possibleMatches

Note: A patientId must be registered in CommonWell in order to use this endpoint, but no person enrollment is required.

Checking for possible patient matches is an optional transaction in the Person Enrollment workflow. This transaction results in both an indication of whether possible patient matches exist as well as the number of possible matches for the patient. A Patient Record with possible matches is more valuable because there is an immediate return on the time invested in enrolling the Person in CommonWell. In order to avoid possible duplicate Person Records, you SHOULD use this protocol after ensuring there is no Person Record matching the patient's demographics.

Sample Request

```
GET
https://rest.api.commonwellalliance.org/v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3
.4%26ISO/possibleMatches HTTP/1.1
Host: rest.api.commonwellalliance.org
Content-Length: 0
Accept: */*
Authorization: Bearer mF_9.B5f-4.1JqM
```

Sample Response: Possible Patient Matches Found


```
{
      "totalPossibleMatches" : 8,
      "_links" : {
```


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```
            "self" : {
                    "href" :
"https://rest.api.commonwellalliance.org/v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.11388
3.3.4%26ISO/possibleMatches"
            },
            "patient" : {
                    "href" :
"https://rest.api.commonwellalliance.org/v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.11388
3.3.4%26ISO/"
            }
      }
}
```


The response indicates the number of possible Patient matches.

Sample Response: No Patient Matches Found


```
{
      "totalPossibleMatches" : 0,
      "_links" : {
             "self" : {
                    "href" :
"https://rest.api.commonwellalliance.org/v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.11388
3.3.4%26ISO/possibleMatches"
             },
             "patient" : {
                    "href" :
"https://rest.api.commonwellalliance.org/v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.11388
3.3.4%26ISO/"
             }
      }
}
```


The response indicates that no possible Patient matches were found.

8.7.1.6 Adding a New Person

POST https://rest.api.commonwellalliance.org/v1/person

Adding a new Person is a mandatory transaction in the Person Enrollment workflow. Basic demographic data are required input parameters to the request, as shown below.

Required Parameters

- person
  - details
    - name
      - family
      - given
    - birthDate
    - gender
      - code
    - address
      - zip

Optionally, the Person resource may include a strong identifier.

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Optional Parameters

- person
  - details
    - identifier
      - key
      - period
        - start
      - system

Sample Request

```
POST https://rest.api.commonwellalliance.org/v1/person HTTP/1.1
Content-Type: application/json; charset=UTF-8
Host: rest.api.commonwellalliance.org
Content-Length: 2134
Authorization: Bearer mF_9.B5f-4.1JqM

{
   "details": {
      "address": [{
         "zip": "60610",
         "state":  "Il",
         "line": ["511 Oswego St"],
         "city": "Chicago"}],
      "name": [{
         "given": ["Frank"],
         "family": ["Nolan"]}],
      "gender": {
         "code": "M"},
      "birthDate": "1945-09-24",
      "identifier": [{
         "key": "12345ABCD",
         "system": "urn:oid:2.16.840.1.113883.4.3.17",
         "period": {
            "start": "2011-06-08"}}]
   }
}
```

Sample Response: Created

```
HTTP/1.1 201 Created
Content-Type: application/hal+json; charset=UTF-8
Location: https://rest.api.commonwellalliance.org/v1/person/c21cc31d-6c57-442b-8e76-5de498903334
Date: Wed, 06 Feb 2013 20:54:44 GMT

{
   "_links": {
      "self": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-5de498903334"},
      "unenroll": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-5de498903334/unenroll"},
      "patientLink": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-5de498903334/patientLink"},
      "patientMatch": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-
5de498903334/patientMatch?orgId='2.16.840.1.113883.4.3.17'"}},
   "enrolled": true,
   "enrollmentSummary": {
       "dateEnrolled": "2013-11-24",
       "enroller": "Oswego"
   },
   "details": {
      "name": [{
         "given": ["Frank"],
```


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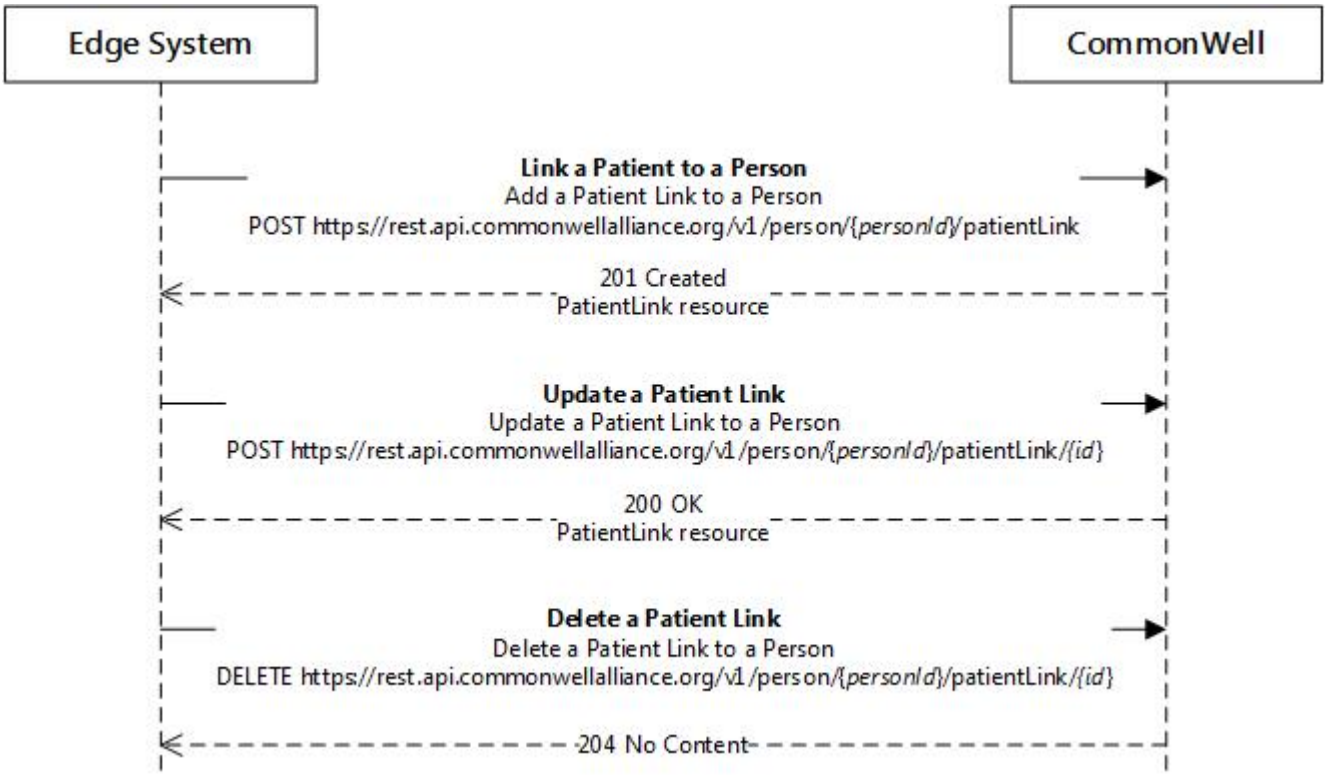
```
        "family": ["Nolan"]}],
      "identifier": [{
        "use": "official",
        "system": "urn:oid:2.16.840.1.113883.4.3.17",
      "address": [{
        "zip": "60610",
        "state":  "Il",
        "line": ["511 Oswego St"],
        "city": "Chicago"}],
      "gender": {
        "system": "http://hl7.org/fhir/vs/administrative-gender",
        "code": "M"},
      "birthDate": "1945-09-24"}
}
```


The response indicates the CommonWell server has created the Person resource. The body of the response includes the resource data, and the Location header provides the absolute URI of the resource.

A Person resource also includes the reserved *_links* property, a collection of links and their associated link relations defining the actions available to the Edge System against this Person resource given its current state.

8.7.2 Managing Links from a Person to a Patient

This section describes the transactions involved in managing link relations from a known Person resource to a known Patient resource. The transactions are illustrated in the sequence diagram below.



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8.7.2.1 *Adding a PatientLink to a Person*

POST https://rest.api.commonwellalliance.org/v1/person/{*personId*}/patientLink

Once an Edge System has obtained the resource identifier for a Person (either by successfully finding an existing Person or creating a new Person resource), the Edge System can link a Local Patient Record by creating a PatientLink resource for the associated Person resource.

Assumptions

The Edge System has access to the fully qualified URL of the Patient Record that is the target of the link. This may be stored by the Edge System as an aliased identity in the local patient management system, or retrieved from the CommonWell server using the Patient search API described in section 8.7.6.1.

Required Parameter

- patient (*referenced by URI*)

Optional Parameter

- identifier
  - key
  - period
    - start
  - system

Sample Request: Create a Patient Link with Strong Identifier

```
POST https://rest.api.commonwellalliance.org/v1/person/c21cc31d-6c57-442b-8e76-5de498903334/patientLink HTTP/1.1
Content-Type: application/json
Host: rest.api.commonwellalliance.org
Content-Length: 267
Authorization: Bearer mF_9.B5f-4.1JqM

{
   "patient":
"https://rest.api.commonwellalliance.org/v1/org/2.16.840.1.113883.4.3.17/patient/9876%5E%5E%5E%262.16.840.1.1138
83.3.4%26ISO",
   "identifier": {
      "key": "Z1234567",
      "period": {
         "start": "2010-09-12"},
      "system": "urn:oid:2.16.840.1.113883.4.3.17"
   }
}
```

Sample Response: Created

```
HTTP/1.1 201 Created
Content-Type: application/hal+json; charset=UTF-8
Location: https://rest.api.commonwellalliance.org/v1/person/c21cc31d-6c57-442b-8e76-5de498903334/patientLink/1
Date: Wed, 06 Feb 2013 20:54:44 GMT

{
   "_links": {
      "self": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-5de498903334/patientLink/1"}},
```


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```
   "assuranceLevel": "3",
   "patient":
"https://rest.api.commonwellalliance.org/v1/org/2.16.840.1.113883.4.3.17/patient/9876%5E%5E%5E%262.16.840.1.1138
83.3.4%26ISO"
}
```

If the strong identifier does not belong to the associated Person Record, CommonWell will return an error.

Sample Response: Invalid Strong Identifier

```
HTTP/1.1 409 Conflict
Content-Type: application/json; charset=UTF-8
Date: Wed, 06 Feb 2013 20:54:52 GMT

{
   "message": "The strong identifier does not belong to this person.",
   "code": XXXX,
   "reference": "f57236f0-d4ad-11e2-8b8b-0800200c9a66",
   "help": {"href": "http://rest.api.commonwellalliance.org/help/#patientLink"}
}
```

If the user identified in the authorization token does not have permission to create links to the Patient, the CommonWell server returns an authorization error.

Sample Response: Authorization Error

```
HTTP/1.1 403 Forbidden
Content-Length: 64
Content-Type: application/json; charset=utf-8
Date: Wed, 06 Mar 2013 21:12:04 GMT

{
   "message": "You are not authorized to created links for this patient.",
   "code": XXXX,
   "help": {"href": "http://rest.api.commonwellalliance.org/help/#patientLink"}
}
```

8.7.2.2 Updating a PatientLink

POST https://rest.api.commonwellalliance.org/v1/person/{personId}/patientLink/{linkId}/

Once a PatientLink resource is created, an Edge System can update the PatientLink to add, update or remove identifier information. Changes to the identifier data will directly reflect on the LOLA of the PatientLink.

Required Parameter

- patient (*referenced by URI*)

Optional Parameter

- identifier
  - key
  - period
    - start
  - system

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Sample Request: Adding a Strong Identifier

```
POST https://rest.api.commonwellalliance.org/v1/person/c21cc31d-6c57-442b-8e76-5de498903334/patientLink/1
HTTP/1.1
Content-Type: application/json
Host: rest.api.commonwellalliance.org
Content-Length: 267
Authorization: Bearer mF_9.B5f-4.1JqM

{
   "patient":
"https://rest.api.commonwellalliance.org/v1/org/2.16.840.1.113883.4.3.17/patient/9876%5E%5E%5E%262.16.840.1.1138
83.3.4%26ISO",
   "identifier": {
      "key": "Z1234567",
      "period": {
         "start": "2010-09-12"},
      "system": "urn:oid:2.16.840.1.113883.4.3.17"
   }
}
```

In this example, adding the strong identifier to the PatientLink will result in upgrading the assurance level from LOLA 2 to 3.

Sample Response

```
HTTP/1.1 200 OK
Content-Type: application/hal+json; charset=UTF-8
Location: https://rest.api.commonwellalliance.org/v1/ person/1234/patientLink/1
Date: Wed, 06 Feb 2013 20:54:44 GMT

{
   "_links": {
      "self": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-5de498903334/patientLink/1"}},
   "assuranceLevel": "3",
   "patient":
"https://rest.api.commonwellalliance.org/v1/org/2.16.840.1.113883.4.3.17/patient/9876%5E%5E%5E%262.16.840.1.1138
83.3.4%26ISO"
}
```

As with adding a PatientLink, when adding or updating strong identifiers to an existing PatientLink, the strong identifier MUST be part of the associated Person resource.

Sample Response: Invalid Strong Identifier

```
HTTP/1.1 409 Conflict
Content-Type: application/json; charset=UTF-8
Date: Wed, 06 Feb 2013 20:54:52 GMT

{
   "message": "The strong identifier does not belong to this person.",
   "code": XXXX,
   "reference": "f57236f0-d4ad-11e2-8b8b-0800200c9a66",
   "help": {"href": "http://rest.api.commonwellalliance.org/help/#patientLink"}
}
```

Sample Request: Removing a Strong Identifier

```
POST https://rest.api.commonwellalliance.org/v1/person/c21cc31d-6c57-442b-8e76-5de498903334/patientLink/1
HTTP/1.1
Content-Type: application/json
```


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```
Host: rest.api.commonwellalliance.org
Content-Length: 267
Authorization: Bearer mF_9.B5f-4.1JqM

{
   "patient":
"https://rest.api.commonwellalliance.org/v1/org/2.16.840.1.113883.4.3.17/patient/9876%5E%5E%5E%262.16.840.1.1138
83.3.4%26ISO",
   "identifier": null
}
```

In this example, removing the strong identifier to the PatientLink will result in downgrading the assurance level from LOLA 3 to 2.

Sample Response

```
HTTP/1.1 200 OK
Content-Type: application/hal+json; charset=UTF-8
Location: https://rest.api.commonwellalliance.org/v1/ person/1234/patientLink/1
Date: Wed, 06 Feb 2013 20:54:44 GMT

{
   "_links": {
      "self": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-5de498903334/patientLink/1"}},
   "assuranceLevel": "2",
   "patient":
"https://rest.api.commonwellalliance.org/v1/org/2.16.840.1.113883.4.3.17/patient/9876%5E%5E%5E%262.16.840.1.1138
83.3.4%26ISO"
}
```

8.7.2.3 Deleting a Patient Link

DELETE https://rest.api.commonwellalliance.org/v1/person/{personId}/patientLink/{linkId}/

An Edge System may delete a link relationship between a Person and a Patient. This action will indicate to CommonWell that the individual represented in the Person resource is not the same individual represented in the Patient resource, and CommonWell will downgrade the LOLA of this Patient to 0 for all subsequent match queries associated with the Person. This includes patient match requests from the Person, as well as any network link requests originating from another Patient resource that is linked to this Person.

Sample Request

```
DELETE https://rest.api.commonwellalliance.org/v1/person/c21cc31d-6c57-442b-8e76-5de498903334/patientLink/1
HTTP/1.1
Host: rest.api.commonwellalliance.org
Authorization: Bearer mF_9.B5f-4.1JqM
```

Sample Response

```
HTTP/1.1 204 No Content
Date: Mon, 25 Mar 2013 22:20:42 GMT
```


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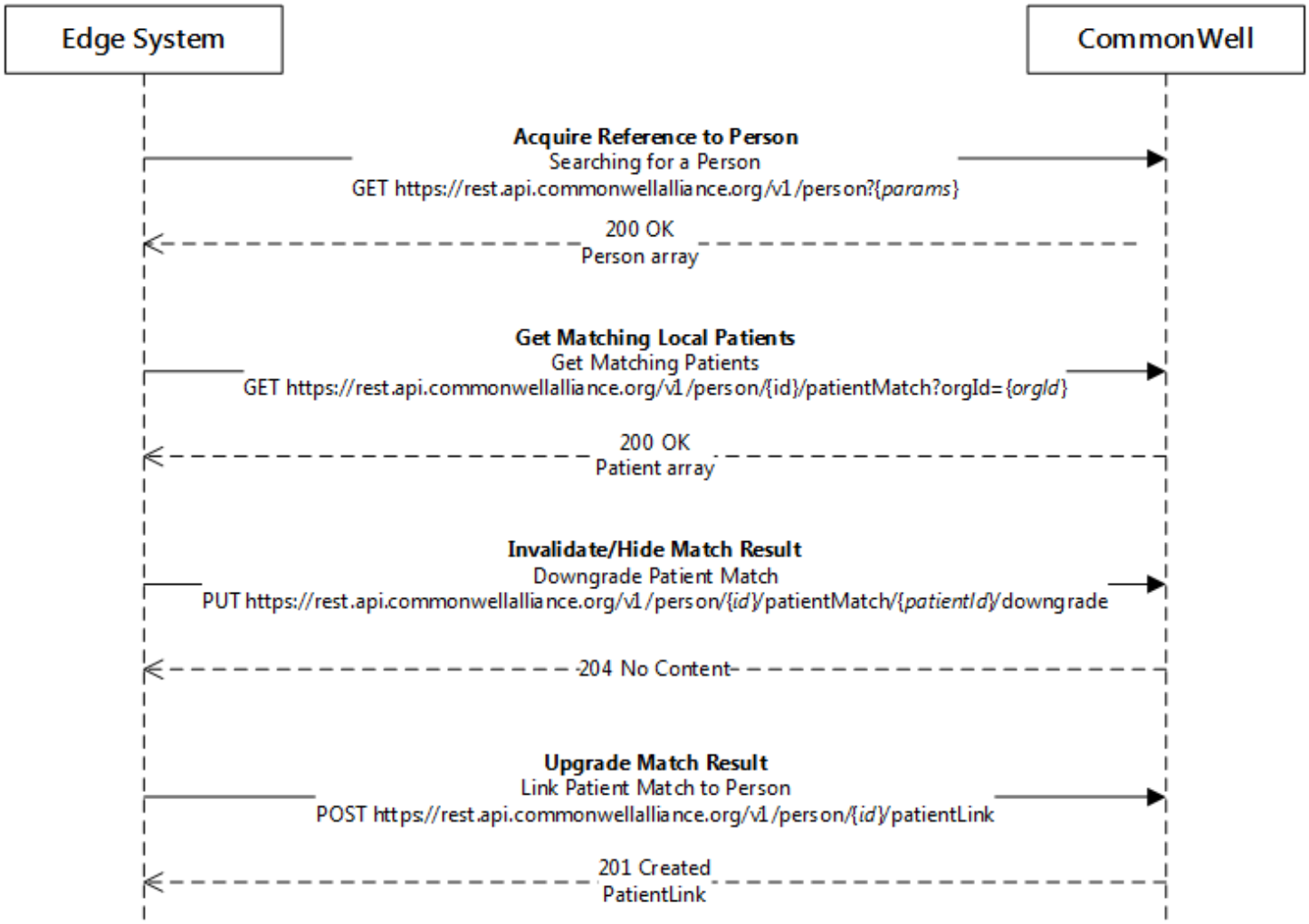
If the user identified in the authorization token does not have permission to manage links to the Patient, the CommonWell server returns an authorization error.

Sample Response: Authorization Error

```
HTTP/1.1 401 Unauthorized
Content-Length: 64
Content-Type: application/json; charset=utf-8
Date: Wed, 06 Mar 2013 21:12:04 GMT

{
   "message": "You are not authorized to change links associated with this patient.",
   "code": XXXX,
   "help": {"href": "http://rest.api.commonwellalliance.org/help/#patientLink"}
}
```

8.7.3 Managing Links from a Patient to a Person



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Not every Edge System will have access to a Local Patient Record (e.g., remote third-party applications acting on behalf of an Organization). This application protocol describes an alternative to the operations described in Section 8.7.2 for creating a link between a Person and a Patient, wherein an Edge System needs to discover the patient who may be associated with a known Person. In this instance, once the Edge System locates a matched Patient, the Edge System can act on the included link relations within the Patient resource to link the Patient to the known Person.

This protocol also provides a mechanism for an Edge System to invalidate a presumptive match between a known Person and a Patient Record returned in the patient match query. By confirming that a Person is not the same individual as the one represented in a given Patient Record, this action will cause the Patient Record to no longer appear in any network searches in which the known Person is linked with the subject patient.

8.7.3.1 Acquire Reference to Person

As with the Person Enrollment, the workflow begins by searching for a Person (see 8.7.1.1).

Sample Response: Person Found

```
HTTP/1.1 200 OK
Content-Length: 174
Content-Type: application/hal+json; charset=utf-8
Date: Wed, 06 Mar 2013 21:12:04 GMT

{
   "_links": {
      "self": {"href": "v1/person?key=12345ABD&system=urn:oid:2.16.840.1.113883.4.3.17"}},
   "message": "CommonWell found one Person matching your search criteria.",
   "_embedded": {
      "person": [{
         "_links": {
            "self": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-5de498903334"},
            "unenroll": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-5de498903334/unenroll"},
            "patientLink": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-5de498903334/patientLink"},
            "patientMatch": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-
5de498903334/patientMatch?orgId='2.16.840.1.113883.4.3.17'"}},
         "enrolled": true,
         "enrollmentSummary": {
             "dateEnrolled": "2013-11-24",
             "enroller": "Oswego"
         },
         "details": {
            "name": [{
               "given": ["Frank"],
               "family": ["Nolan"]}],
            "address": [{
               "line": ["511 Oswego St"],
               "city": "Chicago",
               "state":  "Il",
               "zip": "60610"}],
            "gender": {
               "system": "http://hl7.org/fhir/vs/administrative-gender",
               "code": "M"},
            "birthDate": "1945-09-24"}}
      ]}
}
```

An Edge System can use the *patientLink* and *patientMatch* link relations included in the returned Person resource to find the Patient Records that either 1) have a confirmed link relationship with a Patient Record in the Organization

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(*patientLink);* or 2) are not linked to the Person, but match the key demographic information of the Person (*patientMatch*).

8.7.3.2 Retrieve Patient Matches

GET https://rest.api.commonwellalliance.org/v1/person/{*personId*}/patientMatch?orgId={*orgid*}/

Given a known person, an Edge System can request Patient Records contained within an Organization that match the person's demographic data.

The Organization MAY be specified in the optional *orgId* query parameter of the request. If this is not included, the CommonWell server will use the Organization Identifier provided in the authorization token.

This query ONLY returns Local Patient Records that are NOT already linked to the Person. To retrieve the list of linked Local Patient Records, use the *patientLink* link relation.

Sample Request: Search for Matching Patients

```
GET https://rest.api.commonwellalliance.org/v1/person/ c21cc31d-6c57-442b-8e76-
5de498903334/patientMatch?orgId='2.16.840.1.113883.4.3.17' HTTP/1.1
Host: rest.api.commonwellalliance.org
Authorization: Bearer mF_9.B5f-4.1JqM
```

Sample Response: Patient Found

```
HTTP/1.1 200 OK
Content-Length: 174
Content-Type: application/hal+json; charset=utf-8
Date: Wed, 06 Mar 2013 21:12:04 GMT

{
   "_links": {
      "self": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-
5de498903334/patientMatch?orgId='2.16.840.1.113883.4.3.17'"}},
   "message": "CommonWell found one Patient matching the Person.",
   "_embedded": {
      "patient": [{
         "_links": {
            "self": {"href": "/v1/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO"},
            "networkLink": {"href": "/v1/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/networkLink"},
            "personMatch": {"href": "/v1/org/2.16.1.1
/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/person"},
            "downgrade": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-5de498903334/patientMatch/
9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/downgrade"}
            "upgrade": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-5de498903334/patientLink"}},
         "active": true,
         "provider": {
            "type": "Organization",
            "reference": "https://rest.api.commonwellalliance.org/v1/org/2.16.840.1.113883.3.4/",
            "display": "Oswego Health System"},
         "identifier": [{
            "use": "internal",
            "label": "Oswego MRN",
            "key": "9876",
            "system": "urn:oid:2.16.840.1.113883.3.4",
            "assigner": "Oswego Health System"}],
         "details": {
            "name": [{
               "given": ["Frank"],
```


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```
            "family": ["Nolan"]}],
         "address": [{
            "line": ["511 Oswego St"],
            "city": "Chicago",
            "state":  "Il",
            "zip": "60610"}],
         "gender": {
            "system": "http://hl7.org/fhir/vs/administrative-gender",
            "code": "M"},
         "birthDate": "1945-09-24"}}
      ]}
}
```

8.7.3.3 Downgrading a Patient Match

PUT https://rest.api.commonwellalliance.org/v1/person/{*Id*}/patientMatch/{*patientId*}/downgrade

Following a patient match request, an Edge System can instruct CommonWell to remove a particular Patient from subsequent Patient match requests.

This action will also remove the Patient from remote NetworkLink queries in which the subject Patient Record has a PatientLink to the Person identified in this request.

Sample Request

```
PUT https://rest.api.commonwellalliance.org/v1/person/c21cc31d-6c57-442b-8e76-5de498903334/patientMatch/
9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/downgrade HTTP/1.1
Host: rest.api.commonwellalliance.org
Authorization: Bearer mF_9.B5f-4.1JqM
```

8.7.3.4 Upgrading a Patient Match

An Edge System can create a PatientLink for a Patient returned in the result of a patient match using the *upgrade* link relation included in the Patient resource (see Section 8.7.2.1).

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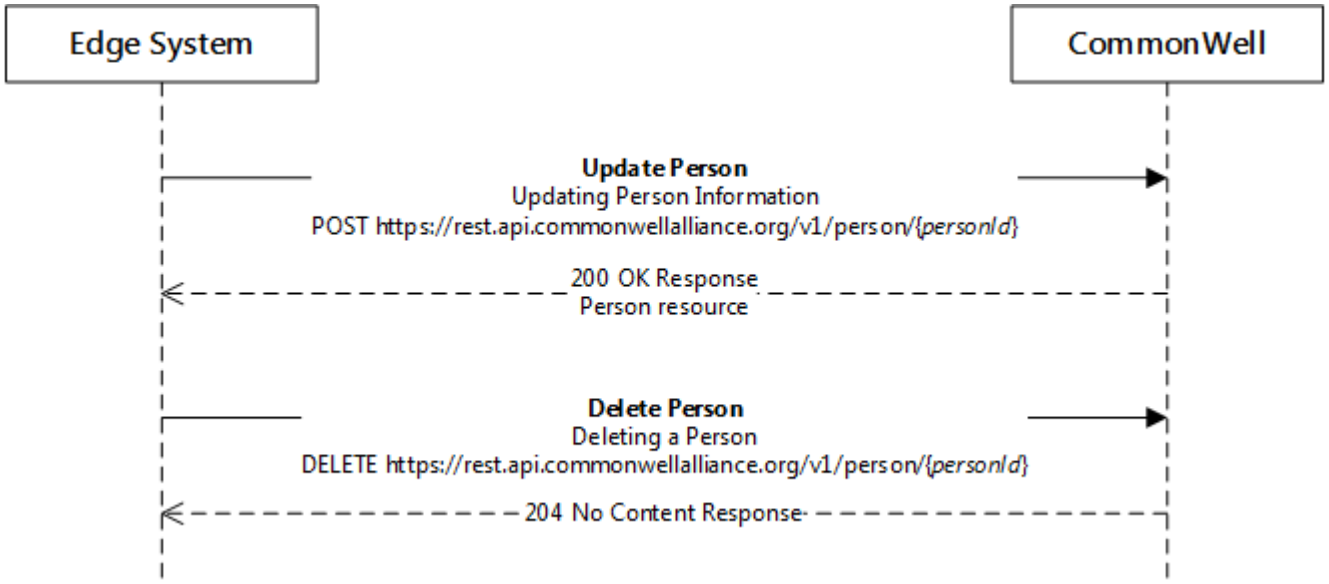
8.7.4 Person Management

This section describes the transaction for updating Person information illustrated in the sequence diagram below.



8.7.4.1 Updating Person Information

POST https://rest.api.commonwellalliance.org/v1/person/{personId}/

The CommonWell request message for updating a Person resource is the same as that for creating a Person resource described in section 8.7.1.5. The only difference is that the URL of the request uniquely identifies the Person resource that is the target of the update.

Sample Request

```
POST https://rest.api.commonwellalliance.org/v1/person/c21cc31d-6c57-442b-8e76-5de498903334 HTTP/1.1
Content-Type: application/json; charset=UTF-8
Host: rest.api.commonwellalliance.org
Content-Length: 2134
Authorization: Bearer mF_9.B5f-4.1JqM

{
   "details": {
      "address": [{
         "zip": "60610",
         "state":  "Il",
         "line": ["511 Oswego St"],
         "city": "Chicago"}],
      "name": [{
         "given": ["Frank"],
         "family": ["Nolan"]}],
      "gender": {
         "code": "M"},
      "birthDate": "1945-09-24",
      "identifier": [{
         "key": "12345ABCD",
         "system": "urn:oid:2.16.840.1.113883.4.3.17",
         "period": {
```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```
            "start": "2011-06-08"}}]
   }
}
```

Sample Response: OK

```
HTTP/1.1 200 OK
Content-Type: application/hal+json; charset=UTF-8
Last-Modified: Wed, 06 Feb 2013 20:54:43 GMT
Date: Wed, 06 Feb 2013 20:54:44 GMT

{
   "_links": {
      "self": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-5de498903334"},
      "unenroll": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-5de498903334/unenroll"},
      "patientLink": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-5de498903334/patientLink"},
      "patientMatch": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-
5de498903334/patientMatch?orgId='2.16.840.1.113883.4.3.17'"}},
   "details": {
      "name": [{
         "given": ["Frank"],
         "family": ["Nolan"]}],
      "identifier": [{
         "use": "official",
         "label": "Illinois Driver's License",
         "system": "urn:oid:2.16.840.1.113883.4.3.17",
         "assigner": "Illinois DMV"}],
      "address": [{
         "zip": "60610",
         "state":  "Il",
         "line": ["511 Oswego St"],
         "city": "Chicago"}],
      "gender": {
         "system": "http://hl7.org/fhir/vs/administrative-gender",
         "code": "M"},
      "birthDate": "1945-09-24"}
}
```

8.7.4.2 Deleting a Person

DELETE https://rest.api.commonwellalliance.org/v1/person/{*personId*}/

Deleting a Person resource removes the Person resource from the system. As part of the deletion process, CommonWell will unenroll the Person from CommonWell and remove all network links to associated Patient resources. Once deleted, the Person will no longer appear in searches.

Sample Request

```
DELETE https://rest.api.commonwellalliance.org/v1/person/c21cc31d-6c57-442b-8e76-5de498903334 HTTP/1.1
Host: rest.api.commonwellalliance.org
Authorization: Bearer mF_9.B5f-4.1JqM
```

Sample Response

```
HTTP/1.1 204 No Content
Date: Mon, 25 Mar 2013 22:20:42 GMT
```


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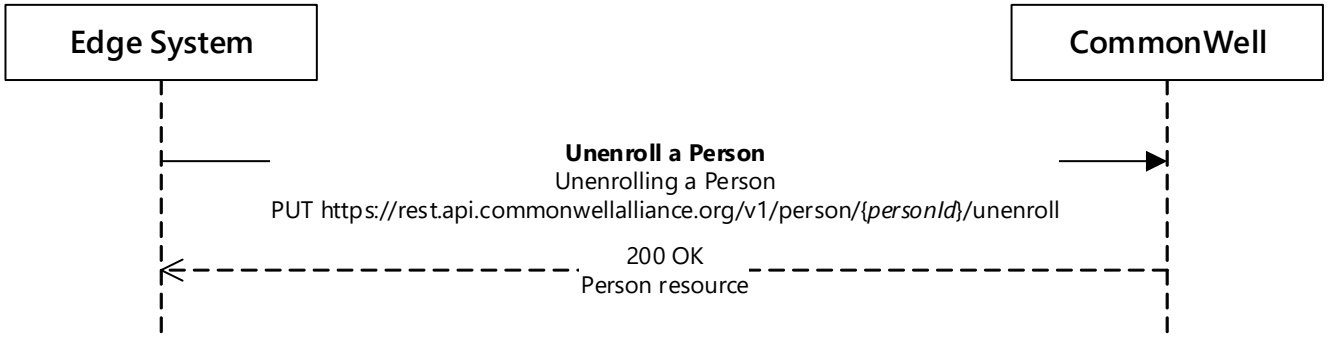
8.7.5 Person Unenrollment

This section describes the transaction for unenrolling a Person illustrated in the sequence diagram below.



8.7.5.1 Unenrolling a Person

PUT https://rest.api.commonwellalliance.org/v1/person/{*personId*}/unenroll

Unenrolling a Person from CommonWell will remove all links to associated Patient resources. The Person may still appear in searches but with its *enrolled* status set to *False*. To re-enroll a patient, perform the steps described in 8.7.1 again.

Sample Request

```
PUT https://rest.api.commonwellalliance.org/v1/person/c21cc31d-6c57-442b-8e76-5de498903334/unenroll HTTP/1.1
Content-Type: application/json
Host: rest.api.commonwellalliance.org
Authorization: Bearer mF_9.B5f-4.1JqM
```

Sample Response: OK

```
HTTP/1.1 200 OK
Content-Type: application/hal+json; charset=UTF-8
Last-Modified: Wed, 06 Feb 2013 20:54:43 GMT
Date: Wed, 06 Feb 2013 20:54:44 GMT

{
   "_links": {
      "self": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-5de498903334"},
      "enroll": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-5de498903334/enroll"}},
   "enrolled": false,
   "enrollmentSummary": {
       "dateEnrolled": "2013-11-24",
       "enroller": "Oswego",
       "dateUnenrolled": "2013-11-28",
       "unenroller": "Brisby Medical"
   },
   "details": {
      "name": [{
         "given": ["Frank"],
         "family": ["Nolan"]}],
      "identifier": [{
```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```
         "use": "official",
         "label": "Illinois Driver’s License",
         "system": "urn:oid:2.16.840.1.113883.4.3.17",
         "assigner": "Illinois DMV"}],
      "address": [{
         "zip": "60610",
         "state":  "Il",
         "line": ["511 Oswego St"],
         "city": "Chicago"}],
      "gender": {
         "system": "http://hl7.org/fhir/vs/administrative-gender",
         "code": "M"},
      "birthDate": "1945-09-24"}
}
```


8.7.6 Patient Management

This section describes the transactions for managing Local Patient Records from an Edge System summarized in the sequence diagram below.

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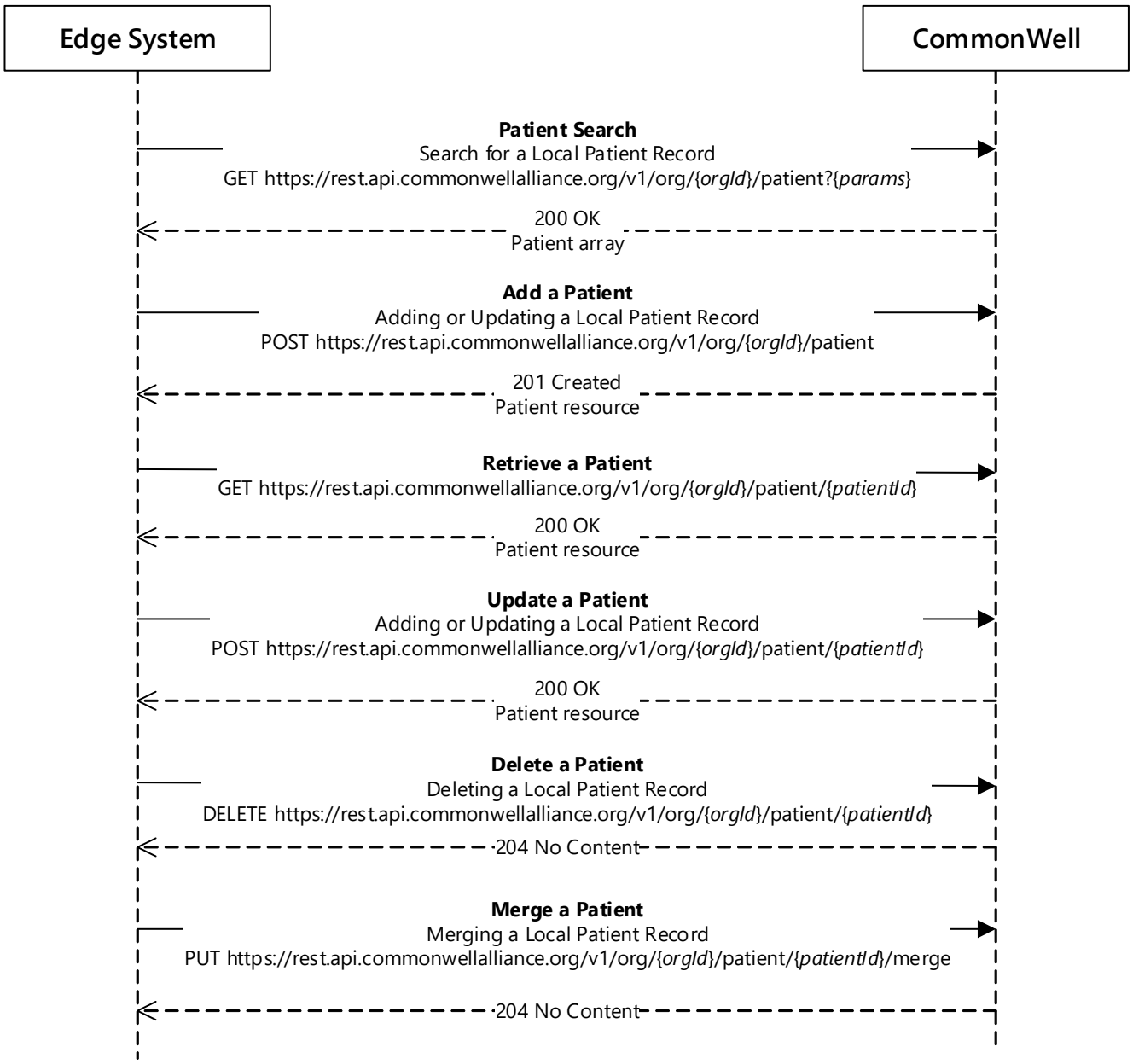

8.7.6.1 Search for a Patient

GET https://rest.api.commonwellalliance.org/v1/org/{ *orgid* }/patient?{*parameters*}

An Edge System can search for an existing Patient based on demographic information. The query parameters are provided in a query string as a series of name-value pairs.

Parameters

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- fname (**required**)
- lname (**required**)
- dob (**required**)
- gender (optional)
- zip (optional)

Sample Request: Search for Patient

```
GET
hhttps://rest.api.commonwellalliance.org/v1/org/2.16.840.1.113883.3.4/patient?fname=Frank&lname=Nolan&dob=1945-
09-24&gender=m&zip=60610 HTTP/1.1
Host: rest.api.commonwellalliance.org
Authorization: Bearer mF_9.B5f-4.1JqM
```

The CommonWell server returns the Patient Records matching the search criteria.

Sample Response: Patient Found

```
HTTP/1.1 200 OK
Content-Length: 174
Content-Type: application/hal+json; charset=utf-8
Date: Wed, 06 Mar 2013 21:12:04 GMT

{
   "_links": {
      "self": {"href": "v1/org/2.16.840.1.113883.3.4/patient?fname=Frank&lname=Nolan&dob=1945-09-
24&gender=m&zip=606130}},
   "message": "CommonWell found one Patient matching your search criteria.",
   "_embedded": {
      "patient": [{
         "_links": {
            "self": {"href":
"/v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO"},
            "networkLink": {"href":
"/v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/networkLink"},
            "personMatch": {"href":
"/v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/person"},
            "downgrade": {"href": "/v1/person/c21cc31d-6c57-442b-8e76-5de498903334/patientMatch/
9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/downgrade"}},
         "active": true,
         "provider": {
            "type": "Organization",
            "reference": "https://rest.api.commonwellalliance.org/v1/org/2.16.840.1.113883.3.4/",
            "display": "Oswego Health System"},
         "identifier": [{
            "use": "internal",
            "label": "Oswego MRN",
            "key": "9876",
            "system": "urn:oid:2.16.840.1.113883.3.4",
            "assigner": "Oswego Health System"}],
         "details": {
            "name": [{
               "given": ["Frank"],
               "family": ["Nolan"]}],
            "address": [{
               "line": ["511 Oswego St"],
               "city": "Chicago",
               "state":  "Il",
               "zip": "60610"}],
            "gender": {
               "system": "http://hl7.org/fhir/vs/administrative-gender",
```


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```
              "code": "M"},
            "birthDate": "1945-09-24"}}
      ]}
}
```

If the user identified in the authorization token does not have permission to search the Organization referenced in the request, the CommonWell server returns an authorization error.

Sample Response: Authorization Error

```
HTTP/1.1 403 Forbidden
Content-Length: 64
Content-Type: application/json; charset=utf-8
Date: Wed, 06 Mar 2013 21:12:04 GMT

{
   "message": "You are not authorized to search for patients in this Organization.",
   "code": XXXX,
   "help": {"href": "http://rest.api.commonwellalliance.org/help/#patient"}
}
```

8.7.6.2 Adding a Local Patient Record

POST https://rest.api.commonwellalliance.org/v1/org/{*orgId*}/patient

Adding patient information to the CommonWell server using the Patient resource is functionally equivalent to ADT event notifications in a PIX ITI-8 transaction.

The URL template for adding a patient has one variable that is essential to uniquely identifying a local Patient Record:

- *orgId* – Identifies the Patient Identity Domain owned by the Organization represented by the Edge System.

Required Parameters

- patient
  - identifier (one identifier is always required; two identifiers are required for correlated linking)
    - key
    - system
  - details
    - name
      - family
      - given
    - birthDate
    - gender
      - code
    - address
      - zip

Sample Request

```
POST https://rest.api.commonwellalliance.org/v1/org/2.16.840.1.113883.3.4/patient HTTP/1.1
Content-Type: application/json
```


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```
Host: rest.api.commonwellalliance.org
Content-Length: 363

{
   "identifier": [{
      "use": "internal",
      "label": "Oswego MRN",
      "key": "9876",
      "system": "urn:oid:2.16.840.1.113883.3.4",
      "assigner": "Oswego Health System"}],
   "details": {
      "name": [{
         "family": ["Nolan"],
         "given": ["Frank"],
         "use": "usual"}],
      "address": [{
         "line": ["511 Oswego St"],
         "city": "Chicago",
         "state":  "Il",
         "zip": "60610"}],
      "birthDate": "1945-09-24",
      "gender": {
         "code": "M"},
      "telecom": [{
         "system": "phone",
         "use": "home",
         "value": "(708) 555 6473"}]
   }
}
```

Sample Response

```
HTTP/1.1 201 Created
Content-Length: 1234
Content-Type: application/hal+json; charset=UTF-8
Last-Modified: Wed, 06 Feb 2013 20:52:58 GMT
Date: Wed, 06 Feb 2013 20:54:59 GMT

{
   "_links": {
         "self": {"href": "/v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/"},
         "personMatch": {"href":
"/v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/person"},
         "networkLink": {"href":
"/v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/networkLink"}},
   "identifier": [{
      "use": "internal",
      "label": "Oswego MRN",
      "key": "9876",
      "system": "urn:oid:2.16.840.1.113883.3.4",
      "assigner": "Oswego Health System"}],
   "details": {
      "address": [{
         "line": ["511 Oswego St"],
         "city": "Chicago",
         "state":  "Il",
         "zip": "60610"}],
      "birthDate": "1945-09-24",
      "gender": {
         "code": "M",
         "system": "http://hl7.org/fhir/vs/administrative-gender"},
      "name": [{
         "family": ["Nolan"],
         "given": ["Frank"]}],
      "telecom": [{
         "system": "phone",
```


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```
        "use": "home",
        "value": "(708) 555-6473"}]
   }
}
```

The following example shows how to provide the facility identifier in the add local patient request in order to associate the patient with the facility.

Note: This should only be used for organizations that are utilizing the facility model for managing organization hierarchies.

Sample Request: Providing Facility Information

```
POST https://rest.api.commonwellalliance.org/v1/org/2.16.840.1.113883.3.4/patient HTTP/1.1
Content-Type: application/json
Host: rest.api.commonwellalliance.org
Content-Length: 363

{
   "identifier": [{
      "use": "internal",
      "label": "Oswego MRN",
      "key": "9876",
      "system": "urn:oid:2.16.840.1.113883.3.4",
      "assigner": "Oswego Health System"
   }],
   "details": {
      "name": [{
         "family": ["Nolan"],
         "given": ["Frank"],
         "use": "usual"}],
      "address": [{
         "line": ["511 Oswego St"],
         "city": "Chicago",
         "state":  "Il",
         "zip": "60610"}],
      "birthDate": "1945-09-24",
      "gender": {
         "code": "M"},
      "telecom": [{
         "system": "phone",
         "use": "home",
         "value": "(708) 555 6473"}]
   },
   "facilities": [{
      "id":"urn:oid:2.16.840.1.113883.3.4.1",
      "name":"Uptown Clinic"
   }]
}
```

The following example shows how to provide multiple identifiers in order to create the local patient along with linking them to a remote patient through the correlated linking functionality.

Sample Request: Multiple Identifiers

```
POST https://rest.api.commonwellalliance.org/v1/org/2.16.840.1.113883.3.4/patient HTTP/1.1
Content-Type: application/json
Host: rest.api.commonwellalliance.org
Content-Length: 363

{
   "identifier": [{
```


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```
      "use": "internal",
      "label": "Oswego MRN",
      "key": "9876",
      "system": "urn:oid:2.16.840.1.113883.3.4",
      "assigner": "Oswego Health System"
   },
   {
      "use": "internal",
      "label": "Lab MRN",
      "key": "9876",
      "system": "urn:oid:1.3.6.1.4.1.29928",
      "assigner": "Oswego Lab"

   }],
   "details": {
      "name": [{
         "family": ["Nolan"],
         "given": ["Frank"],
         "use": "usual"}],
      "address": [{
         "line": ["511 Oswego St"],
         "city": "Chicago",
         "state":  "Il",
         "zip": "60610"}],
      "birthDate": "1945-09-24",
      "gender": {
         "code": "M"},
      "telecom": [{
         "system": "phone",
         "use": "home",
         "value": "(708) 555 6473"}]
   }
}
```


8.7.6.3 Updating a Local Patient Record

POST https://rest.api.commonwellalliance.org/v1/org/{*orgId*}/patient/{*patientId*}/

Updating patient information is functionally equivalent to ADT event notifications in a PIX ITI-8 transaction.

The URL template for updating a patient has two variables that are essential to uniquely identifying a local Patient Record:

- *orgId* – Identifies the Patient Identity Domain owned by the Organization represented by the Edge System.
- *patientId* – The local Patient Identifier. The value is under the control of the local Edge System and represents the unique identifier for the Patient Record in the local system. The format for this identifier MUST follow the HL7 CX data type format: *IdentifierValue^^^AssigningAuthority*.

Note: The Patient Identifier MUST be percent encoded in all URLs (see RFC 3986: http://tools.ietf.org/html/rfc3986). For example, the *patientId* "1234^^^&1.3.6.1.4.1.29928&ISO" will be represented in a URL string as "1234%5E%5E%5E 1.3.6.1.4.1.29928%26ISO".

Together, the *orgId* and *patientId* establish a unique URL resource identifier for a Patient Record in the CommonWell REST interface.

Required Parameters

- patient

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- identifier
  - key
  - system
- details
  - name
    - family
    - given
  - birthDate
  - gender
    - code
  - address
    - zip

Sample Request

```
POST
https://rest.api.commonwellalliance.org/v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3
.4%26ISO/ HTTP/1.1
Content-Type: application/json
Host: rest.api.commonwellalliance.org
Content-Length: 363

{
   "identifier": [{
      "use": "internal",
      "label": "Oswego MRN",
      "key": "9876",
      "system": "urn:oid:2.16.840.1.113883.3.4",
      "assigner": "Oswego Health System"}],
   "details": {
      "name": [{
         "family": ["Nolan"],
         "given": ["Frank"],
         "use": "usual"}],
      "address": [{
         "line": ["511 Oswego St"],
         "city": "Chicago",
         "state":  "Il",
         "zip": "60610"}],
      "birthDate": "1945-09-24",
      "gender": {
         "code": "M"},
      "telecom": [{
         "system": "phone",
         "use": "home",
         "value": "(708) 555 6473"}]
   }
}
```

Sample Response

```
HTTP/1.1 200 OK
Content-Length: 1234
Content-Type: application/hal+json; charset=UTF-8
Last-Modified: Wed, 06 Feb 2013 20:52:58 GMT
Date: Wed, 06 Feb 2013 20:54:59 GMT

{
   "_links": {
```


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```
         "self": {"href": "/v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/"},
         "personMatch": {"href":
"/v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/person"},
         "networkLink": {"href":
"/v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/networkLink"}},
   "identifier": [{
      "label": "CommonWell Identifier",
      "key": "abcdefg",
      "system": "urn:oid: 2.16.840.1.113883.3.3330.32",
      "assigner": "CommonWell"},
      {
      "use": "internal",
      "label": "Oswego MRN",
      "key": "9876",
      "system": "urn:oid:2.16.840.1.113883.3.4",
      "assigner": "Oswego Health System"}],
   "details": {
      "address": [{
         "line": ["511 Oswego St"],
         "city": "Chicago",
         "state":  "Il",
         "zip": "60610"}],
      "birthDate": "1945-09-24",
      "gender": {
         "code": "M",
         "system": "http://hl7.org/fhir/vs/administrative-gender"},
      "name": [{
         "family": ["Nolan"],
         "given": ["Frank"]}],
      "telecom": [{
         "system": "phone",
         "use": "home",
         "value": "(708) 555-6473"}]
   }
}
```


The CommonWell server automatically creates the CommonWell Identifier.

8.7.6.4 Deleting a Local Patient Record

DELETE https://rest.api.commonwellalliance.org/v1/org/{*orgId*}/patient/{*patientId*}/

The URL template for deleting a patient has two variables that are essential to uniquely identifying a local Patient Record:

- *orgId* – Identifies the Patient Identity Domain owned by the Organization represented by the Edge System.
- *patientId* – The local Patient Identifier. The value is under the control of the local Edge System and represents the unique identifier for the Patient Record in the local system.

Sample Request

```
DELETE
https://rest.api.commonwellalliance.org/v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3
.4%26ISO/ HTTP/1.1
Host: rest.api.commonwellalliance.org
Authorization: Bearer mF_9.B5f-4.1JqM
```


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Sample Response

```
HTTP/1.1 204 No Content
Date: Wed, 06 Feb 2013 20:54:44 GMT
```

8.7.6.5 Merging Local Patient Records

PUT https://rest.api.commonwellalliance.org/v1/org/{*orgId*}/patient/{*non-surviving-patientId*}/merge

This operation supports merging Patient Records within an Organization. It is functionally equivalent to ADT merge event notifications in a PIX ITI-8 transaction.

The URL template for merging a patient has two variables identifying the local Patient Record subject to merge:

- *orgId* – Identifies the Patient Identity Domain owned by the Organization represented by the Edge System.
- *non-surviving-patientId* – The local Patient Identifier of the non-surviving Patient Record. The value is under the control of the local Edge System and represents the unique identifier for the Patient Record in the local system.

The body of the PUT request MUST be a Link resource with its *type* property value set to "replace".

Sample Request

```
PUT
https://rest.api.commonwellalliance.org/v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3
.4%26ISO/merge HTTP/1.1
Content-Type: application/json
Host: rest.api.commonwellalliance.org
Content-Length: 63
Authorization: Bearer mF_9.B5f-4.1JqM

{
  "link":
      {
        "other": {
          "reference": "patient/1234%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/"
        },
        "type": "replace"
      }
}
```

Sample Response

```
HTTP/1.1 204 No Content
Date: Wed, 06 Feb 2013 20:54:44 GMT
```


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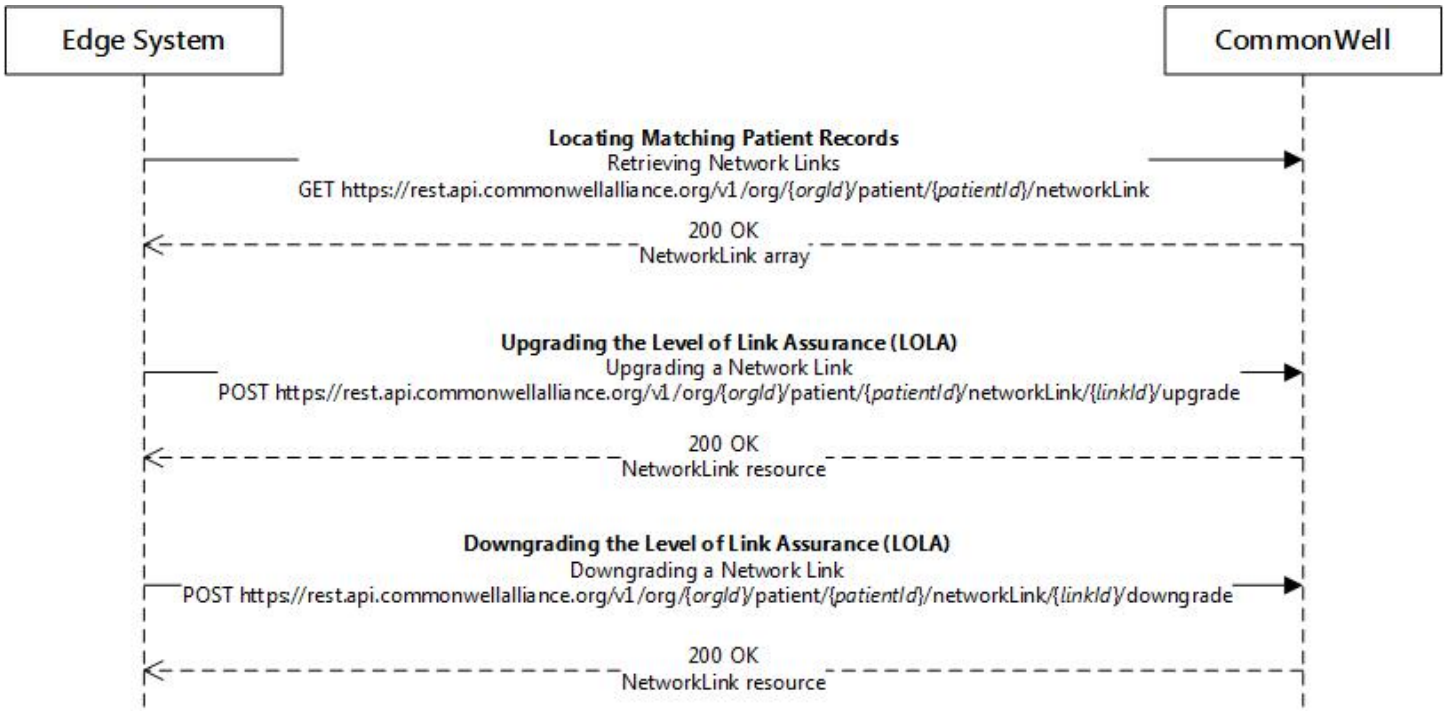
8.7.7 Record Location and Patient-to-Patient Linking

This section describes the operations associated with the NetworkLink resource used to manage patient-to-patient linking. The transactions are summarized in the sequence diagram below.

For REST-based linking of Patient Records within a specific Organization, see the Merge Operation in Patient Administration.



8.7.7.1 Retrieving Network Links

GET https://rest.api.commonwellalliance.org/v1/{*orgId*}/patient/{*patientId*}/networkLink

Obtaining the network links associated with a local Patient Record is the primary transaction for discovery of Patient Records across the CommonWell network. The results from this request will return zero or more network links with associated levels of link assurance. This section provides examples of common scenarios and the actions an Edge System can take in response to each.

Discovery of network links begins with a GET request for the network links for a Patient Record.

Sample Request: Get Network Links

```
GET
https://rest.api.commonwellalliance.org/v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3
.4%26ISO/networkLink HTTP/1.1
Host: rest.api.commonwellalliance.org
Authorization: Bearer mF_9.B5f-4.1JqM
```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Sample Response: One Level 3 Link

```
HTTP/1.1 200 OK
Content-Length: 1234
Content-Type: application/hal+json; charset=UTF-8
Date: Wed, 06 Feb 2013 20:54:59 GMT

{
   "_links": {
      "self": {"href": "v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/
networkLink"}},
   "_embedded": {
      "networkLink": [{
         "_links": {
            "self": {"href":
v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/networkLink/150a03eb"}},
         "assuranceLevel": "3",
         "patient": {
            "details": {
               "identifier": [{
                  "assigner": "Illinois DMV",
                  "period": {
                     "start": "2010-09-12"},
                  "system": "urn:oid:2.16.840.1.113883.4.3.17",
                  "use": "official"}],
               "address": [{
                  "line": ["511 Oswego St"],
                  "city": "Chicago",
                  "state":  "Il",
                  "zip": "60610"}],
               "birthDate": "1945-09-24",
               "gender": {
                  "code": "M",
                  "system": "http://hl7.org/fhir/vs/administrative-gender"},
               "name": [{
                  "family": ["Nolan"],
                  "given": ["Frank"]}]
         }}
   }]
}}
```

In this example, CommonWell has returned a single network link that is validated with a Level 3 LOLA.

Sample Response: One Level 1 Link

```
HTTP/1.1 200 OK
Content-Length: 1234
Content-Type: application/hal+json; charset=UTF-8
Date: Wed, 06 Feb 2013 20:54:59 GMT

{
   "_links": {
      "self": {"href": "v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO
/networkLink"}},
   "_embedded": {
      "networkLink": [{
         "_links": {
            "self": {"href":
"v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/networkLink/a1effd9"},
            "upgrade": {"href":
"v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/networkLink/a1effd9/upgrade"},
            "downgrade": {"href":
"v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/networkLink/a1effd9/downgrade"
}},
         "assuranceLevel": "1",
```


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```
        "patient": {
           "details": {
              "address": [{
                 "line": ["511 Oswego St"],
                 "city": "Chicago",
                 "state":  "Il",
                 "zip": "60610"}],
              "birthDate": "1945-09-24",
              "gender": {
                 "code": "M",
                 "system": "http://hl7.org/fhir/vs/administrative-gender"},
              "name": [{
                 "family": ["Nolan"],
                 "given": ["Frank"]}]},
        "visit": [{
           "class": "inpatient",
           "date": {
              "start": "2012-05-29",
              "end": "2012-05-30"},
           "location": "St. Barnabas Hospital",
           "reason": "appendectomy",
           "participant": [{
              "details": {
                 "name": [{
                    "given": ["Jeffrey"],
                    "family": ["Geiger"],
                    "suffix": ["MD"]}]}}]
      }]
   }]}
}
```


In this example, the single remote link is represented as an embedded resource. Consuming Edge Systems may use this data to present detail about a Level 1 presumptive match for purposes of determining the validity of the match.

Sample Response: One Level 1 Link with Facility Information


```
HTTP/1.1 200 OK
Content-Length: 1234
Content-Type: application/hal+json; charset=UTF-8
Date: Wed, 06 Feb 2013 20:54:59 GMT

{
   "_links": {
      "self": {"href": "v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO
/networkLink"}},
   "_embedded": {
      "networkLink": [{
         "_links": {
            "self": {"href":
"v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/networkLink/a1effd9"},
            "upgrade": {"href":
"v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/networkLink/a1effd9/upgrade"},
            "downgrade": {"href":
"v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/networkLink/a1effd9/downgrade"
}},
         "assuranceLevel": "1",
         "patient": {
            "provider": {
              "type":"organization",
              "reference":"v1/org/2.16.840.1.113883.3.4/",
              "display":"Organization Name"
            },
            "facilities":[{
               "id":"urn:oid:2.16.840.1.113883.3.4.11",
               "name":"Fremont Uptown Clinic",
```


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```
                "address": {
                   "line":[2500 N. Fremont St.],
                   "city":"Chicago",
                   "state":"IL",
                   "zip":"60610"
                }
         }, {
                "id":" urn:oid:2.16.840.1.113883.3.4.12",
                "name":"Bleaker Downtown Care",
                "address": {
                   "line":[1500 Bleaker Blvd.],
                   "city":"Chicago",
                   "state":"IL",
                   "zip":"60610"
                }
         }],
         "details": {
                "address": [{
                   "line": ["511 Oswego St"],
                   "city": "Chicago",
                   "state":  "Il",
                   "zip": "60610"}],
                "birthDate": "1945-09-24",
                "gender": {
                   "code": "M",
                   "system": "http://hl7.org/fhir/vs/administrative-gender"},
                "name": [{
                   "family": ["Nolan"],
                   "given": ["Frank"]
                }]
          },
         "visit": [{
            "class": "inpatient",
            "date": {
               "start": "2012-05-29",
               "end": "2012-05-30"},
            "location": "St. Barnabas Hospital",
            "reason": "appendectomy",
            "participant": [{
               "details": {
                  "name": [{
                     "given": ["Jeffrey"],
                     "family": ["Geiger"],
                     "suffix": ["MD"]}]}}]
      }]
   }]}
}
```


In this example, the response will contain a collection of facilities that the patient visited to assist with the link verification.

Note: This new collection will only be provided in the response if the organization associated with the patient is using the facility model to manage their organization hierarchies.

Sample Response: Multiple Network Links


```
HTTP/1.1 200 OK
Content-Length: 4567
Content-Type: application/hal+json; charset=UTF-8
Date: Wed, 06 Feb 2013 20:54:59 GMT

{
   "_links": {
```


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```
      "self": {"href":
"v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/networkLink"}},
   "_embedded": {
      "networkLink": [{
         "_links": {
            "self": {"href":
"v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/networkLink/da547f1d"},
         "assuranceLevel": "3",
         "patient": {
            "details": {
               "address": [{
                  "line": ["511 Oswego St"],
                  "city": "Chicago",
                  "state":  "Il",
                  "zip": "60610"}],
               "birthDate": "1945-09-24",
               "gender": {
                  "code": "M",
                  "system": "http://hl7.org/fhir/vs/administrative-gender"},
               "name": [{
                  "family": ["Nolan"],
                  "given": ["Frank"]}],
               "identifier": [{
                  "use": "official",
                  "label": "Illinois driver’s license",
                  "system": "urn:oid:2.16.840.1.113883.4.3.17",
                  "assigner": "Illinois DMV"}]}}},
         {
         "_links": {
            "self": {"href":
"v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/networkLink/d4607fcd"},
            "downgrade": {"href":
"v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/networkLink/d4607fcd/downgrade
"}},
         "assuranceLevel": "2",
         "patient": {
            "details": {
               "address": [{
                  "line": ["511 Oswego Stret"],
                  "city": "Chicago",
                  "state":  "Il",
                  "zip": "60610"}],
               "birthDate": "1945-09-24",
               "gender": {
                  "code": "M",
                  "system": "http://hl7.org/fhir/vs/administrative-gender"},
               "name": [{
                  "family": ["Nolan"],
                  "given": ["Frank"]}]}}},
         {
         "_links": {
            "self": {"href":
"v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/networkLink/a1effd9"},
            "upgrade": {"href":
"v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/networkLink/a1effd9/upgrade"},
            "downgrade": {"href":
"v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/networkLink/a1effd9/downgrade"
}},            "assuranceLevel": "1",
         "patient": {
            "details": {
               "address": [{
                  "line": ["511 Oswego"],
                  "city": "Chicago",
                  "state":  "Il",
                  "zip": "60610"}],
               "birthDate": "1945-09-24",
               "gender": {
```


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```
                  "code": "M",
                  "system": "http://hl7.org/fhir/vs/administrative-gender"},
               "name": [{
                  "family": ["Nolan"],
                  "given": ["Frank"]}]}}},
         {
         "_links": {
            "self": {"href":
"v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/networkLink/b850c8"},
            "upgrade": {"href":
"v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/networkLink/b850c8/upgrade"},
            "downgrade": {"href":
"v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/networkLink/b850c8/downgrade"}
},
         "assuranceLevel": "1",
         "patient": {
            "details": {
               "address": [{
                  "line": ["511 Oswego Street"],
                  "city": "Chicago",
                  "state":  "Il",
                  "zip": "60610"}],
               "birthDate": "1945-09-24",
               "gender": {
                  "code": "M",
                  "system": "http://hl7.org/fhir/vs/administrative-gender"},
               "name": [{
                  "family": ["Nolan"],
                  "given": ["Frank"]}]}}}
      ]}
}
```


In this example, the CommonWell server returned an ordered list of network links ranked by confidence level.

Sample Response: Patient not linked to Person


```
HTTP/1.1 412 Precondition Failed
Content-Type: application/json; charset=utf-8
Date: Fri, 05 Sep 2014 22:40:53 GMT
Content-Length: 273

{
  "message": "Patient with Local Id 7128LKZX^^^urn:oid:1.3.3.556 is not linked to any Person",
  "code": 9532,
  "reference": "73bb2c7a-e9f5-4faf-ab61-39792a5a3ddb",
  "help": {
    "href":
"https://commonwellalliance.sharepoint.com/developers/SitePages/Log%20Message%20Troubleshooting.aspx"
  }
}
```


8.7.7.2 Upgrading a Network Link

POST https://rest.api.commonwellalliance.org/v1/{*orgId*}/patient/{*patientId*}/networkLink/{*linkId*}/upgrade

The URL template for validating a relationship between a Local Patient Record and a Remote Patient Record has three variables:

- *orgId* –Identifies the Patient Identity Domain owned by the Organization represented by the Edge System.

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- *patientId* – The local Patient Identifier. The value is under the control of the local Edge System and represents the unique identifier for the Patient Record in the local system.
- *linkId* – The network link identifier.

Optional Variables

• proxy	Element	0…1	The proxy for the patient link action.
• name	String	1…1	The full name of the proxy.
• relationship	CodeableConcept	1…1	The relationship of the proxy to the patient.

As shown in the previous examples, the template is populated with this data in the *upgrade* link relation included in the *_links* collection of the NetworkLink resource.

Sample Request

```
POST
https://rest.api.commonwellalliance.org/v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3
.4%26ISO/networkLink/a1effd9/upgrade HTTP/1.1
Host: rest.api.commonwellalliance.org
Authorization: Bearer mF_9.B5f-4.1JqM


{
    “Proxy”:
    {
        “Relationship”:”Parent”,
        “Name:”John Smith”
    }
}
```

Sample Response: OK

```
HTTP/1.1 200 OK
Content-Type: application/hal+json; charset=UTF-8
Date: Wed, 06 Feb 2013 20:54:44 GMT

{
   "_links": {
      "self": {"href":
"v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/networkLink/b850c8"},
      "downgrade": {"href":
"v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/networkLink/b850c8/downgrade"}
},
   "assuranceLevel": "2",
   "patient": {
      "details": {
         "address": [{
            "line": ["511 Oswego Street"],
            "city": "Chicago",
            "state":  "Il",
            "zip": "60610"}],
         "birthDate": "1945-09-24",
```


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```
        "gender": {
           "code": "M",
           "system": "http://hl7.org/fhir/vs/administrative-gender"},
        "name": [{
           "family": ["Nolan"],
           "given": ["Frank"]}]}}
   }
}
```

If the current LOLA of the NetworkLink is NOT level 1, the CommonWell server will return an error.

Sample Response: Invalid LOLA State

```
HTTP/1.1 409 Conflict
Content-Length: 67
Content-Type: application/json; charset=UTF-8
Date: Wed, 06 Feb 2013 20:54:59 GMT

{
   "message": "The network link cannot be upgraded given its current level of link assurance.",
   "code": XXX,
   "help": {"href": "http://rest.api.commonwellalliance.org/help/#networkLink"}
}
```

8.7.7.3 Downgrading a Network Link

POST https://rest.api.commonwellalliance.org/v1/{*orgId*}/patient/{*patientId*}/networkLink/{*linkId*}/downgrade

The URL template for invalidating a relationship between a Local Patient Record and a Remote Patient Record has three variables:

- *orgId* – Identifies the Patient Identity Domain owned by the Organization represented by the Edge System.
- *patientId* – The local Patient Identifier. The value is under the control of the local Edge System and represents the unique identifier for the Patient Record in the local system.
- *linkId* – The network link identifier.

As shown in the previous examples, the template is populated with this data in the *downgrade* link relation included in the *_links* collection of the NetworkLink resource.

Sample Request

```
POST
https://rest.api.commonwellalliance.org/v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3
.4%26ISO/networkLink/a1effd9/downgrade HTTP/1.1
Host: rest.api.commonwellalliance.org
Authorization: Bearer mF_9.B5f-4.1JqM
```

Sample Response: OK

```
HTTP/1.1 200 OK
Content-Type: application/hal+json; charset=UTF-8
Date: Wed, 06 Feb 2013 20:54:44 GMT

{
   "_links": {
      "self": {"href":
"v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO/networkLink/b850c8"}},
```


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```
   "assuranceLevel": "0",
   "patient": {
      "details": {
         "address": [{
            "line": ["511 Oswego Street"],
            "city": "Chicago",
            "state":  "Il",
            "zip": "60610"}],
         "birthDate": "1945-09-24",
         "gender": {
            "code": "M",
            "system": "http://hl7.org/fhir/vs/administrative-gender"},
         "name": [{
            "family": ["Nolan"],
            "given": ["Frank"]}]}}
   }
}
```

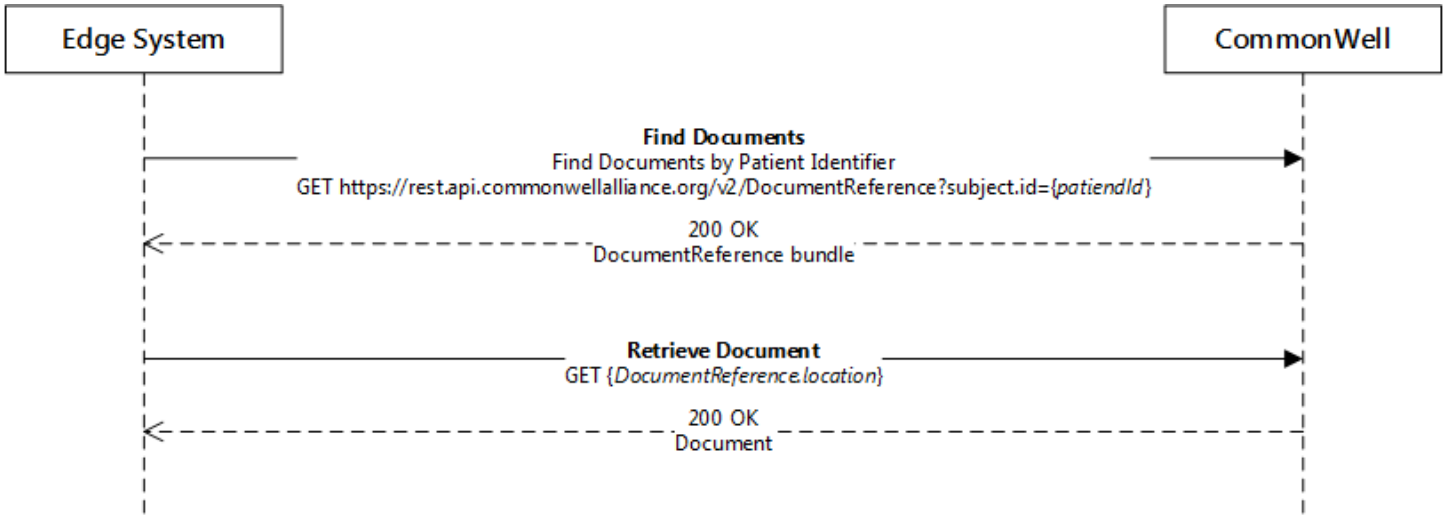
If the current LOLA of the NetworkLink is NOT level 1 or 2, the CommonWell server will return an error.

Sample Response: Invalid LOLA State

```
HTTP/1.1 409 Conflict
Content-Length: 67
Content-Type: application/json; charset=UTF-8
Date: Wed, 06 Feb 2013 20:54:59 GMT

{
   "message": "The network link cannot be downgraded given its current level of link assurance.",
   "code": XXXX,
   "help": {"href": "http://rest.api.commonwellalliance.org/help/#networkLink"}
}
```

8.7.8 Document Query and Retrieve



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This section is based on the transactions described in the IHE Mobile Health Documents (MHD) profile. IHE and HL7 FHIR working groups are collaborating to revise and enhance MHD, and this portion of the CommonWell service is subject to change once MHD has stabilized.

8.7.8.1 Find Documents

GET https://rest.api.commonwellalliance.org/v2/DocumentReference?subject.id={*patiendId*}

Find Documents is equivalent to the IHE ITI-18 (Registry Stored Query) transaction. It finds *DocumentReference* resources satisfying provided query parameters. The result of the query is a bundle of *DocumentReference* resources that match the query parameters.

Search Parameter	Required	Notes
subject.id	Yes	*Token* matching the value of the patient identifier: [**system**]|[**code**]: the value of [code] matches Identifier.value and the value of [system] matches the system property of the Identifier, separated by a pipe delimiter.
created	No	A *date* specifying the time when the DocumentReference was created. Edge Systems shall populate the created search parameter using either a less-than or equal to, or greater-than or equal to search parameter modifier. In XDS nomenclature, this query parameter represents from/to parameters filtering by when the submission set was submitted.
author.given and author.family	No	Specify the name parts of the author person associated with the DocumentReference.
contentTypeCode	No	A *token* specifying the *contentTypeCode* value supplied in the DocumentReference resource, or in XDS nomenclature, the content type of the submission set.
status	No	The status of the DocumentReference, or in XDS nomenclature, the availability status of the submission set, using one of the shortened values listed below: **Short Code** — **ebRIM Code equivalent** current — urn:oasis:names:tc:ebxml-regrep:StatusType:Approved superceded — urn:oasis:names:tc:ebxml-regrep:StatusType:Deprecated

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A token type is a parameter that searches on a code or identifier value where the value may have a URI that scopes its meaning.

Sample Request

In this example, the query string contains the mandatory subject identifier for the patient (urn:oid:2.16.840.1.113883.3.4|9876) and optional status input parameters.

```
GET https://rest.api.commonwellalliance.org/v2/DocumentReference?
subject.id=urn%3Aoid%3A2.16.840.1.113883.3.4%7C9876&status=current HTTP/1.1
Host: rest.api.commonwellalliance.org
Authorization: Bearer mF_9.B5f-4.1JqM
```

Sample Response

```
HTTP/1.1 200 OK
Content-Type: application/hal+json; charset=UTF-8
Date: Wed, 06 Oct 2014 20:54:44 GMT

{
  "_links": {
    "self": {
      "href": "/v2/DocumentReference?subject.id=urn%3Aoid%3A2.16.840.1.113883.3.4%7C9876&status=current"
    }
  },
  "_embedded": {
    "DocumentReference": [
      {
        "resourceType": "DocumentReference",
        "text": {
          "status": "generated",
          "div": "<div>\n <p>\n <b>Generated Narrative</b>"
        },
        "contained": [
          {
            "resourceType": "Practitioner",
            "_id": "a1",
            "name": {
              "family": [
                "Geiger"
              ],
              "given": [
                "Geoffrey"
              ]
            },
            "telecom": [
              {
                "system": "email",
                "value": "ggieger@oswego.org"
              }
            ],
            "organization": {
              "display": "Oswego Medical"
            },
            "role": [
              {
                "text": "Primary Surgeon"
              }
            ],
            "specialty": [
              {
                "text": "Orthopedic"
```


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```
            }
          ]
        },
        {
          "resourceType": "Practitioner",
          "_id": "a2",
          "name": {
            "family": [
              "Smitty"
            ],
            "given": [
              "Gerald"
            ]
          },
          "telecom": [
            {
              "system": "email",
              "value": "gsmitty@oswego.org"
            }
          ],
          "organization": {
            "display": "Oswego Medical"
          },
          "role": [
            {
              "text": "Attending"
            }
          ],
          "specialty": [
            {
              "text": "Orthopedic"
            }
          ]
        }
      ],
      "masterIdentifier": {
        "system": "urn:ietf:rfc:3986",
        "value": "urn:oid:1.3.6.1.4.1.21367.2005.3.7"
      },
      "subject": {
        "reference": "Patient/1234 "
      },
      "type": {
        "coding": [
          {
            "code": "34108-1",
            "display": "Outpatient Note"
          }
        ]
      },
      "author": [
        {
          "reference": "#a1"
        },
        {
          "reference": "#a2"
        }
      ],
      "created": "2005-12-24T09:35:00+11:00",
      "indexed": "2005-12-24T09:43:41+11:00",
      "status": "current",
      "description": "Physical",
      "confidentiality": [
        {
          "coding": [
            {
              "code": "1.3.6.1.4.1.21367.2006.7.101",
```


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```
                "display": "Clinical-Staff"
              }
            ]
          }
        ],
        "primaryLanguage": "en-US",
        "mimeType": "application/hl7-v3+xml",
        "size": 3654,
        "hash": "da39a3ee5e6b4b0d3255bfef95601890afd80709",
        "location": "https://rest.api.commonwellalliance.org/Binary/urn%3Aoid%3A1.3.6.1.4.1.21367.2005.3.7",
        "context": {
          "event": [
            {
              "coding": [
                {
                  "code": "T-D8200",
                  "display": "Arm"
                }
              ]
            }
          ],
          "period": {
            "start": "2004-12-23T08:00:00",
            "end": "2004-12-23T08:01:00"
          },
          "facilityType": {
            "coding": [
              {
                "code": "Outpatient",
                "display": "Outpatient"
              }
            ]
          }
        }
      }
    ]
  }
}
```


8.7.8.2 Retrieve Document

GET {*DocumentReference.location*}

To retrieve a document, the Edge System sends an HTTP GET request to the server using the *location* value from the *DocumentReference* returned in the results of the *Find Documents* transaction. The Edge System should use content negotiation by providing an HTTP Accept header according to the semantics of the HTTP protocols (see RFC 2616, section 14.1). The only MIME type assured to be returned is the MIME type indicated in the *mimeType* property of the *DocumentReference*.

Sample Request

Following the Find Documents response from section 8.7.8.1 above, the sample request uses the *location* value as the request URL and *mimeType* as the HTTP Accept header value.

```
GET https://rest.api.commonwellalliance.org/v2/Binary/urn%3Aoid%3A1.3.6.1.4.1.21367.2005.3.7 HTTP/1.1
Accept: application/hl7-v3+xml
Host: rest.api.commonwellalliance.org
Authorization: Bearer mF_9.B5f-4.1JqM
```

The response to the request will be the document and an HTTP 200 (OK) response code.

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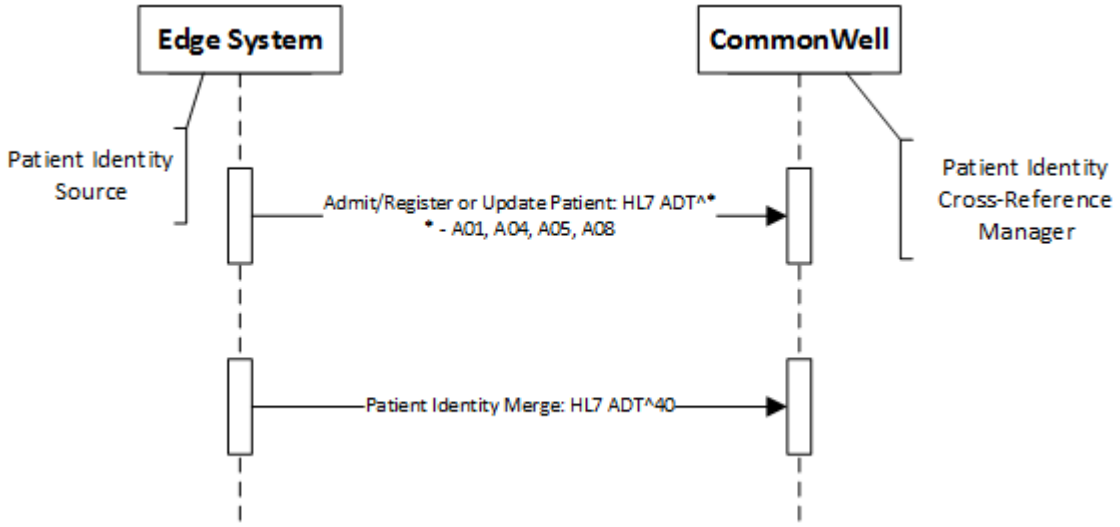
Sample Response: Document Not Found

In the case where a document cannot be found (for example, if the Edge System is using a location URL cached from a query performed in the past), an HTTP 404 (Not Found) response indicates the Edge System should perform the Find Documents transaction again.

9 CommonWell Patient Identity Management Service

This section describes a CommonWell PIX v2.x service, which is offered as an alternative for HIT vendors to the REST-based services for Patient Identity management described in Section 8.7.2 above. The conforming message events are summarized in the diagram below.



9.1 Design Principles and Assumptions

The implementation of the CommonWell PIX Manager has the following general assumptions and design goals:

- A Patient Identity source MAY send alternatives to the A-40 merge event messages.
- Support the transmission of Patient Identity information from an Edge System identity source to the CommonWell PIX Manager.
- Enable Edge Systems to access the CommonWell Identifier for an indexed Patient Identity via a query/response.
- Does NOT support PIX update notifications.
- Support widely deployed HL7 interface engines based on v2 of the IHE PIX specification and using the Minimal Lower Layer Protocol (MLLP) as the underlying session framing and transport protocol.
- Secure communication between an Edge System and the CommonWell PIX Manager using a dedicated Virtual Private Network (VPN) or using TLS 1.2 with X509 client certificate.
- The Edge System acting as a Patient Identity Source is providing Patient Identity event notifications to both the CommonWell PIX Manager and the Edge System's Document Registry (which is known to CommonWell via the Edge System's Organization configuration). How Patient Identity event notifications are communicated to the Document Registry is outside the scope of this specification.

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9.2 Message Constraints

Messages MUST follow version 2.3.1 (or higher) of the HL7 Specification. The primary messaging constraints for HL7 messages are listed below.

- All messages MUST include MSH, EVN and PID segments.
- Segments PV1 and PV2 are optional.
- The MSH segment MUST include MSH-1, MSH-2, MSH-3, MSH-4, MSH-5, MSH-6, MSH-7, MSH-9 and MSH-10.
- MSH-1 MUST have the value "|".
- MSH-2 MUST have the value "^~\&".
- MSH-5 MUST have the specified receiving application value.
- MSH-6 MUST have the specified receiving facility value.
- The message MUST include only one identifier in the PID-3 and that identifier MUST be a unique identifier in the Patient Identifier Domain and will be globally unique.
- For add and update messages, the PID segment MUST include PID-5, PID-7, PID-8 and PID-11 (Postal Code).
- For A40 merge messages, there MUST be only one identifier in MRG-2, and that identifier MUST be a unique identifier in the Patient Identifier Domain.
- All date and time fields MUST include UTC offset if the local time is used; otherwise it will be treated as UTC.

Codes that may be returned in the message acknowledgement are summarized below.

MSA-1	Description	Error Code
CA	Message accepted	0
CE	Segment sequence error	100
CE	Required field missing	101
CE	Data type error	102
CE	Table value not found	103
CR	Unsupported message type	200
CR	Unsupported event code	201
CR	Unsupported version id	203
CR	Application internal error	207

9.3 Acknowledgments: Enhanced Mode

The CommonWell server will perform basic data validation as mentioned in ADT Message Constraints. If no errors are found, CommonWell will commit the message to safe storage and return an accept acknowledgment to the

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sending Edge System. This acknowledgement releases the sending Edge System from the need to resend the message.

After the message has been processed by CommonWell, the message processing status can be queried using CommonWell Management portal. In addition, CommonWell MAY provide an alerting mechanism based on high failure rates for messages that have been acknowledged as accepted for processing.

9.4 Patient Add and Update

In response to patient admission, registration or update events, an Edge System acting as a Patient Identity Source Actor MUST respond by sending one of the following Admit/Register or Update messages to the CommonWell server acting as a Patient Identity Cross-reference Manager:

- A01 – Admission of an inpatient into a facility
- A04 – Registration of an outpatient for a visit of the facility
- A05 – Pre-admission of an inpatient (i.e., registration of patient information ahead of actual admission)

Changes to patient demographics (e.g., change in patient name, patient address, etc.) shall trigger the following Admit/Register or Update message:

- A08 – Update Patient Information

This message shall use the field PID-3 Patient Identifier List to convey the Patient ID uniquely identifying the patient within a given Patient Identification Domain.

Sample Request: ADT Update Message

```
MSH|^~\&|Resonance^2.16.840.1.113883.3.13.3.3^ISO|Cli_Facility|CW_App|CW_Facility|201307080944||ADT^A01|5616|D|2
.5
EVN|A01|200711060941
PID|1||4933^^^&1.3.6.1.4.1.29928&ISO||Nolan^Frank||19450924|M|||8123 Hawthorne
Ave^^chicago^IL^60612^US^P^042||(708)555-1234|(312)555-3456|E^ENGLISH^CLAN
PD1||||15014^Geiger^Jeffrey
```

The CommonWell server returns an ACK response to the Edge System. CommonWell follows the HL7 2.5 specification to generate a message acknowledgement.

Sample Response: ACK Message

```
MSH|^~\|CW_App|CW_Facility|Resonance^2.16.840.1.113883.3.13.3.3^ISO|Cli_Facility|201101040941||ADT^A08|5616|D|2.
5
MSA|CA|0
```

If the system sends an unsupported event type, CommonWell will return response with error.

Sample Request: Unsupported ADT Event

```
MSH|^~\&|Resonance^2.16.840.1.113883.3.13.3.3^ISO|Cli_Facility|CW_App|CW_Facility|201307080944||ADT^A60|5616|D|2
.5
EVN|
PID|1||4933^^^&1.3.6.1.4.1.29928&ISO||Nolan^Frank||19450924|M|||8123 Hawthorne
Ave^^chicago^IL^60612^US^P^042||(708)555-1234|(312)555-3456|E^ENGLISH^CLAN
PD1||||15014^Geiger^Jeffrey
```


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```
PV1|1|O|30968||||15014^Geiger^Jeffrey
```

Sample Response: Error Message

```
MSH|^~\&|CW_App|CW_Facility|Resonance^2.16.840.1.113883.3.13.3.3^ISO|Cli_Facility|20130711194552||ACK^A60^ACK|56
16|D|2.5
MSA|CR|5616
ERR||MSH^1^9^^2^|201^Unsupported event code&HL70357|E||||
```

For complete list of requests and responses, see the Appendix.

9.5 Patient Merge

When two Patient Records are found to identify the same patient in a Patient Identity Domain, an Edge System, acting as a Patient Identity Source Actor, MUST respond by sending the appropriate ADT merge event notification to the CommonWell server acting as the Patient Identity Cross-reference Manager:

- A40 – Merge Patient – Internal ID

An A40 message indicates that the Patient Identity Source Actor has merged Patient Records within a specific Patient Identification Domain. That is, MRG-1 (Patient ID) has been merged into PID-3 (Patient ID).

Sample ADT Merge Message

```
MSH|^~\&|Resonance^2.16.840.1.113883.3.13.3.3^ISO|Cli_Facility|CW_App|CW_Facility|201307080944||ADT^A40|5616|D|2
.5
EVN|A40
PID|1||6676^^^&1.3.6.1.4.1.29928&ISO||Lannister^Tyrel||19681108|M|||81280 Peachtree
Street^^Atlanta^GA^30309^US^P^042||(404)555-3054|(404)555-3054|E^ENGLISH^CLAN
PV1|1|O|30968||||15014^Geiger^Jeffrey
MRG|6689^^^EPI
```

The CommonWell server returns an acknowledgement response to the Edge System.

Sample Response: ACK Message

```
MSH|^~\&amp;|CW_App|CW_Facility|Resonance^2.16.840.1.113883.3.13.3.3^ISO|Cli_Facility|20130711153905||ACK^A40^AC
K|5616|D|2.5
MSA|CA|5616
```

Sample Request: ADT Merge Message with No Identifier in MRG-1

```
MSH|^~\&|Resonance^2.16.840.1.113883.3.13.3.3^ISO|Cli_Facility|CW_App|CW_Facility|201307080944||ADT^A40|5616|D|2
.5
EVN|A40
PID|1||6676^^^EPI||Lannister^Tyrel||19681108|M|||81280 Peachtree Street^^Atlanta^GA^30309^US^P^042||(404)555-
3054|(404)555-3054|E^ENGLISH^CLAN
PV1|1|O|30968||||15014^Geiger^Jeffrey
MRG|
```

The CommonWell server returns an error message to the Edge System.

Sample Response: Error Message

```
MSH|^~\&|CW_App|CW_Facility|Resonance^2.16.840.1.113883.3.13.3.3^ISO|Cli_Facility|001|4|20130711184856||ACK^A40^
ACK|5616|D|2.5
```


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```
MSA|CE|5616
ERR||MRG^^1^^1^|101^Required field missing&HL70357|E||||
```

For complete list of requests and responses, see the Appendix.

9.6 Dynamic Creation of Correlated Links using Patient Identity Feeds (PIXv2.x)

CommonWell supports the automatic linking of patients to Organizations from which they need to receive care but may not visit by sharing and comparing patient identifiers. The destination system sends identifiers from a previously-linked Organization initiating the order or referral in question, and additionally from its own Organization, which now requires access to the patient's clinical data.

If the same identifier can be sent by both systems and can be validated by CommonWell along with a demographic match, the platform dynamically creates a LOLA2-equivalent link between the acting systems.

Workflow and Messaging

1. An order or referral is created for a patient.
2. The ordering system's local patient ID is sent to the downstream system within the order or referral.
3. The local identifier for the downstream system and the ordering system's local patient ID are then sent to CommonWell from the downstream system within a PIX registration message. This shared identifier can be used to correlate the identity of the patient as the same person.

In order to initiate the process of establishing a Correlated Link, the initiating system (that is, the Patient Identity Source Actor) shall provide its identifier for the patient receiving care in the ID component (the first component) of the PID-3 field (PID-3.1).

The Patient Identity Source Actor shall use component PID-3.4 to convey the assigning authority (Patient Identification Domain) of the patient identifier. Either the first subcomponent (namespace ID) or the second and third subcomponents (universal ID and universal ID type) shall be populated. If all three subcomponents are populated, the first subcomponent shall reference the same entity as is referenced by the second and third components.

Recipients of such orders shall add the identifier from the ordering system to an outbound HL7 PIXv2 ADT transaction in the PID-3 segment before sending this message to CommonWell.

Upon receipt of these messages, the service provider shall examine these PID-3 identifiers, comparing them to known patients. If a) a match is found and b) demographic values meet the current system threshold for LOLA1 matches, then a new LOLA2-equivalent link will be created for the person, enabling the originating system to query for and retrieve documents from all linked endpoints.

Sample Message

A. PIX from Ordering System to CommonWell

```
MSH|^~\&|Resonance^2.16.840.1.113883.3.13.3.3^ISO|Cli_Facility|CW_App|CW_Facility|201307080944||ADT^A08|5616|P|2
.5
EVN|A08|201202150937
PID|1||4933^^^&1.3.6.1.4.1.29928&ISO||Nolan^Frank||19450924|M|||8123 Hawthorne
Ave^^Chicago^IL^60612^US^P^042||(708)555-1234|(312)555-3456|E^ENGLISH^CLAN
PD1||||15014^Geiger^Geoffrey
```


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```
PV1||O|128~355~C~PMA^^^^^^^^^^||||15014^Geiger^Geoffrey^^^^||||||||||||201202178||||||||||||||||||||||||||20160215
0937||||||
1233443234
```

B. Lab or AP Orders/Referrals

Variant 1: New Order from Upstream EHR to Downstream Lab

```
MSH|^~\&|Resonance^2.16.840.1.113883.3.13.3.3^ISO|Cli_Facility|CW_App|CW_Facility|201307080955||ORM^O01|MSGID200
60307110114|P|2.5
 PID|1||4933^^^&1.3.6.1.4.1.29928&ISO||Nolan^Frank||19450924|M|||8123 Hawthorne

Ave^^Chicago^IL^60612^US^P^042||(708)555-1234|(312)555-3456|E^ENGLISH^CLAN
PV1||O|OP^PAREG^||||2342^^Geiger^Geoffrey^^^^|||OP|||||||||2||||||||||||||||||||||20160307110111|
 ORC|NW|20060307110114
 OBR|1|20060307110114||003038^Urinalysis^L|||20060307110114
```

Variant 2: New Post-Acute Referral from Upstream System to Downstream System

```
MSH|^~\&|Brightree^2.16.840.1.113883.3.12.2.2^ISO|PA_Facility|CW_App|CW_Facility|201307080944||ADT^A08|5616|D|2.
5
RF1||R|MED|RP|O|REF4502|20140111|20140510|20140111||4933^^^&1.3.6.1.4.1.29928&ISO
EVN|A08|201202150937
PID|1||4933^^^&1.3.6.1.4.1.29928&ISO|Nolan^Frank||19450924|M|||8123 Hawthorne
Ave^^Chicago^IL^60612^US^P^042||(708)555-1234|(312)555-3456|E^ENGLISH^CLAN
PD1||||15014^Geiger^Geoffrey
PV1||O|128~355~C~PMA^^^^^^^^^^||||15014^Geiger^Geoffrey^^^^||||||||||||201202178||||||||||||||||||||||||||20160215
0937||||||
1233443234
```

Variant 3: Orders Submitted via FAX

Fax is a common referral mechanism for Post-Acute systems. In this scenario, the Post-Acute system can manually enter the sending system's MRN and OID to enable the correlated linking via PIX. It is expected that the Post-Acute system will already have access to this OID.

C. Destination System to CommonWell

Note: There are *two* fully qualified patient identifiers in the PID field.

```
MSH|^~\&|Sunquest^2.16.840.1.113883.3.13.3.3^ISO|Cli_Facility|CW_App|CW_Facility|201307080944||ADT^A08|5616|D|2.
5
EVN|A08|201202150937
PID|1||1234^^^&1.3.6.1.4.1.299303&ISO~4933^^^&1.3.6.1.4.1.29928&ISO|Nolan^Frank||19450924|M|||8123 Hawthorne
Ave^^Chicago^IL^60612^US^P^042||(708)555-1234|(312)555-3456|E^ENGLISH^CLAN
PD1||||15014^Geiger^Jeffrey
PV1||O|128~355~C~PMA^^^^^^^^^^||||15014^Geiger^Geoffrey^^^^||||||||||||201202178||||||||||||||||||||||||||20160215
0937||||||
1233443234
```

9.7 Facility Mapping using Patient Identity Feeds (PIXv2.x)

In order to support the facility model for managing organization structures, the initiating system shall provide the facility identifier in the Assigned Patient Location field of the PV1 segment (PV1-3.4). The facility information is provided in the 4th component Facility (HD). As the facility information is an OID you will need to provide the Universal ID and the Universal ID Type of the component.

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Facility will be support in all the supported message. For A40 (Patient Merge), the facility information is optional as the expectation is that this is a back office transaction and the patient is not currently receiving care.

Example: &2.16.840.1.113883.3.4.11&ISO

Note: This should only be used for organizations that are utilizing the facility model for managing organization hierarchies.

```
MSH|^~\&|Sunquest^2.16.840.1.113883.3.13.3.3^ISO|Cli_Facility|CW_App|CW_Facility|201307080944||ADT^A08|5616|D|2.
5
EVN|A08|201202150937
PID|1||1234^^^&1.3.6.1.4.1.299303&ISO~4933^^^&1.3.6.1.4.1.29928&ISO|Nolan^Frank||19450924|M|||8123 Hawthorne
Ave^^Chicago^IL^60612^US^P^042||(708)555-1234|(312)555-3456|E^ENGLISH^CLAN
PD1||||15014^Geiger^Jeffrey
PV1||O|^^^&1.3.6.1.4.1.299303.11&ISO^^^^^^||||15014^Geiger^Geoffrey^^^^||||||||||||201202178||||||||||||||||||
|||||201602150937||||||1233443234
```

10 CommonWell Health Alliance Broker (CHA Broker)

The CHA Broker provides a centralized service for executing document query and retrieval transactions on behalf of Edge Systems to the various EHR Registries and EHR Repositories participating in the CommonWell network. The transactions implement the Cross-Community Access (XCA) and Cross-Community Access for Imaging profiles specified in the IHE IT Infrastructure and Radiology Technical Frameworks.

10.1 IHE Roles

With reference to the roles defined in the IHE IT Infrastructure Technical Framework for XCA, an Edge System will act as a Document Consumer in all transactions. The CHA Broker will provide a layer of abstraction to the Edge System Document Consumer.

If an Edge System supports Image Exchange, it will be able to act as an Imaging Document Consumer in the appropriate transactions. The CHA Broker will provide a layer of abstraction to the Edge System Imaging Document Consumer.

10.2 Synchronous and Asynchronous Exchange

The CHA Broker currently supports only synchronous transactions.

The IHE IT Infrastructure Technical Framework requires that Responding Gateways support Asynchronous Web Services Exchange for both document query and retrieval. However, this specification does NOT require that an Organization's Responding Gateway support asynchronous transactions.

The IHE Radiology Technical Framework requires that Responding Imaging Gateways support Asynchronous Web Services Exchage for image retrieval. However, this specification does NOT require that an Organization's Responding Imaging Gateway, if present, support asynchronous transactions.

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10.3 homeCommunityId

A community is identifiable by a globally unique id called the *homeCommunityId*. Membership of a CommonWell Organization in one community does not preclude it from being a member in another community. The following information is included in the IHE XCA profile to define the use of the *homeCommunityId*.

- The *homeCommunityId* is a globally unique identifier for a community used to assist in subsequent requests for locating the data held by that community. *homeCommunityId* is structured as an OID limited to 64 characters and specified in URI syntax, for example the *homeCommunityId* of *2.16.840.1.113883.3.166* would be formatted as *urn:oid: 2.16.840.1.113883.3.166*.
- It is returned within the response to Cross Gateway Query to indicate the association of a response element with a community. It is specified as the ebRIM home attribute within the relevant response elements. Document Consumers process the value in the response as an opaque unique identifier.
- It is used by Initiating Gateways to direct requests to the community where the data originated.

A CommonWell organization MUST provide its *homeCommunityId* to CommonWell when registering as a CommonWell organization.

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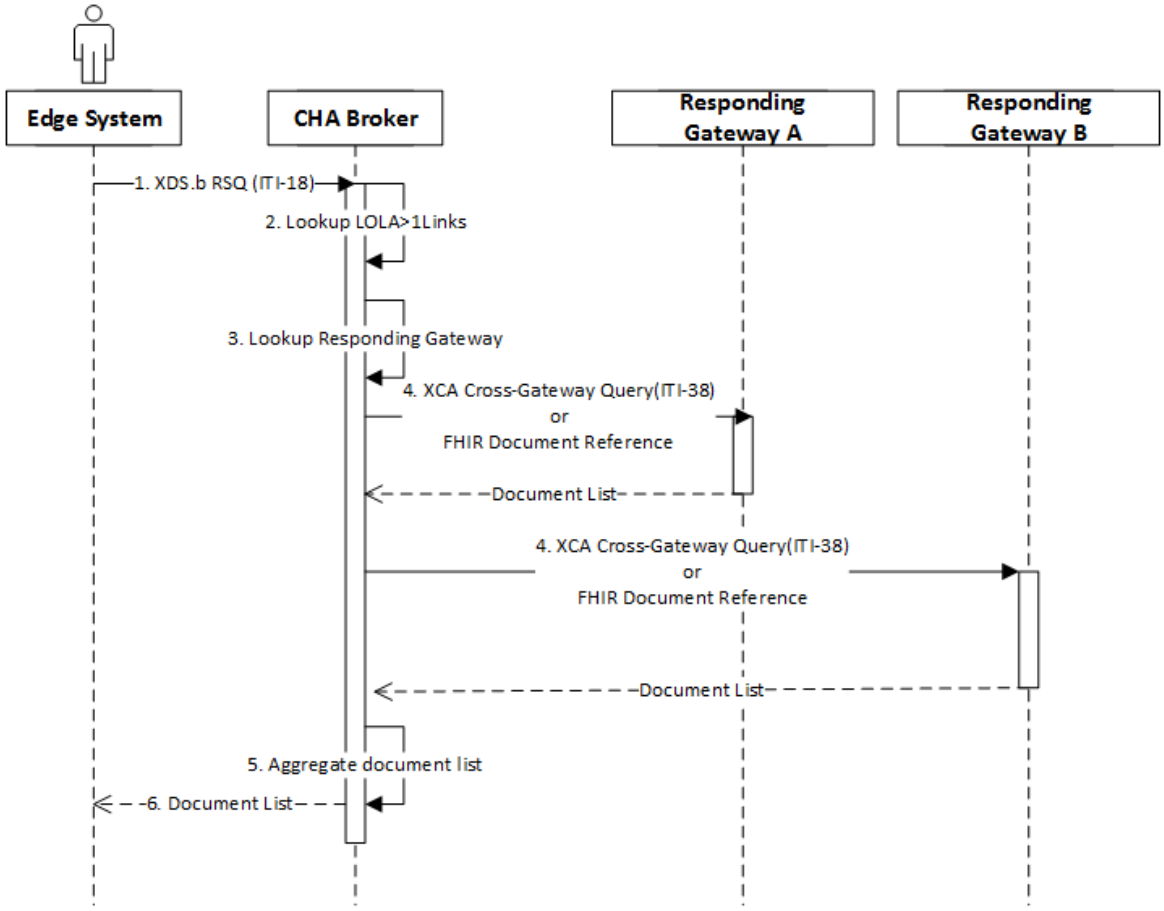
10.4 Document Query



The figure above illustrates the actors and transactions involved in the Registry Stored Query transaction.

1. The Edge System sends a FindDocuments Registry Stored Query (ITI-18) message to the CHA Broker. In this example the Edge System sends an ITI-18 request, but a comparable ITI-38 Cross Gateway Query request could have been sent instead. The request message contains either the local patient Identifier for the patient or the CommonWell identifier for the patient.

2. The CHA Broker uses the patient Identifier to lookup the remote Patient Records with LOLA 2 or higher.

3. The CHA Broker references the responding gateway configuration for the Organizations corresponding to each of the remote Patient Records.

4. The CHA Broker sends a Cross-Gateway Query (ITI-38) or FHIR (DocumentReference) request to each of the responding gateways.

5. The CHA Broker aggregates the document lists returned by each of the responding gateways.

6. The CHA Broker returns the aggregated document list to the Edge System.

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10.4.1 XDS Affinity Domain Option

With respect to the XDS Affinity Domain Option as defined in the IHE IT Infrastructure Technical Framework (ITI TF-1, Section 18.2.1), the CHA Broker acts as an Initiating Gateway and the Edge System as a Document Consumer submitting a Registry Stored Query (ITI-18) or Cross-Gateway Query (ITI-38). The Edge System acting as a Document Consumer includes a local Patient Identifier or a CommonWell Patient Identifier in a Registry Stored Query (ITI-18) or Cross-Gateway Query (ITI-38). The CHA Broker, acting as an Initiating Gateway, adjusts the patient identifier known to the Responding Gateway in the Cross Gateway Query Request (ITI-38) submitted to the Responding Gateway.

10.4.2 On-Demand Document Support

With respect to On-Demand Documents as defined in the IHE IT Infrastructure Technical Framework (ITI TF-1, Section 18.2.4), the CHA Broker will act as described in the underlying specification based on its support for the XDS Affinity Domain Option. Specifically, the CHA Broker, acting as an Initiating Gateway, relies on an Edge System, acting as a Document Consumer, to generate requests that support On-Demand Document Entries. The CHA Broker will not modify the content related to On-Demand Entries and will pass it in the Cross-Gateway Query (ITI-38) to the Responding Gateway. CHA Broker will return the full results to the Edge System.

10.4.3 Query Parameters (Request)

The query parameters for the Cross Gateway Query are defined by the IHE. See Volume 2a of IHE ITI Technical Framework, Section 3.18.4.1.2.3.7 “Parameters for Required Queries.” For more detailed descriptions of the parameters, see Volume 3 of the IHE IT Technical Framework, Section 4.1.7 “Document Definition Metadata” Table 4.1-5.

For document searches using the CHA Broker, an Edge System may use the following elements as the primary search parameters:

- Patient ID (required)
- Class code
- Type code
- Practice Setting Code
- Healthcare Facility Type
- Document Creation Time(s)
- Service Time(s)
- Event Codes
- Confidentiality Code
- Author Person
- Format Code
- Status (required)
- Reference ID List

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Both the Patient ID and Status are required.

10.4.3.1 Patient ID

The patient ID is the technical identifier for the person for whom the related documents are sought. A patient ID consists of two parts:

- The Organization's Assigning Authority in the form of an OID.
- The Patient identifier in the Organization's Assigning Authority domain.

Within the query request, these components of the patient ID MUST be specified in the HL7 CX format.

The Assigning Authority is the root of the Patient Identifier and the Patient ID is the extension. Per the IHE specification, the required format for the document query is:

IDNumber^^^&OIDofAA&ISO

Example: CommonWell Patient Identifier

```
<rim:Slot name="$XDSDocumentEntryPatientId">
   <rim:ValueList>
      <Value>'1234^^^&amp;1.3.6.1.4.1.29928&amp;ISO'</Value>
   </rim:ValueList>
</rim:Slot>
```

Note that the '&' character must be properly HTML-encoded and the Patient Identifier surrounded by single quotes.

10.4.3.2 Document Query Metadata (Response)

The Edge System should display the response from the CHA Broker using the document metadata to provide the necessary information for users of the Edge System to decide whether or not they want to retrieve the document.

For every potential document, there is a minimal set of XCA Metadata that is useful for identifying documents, identified by the Table 10.4.3-2.

Edge Systems should display the minimal set of XCA Metadata, with the suggested labels, when showing CommonWell Document Query responses to users.

Table 10.4.3-2 Minimal XCA Metadata set 1

Metadata	Suggested Label	Notes
serviceStartTime	Date of Service	
Title	Title	Open today. No enforced constraints to date.
typeCode	DocType	
authorInstitution	Service Location	

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Metadata	Suggested Label	Notes
eventCodeList	Services	
practiceSettingCode	Practice Type	
authorPerson	Doc Author	not always present – system generated documents
referenceIdList	References *or, if appropriate,* Accession Number	The element can reference identifiers of several types; accession numbers are of particular use in Radiology.

Edge systems should also be capable of allowing users to see any errors and warnings that may be returned along with metadata content for documents.

Sample Response: Aggregated Document List


```
HTTP/1.1 200 OK
Content-Type: text/xml; charset=utf-8
Date: Thu, 02 May 2013 03:33:58 GMT
Content-Length: 423

<s:Envelope xmlns:s="http://www.w3.org/2003/05/soap-envelope" xmlns:a="http://www.w3.org/2005/08/addressing">
   <s:Header>
      <a:Action s:mustUnderstand="1">urn:ihe:iti:2007:RegistryStoredQueryResponse</a:Action>
      <a:RelatesTo>urn:uuid:a02ca8cd-86fa-4afc-a27c-616c183b2055</a:RelatesTo>
   </s:Header>
   <s:Body>
      <query:AdhocQueryResponse xsi:schemaLocation="urn:oasis:names:tc:ebxml-regrep:xsd:query:3.0
../../schema/ebRS/query.xsd" status="Success" xmlns:query="urn:oasis:names:tc:ebxml-regrep:xsd:query:3.0"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:rim="urn:oasis:names:tc:ebxml-regrep:xsd:rim:3.0">
         <rim:RegistryObjectList>
            <rim:ExtrinsicObject id="urn:uuid:08a15a6f-5b4a-42de-8f95-89474f83abdf" isOpaque="false"
mimeType="text/xml" objectType="urn:uuid:7edca82f-054d-47f2-a032-9b2a5b5186c1" status="urn:oasis:names:tc:ebxml-
regrep:StatusType:Approved" xmlns:q="urn:oasis:names:tc:ebxml-regrep:xsd:query:3.0">
               <rim:Slot name="URI">
                  <rim:ValueList>
                     <rim:Value>http://localhost:8080/XDS/Repository/08a15a6f-5b4a-42de-8f95-
89474f83abdf.xml</rim:Value>
                  </rim:ValueList>
               </rim:Slot>
               <rim:Slot name="authorInstitution">
                  <rim:ValueList>
                     <rim:Value>Fairview Hospital</rim:Value>
                  </rim:ValueList>
               </rim:Slot>
               <rim:Slot name="creationTime">
                  <rim:ValueList>
                     <rim:Value>200412261119</rim:Value>
                  </rim:ValueList>
               </rim:Slot>
               <rim:Slot name="hash">
                  <rim:ValueList>
                     <rim:Value>4cf4f82d78b5e2aac35c31bca8cb79fe6bd6a41e</rim:Value>
                  </rim:ValueList>
               </rim:Slot>
               <rim:Slot name="languageCode">
                  <rim:ValueList>
                     <rim:Value>en-us</rim:Value>
                  </rim:ValueList>
               </rim:Slot>
               <rim:Slot name="serviceStartTime">
```


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```
                  <rim:ValueList>
                     <rim:Value>200412230800</rim:Value>
                  </rim:ValueList>
               </rim:Slot>
               <rim:Slot name="serviceStopTime">
                  <rim:ValueList>
                     <rim:Value>200412230801</rim:Value>
                  </rim:ValueList>
               </rim:Slot>
               <rim:Slot name="size">
                  <rim:ValueList>
                     <rim:Value>54449</rim:Value>
                  </rim:ValueList>
               </rim:Slot>
               <rim:Slot name="sourcePatientId">
                  <rim:ValueList>
                     <rim:Value>jd12323^^^wsh</rim:Value>
                  </rim:ValueList>
               </rim:Slot>
               <rim:Slot name="sourcePatientInfo">
                  <rim:ValueList>
                     <rim:Value>PID-3|pid1^^^domain</rim:Value>
                     <rim:Value>PID-5|Nolan^Frank^^^</rim:Value>
                     <rim:Value>PID-7|19560527</rim:Value>
                     <rim:Value>PID-8|M</rim:Value>
                     <rim:Value>PID-11|511 Oswego St^^Chicago^Il^60610^USA</rim:Value>
                  </rim:ValueList>
               </rim:Slot>
               <rim:Name>
                  <rim:LocalizedString charset="UTF-8" value="Sample document 1" xml:lang="en-us"/>
               </rim:Name>
               <rim:Description/>
               <rim:Classification classificationScheme="urn:uuid:41a5887f-8865-4c09-adf7-e362475b143a"
classifiedObject="urn:uuid:08a15a6f-5b4a-42de-8f95-89474f83abdf" id="urn:uuid:ac872fc0-1c6e-439f-84d1-
f76770a0ccdf" nodeRepresentation="Education" objectType="Urn:oasis:names:tc:ebxml-
regrep:ObjectType:RegistryObject:Classification">
                  <rim:Slot name="codingScheme">
                     <rim:ValueList>
                        <rim:Value>Connect-a-thon classCodes</rim:Value>
                     </rim:ValueList>
                  </rim:Slot>
                  <rim:Name>
                     <rim:LocalizedString charset="UTF-8" value="Education" xml:lang="en-us"/>
                  </rim:Name>
                  <rim:Description/>
               </rim:Classification>
               <rim:Classification classificationScheme="urn:uuid:f4f85eac-e6cb-4883-b524-f2705394840f"
classifiedObject="urn:uuid:08a15a6f-5b4a-42de-8f95-89474f83abdf" id="urn:uuid:f1a8c8e4-3593-4777-b7e0-
8b0773378705" nodeRepresentation="C" objectType="Urn:oasis:names:tc:ebxml-
regrep:ObjectType:RegistryObject:Classification">
                  <rim:Slot name="codingScheme">
                     <rim:ValueList>
                        <rim:Value>Connect-a-thon confidentialityCodes</rim:Value>
                     </rim:ValueList>
                  </rim:Slot>
                  <rim:Name>
                     <rim:LocalizedString charset="UTF-8" value="Celebrity" xml:lang="en-us"/>
                  </rim:Name>
                  <rim:Description/>
               </rim:Classification>
               <rim:Classification classificationScheme="urn:uuid:a09d5840-386c-46f2-b5ad-9c3699a4309d"
classifiedObject="urn:uuid:08a15a6f-5b4a-42de-8f95-89474f83abdf" id="urn:uuid:b6e49c73-96c8-4058-8c95-
914d83bd262a" nodeRepresentation="CDAR2/IHE 1.0" objectType="Urn:oasis:names:tc:ebxml-
regrep:ObjectType:RegistryObject:Classification">
                  <rim:Slot name="codingScheme">
                     <rim:ValueList>
                        <rim:Value>Connect-a-thon formatCodes</rim:Value>
```


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```
                    </rim:ValueList>
                 </rim:Slot>
                 <rim:Name>
                    <rim:LocalizedString charset="UTF-8" value="CDAR2/IHE 1.0" xml:lang="en-us"/>
                 </rim:Name>
                 <rim:Description/>
              </rim:Classification>
              <rim:Classification classificationScheme="urn:uuid:f33fb8ac-18af-42cc-ae0e-ed0b0bdb91e1"
classifiedObject="urn:uuid:08a15a6f-5b4a-42de-8f95-89474f83abdf" id="urn:uuid:61e2b376-d74a-4984-ac21-
dcd0b8890f9d" nodeRepresentation="Emergency Department" objectType="Urn:oasis:names:tc:ebxml-
regrep:ObjectType:RegistryObject:Classification">
                 <rim:Slot name="codingScheme">
                    <rim:ValueList>
                       <rim:Value>Connect-a-thon healthcareFacilityTypeCodes</rim:Value>
                    </rim:ValueList>
                 </rim:Slot>
                 <rim:Name>
                    <rim:LocalizedString charset="UTF-8" value="Assisted Living" xml:lang="en-us"/>
                 </rim:Name>
                 <rim:Description/>
              </rim:Classification>
              <rim:Classification classificationScheme="urn:uuid:cccf5598-8b07-4b77-a05e-ae952c785ead"
classifiedObject="urn:uuid:08a15a6f-5b4a-42de-8f95-89474f83abdf" id="urn:uuid:fb7677c5-c42f-485d-9010-
dce0f3cd4ad5" nodeRepresentation="Cardiology" objectType="Urn:oasis:names:tc:ebxml-
regrep:ObjectType:RegistryObject:Classification">
                 <rim:Slot name="codingScheme">
                    <rim:ValueList>
                       <rim:Value>Connect-a-thon practiceSettingCodes</rim:Value>
                    </rim:ValueList>
                 </rim:Slot>
                 <rim:Name>
                    <rim:LocalizedString charset="UTF-8" value="Cardiology" xml:lang="en-us"/>
                 </rim:Name>
                 <rim:Description/>
              </rim:Classification>
              <rim:Classification classificationScheme="urn:uuid:f0306f51-975f-434e-a61c-c59651d33983"
classifiedObject="urn:uuid:08a15a6f-5b4a-42de-8f95-89474f83abdf" id="urn:uuid:0a8a8ed9-8be5-4a63-9b68-
a511adee8ed5" nodeRepresentation="34098-4" objectType="Urn:oasis:names:tc:ebxml-
regrep:ObjectType:RegistryObject:Classification">
                 <rim:Slot name="codingScheme">
                    <rim:ValueList>
                       <rim:Value>LOINC</rim:Value>
                    </rim:ValueList>
                 </rim:Slot>
                 <rim:Name>
                    <rim:LocalizedString charset="UTF-8" value="Conference Evaluation Note" xml:lang="en-us"/>
                 </rim:Name>
                 <rim:Description/>
              </rim:Classification>
              <rim:ExternalIdentifier id="urn:uuid:db9f4438-ffff-435f-9d34-d76190728637"
registryObject="urn:uuid:08a15a6f-5b4a-42de-8f95-89474f83abdf" identificationScheme="urn:uuid:58a6f841-87b3-
4a3e-92fd-a8ffeff98427" objectType="ExternalIdentifier"
value="st3498702^^^&amp;1.3.6.1.4.1.21367.2005.3.7&amp;ISO">
                 <rim:Name>
                    <rim:LocalizedString charset="UTF-8" value="XDSDocumentEntry.patientId" xml:lang="en-us"/>
                 </rim:Name>
                 <rim:Description/>
              </rim:ExternalIdentifier>
              <rim:ExternalIdentifier id="urn:uuid:c3fcbf0e-9765-4f5b-abaa-b37ac8ff05a5"
registryObject="urn:uuid:08a15a6f-5b4a-42de-8f95-89474f83abdf" identificationScheme="urn:uuid:2e82c1f6-a085-
4c72-9da3-8640a32e42ab" objectType="ExternalIdentifier" value="1.3.6.1.4.1.21367.2005.3.99.1.1010">
                 <rim:Name>
                    <rim:LocalizedString charset="UTF-8" value="XDSDocumentEntry.uniqueId" xml:lang="en-us"/>
                 </rim:Name>
                 <rim:Description/>
              </rim:ExternalIdentifier>
           </rim:ExtrinsicObject>
```


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```
            <rim:ObjectRef id="urn:uuid:41a5887f-8865-4c09-adf7-e362475b143a" xmlns:q="urn:oasis:names:tc:ebxml-
regrep:xsd:query:3.0"/>
            <rim:ObjectRef id="urn:uuid:f4f85eac-e6cb-4883-b524-f2705394840f" xmlns:q="urn:oasis:names:tc:ebxml-
regrep:xsd:query:3.0"/>
            <rim:ObjectRef id="urn:uuid:a09d5840-386c-46f2-b5ad-9c3699a4309d" xmlns:q="urn:oasis:names:tc:ebxml-
regrep:xsd:query:3.0"/>
            <rim:ObjectRef id="urn:uuid:f33fb8ac-18af-42cc-ae0e-ed0b0bdb91e1" xmlns:q="urn:oasis:names:tc:ebxml-
regrep:xsd:query:3.0"/>
            <rim:ObjectRef id="urn:uuid:cccf5598-8b07-4b77-a05e-ae952c785ead" xmlns:q="urn:oasis:names:tc:ebxml-
regrep:xsd:query:3.0"/>
            <rim:ObjectRef id="urn:uuid:f0306f51-975f-434e-a61c-c59651d33983" xmlns:q="urn:oasis:names:tc:ebxml-
regrep:xsd:query:3.0"/>
            <rim:ObjectRef id="urn:uuid:58a6f841-87b3-4a3e-92fd-a8ffeff98427" xmlns:q="urn:oasis:names:tc:ebxml-
regrep:xsd:query:3.0"/>
            <rim:ObjectRef id="urn:uuid:2e82c1f6-a085-4c72-9da3-8640a32e42ab" xmlns:q="urn:oasis:names:tc:ebxml-
regrep:xsd:query:3.0"/>
         </rim:RegistryObjectList>
      </query:AdhocQueryResponse>
   </s:Body>
</s:Envelope>
```

10.4.4 DocumentQuery Fanout to a FHIR gateway

CommonWell supports fanout to a FHIR Responding Gateways for member Organizations which support FHIR DocumentReference searches, and Binary resource retrieval. If DocumentReference is supported, then Binary must also be supported.

FHIR specifications:

- DSTU2
  - Argonaut Data Query Implementation Guide
  - Resource DocumentReference v1.0.2
  - Binary: Resource Binary v1.0.2
- STU3
  - US Core DocumentReference Profile
  - Document Reference : Resource DocumentReference v3.0.1
  - Binary : Resource Binary v3.0.1

10.4.4.1 XCA to FHIR and FHIR to XCA

When an Organization is set up to fan out to a FHIR gateway, CommonWell will convert the the ITI-38 request to a FHIR DocumentReference request. All responses from the FHIR responding gateway will be converted back to an AdhocQueryResponse, and returned to the Edge System, aggregated with any other responses from XCA responding gateways.

For the details of request and response mappings, see Appendix I

10.4.4.2 Resolution of XCA Document ID to FHIR Document ID

There is a fundamental difference in a “Document ID” between the XCA and FHIR specifications.

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In XCA, a document is uniquely identified by a unique set of *HomeCommunityId, RepositoryUniqueId,* and *DocumentUniqueId* . In FHIR, a document is identified by a URL, which is always unique.

For responses from FHIR responding gateway's, CommonWell will always return an ExtrinsicObject using the following:

HomeCommunityId	2.16.840.1.113883.15.12
RepositoryUniqueId	2.16.840.1.113883.15.13
DocumentUniqueId	A URN using a generated UUID

When CHA Broker receives a DocumentRetrieve request with the above values, it will know that it needs to look up the real FHIR Binary ID, which it will use to get the document from the Responding Gateway.

10.4.4.3 Included and Contained FHIR Resources

When making the DocumentReference calls to Responding Gateway's, CommonWell will always request the following _include values. CommonWell will parse the resources whether they are contained references on the DocumentReference object, or included resources in the Bundle.

CommonWell will not make multiple calls to a Responding Gateway to retrieve resources which are not either contained or included in the initial response Bundle.

Resource	Notes
`_include=DocumentReference:subject`	It is required that either "subject" or "sourcePatientInfo" is returned in the Bundle. CommonWell will prefer the "subject" to the "sourcePatientInfo" if they are both present.
`_include=DocumentReference: sourcePatientInfo`	
`_include=DocumentReference:authenticator`	Optional
`_include=DocumentReference:author`	May be either a Practitioner or an Organization

10.4.4.4 DocumentReference Query Parameters

XDS Slot name	**FHIR**
$XDSDocumentEntryClassCode	class.system
$XDSDocumentEntryClassCodeScheme	class.value

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$XDSDocumentEntryHealthcareFacilityTypeCode	facility
$XDSDocumentEntryType	type
$XDSDocumentEntryEventCodeList	event (comma separated list of "EventCodeListScheme|EventCode"}
$XDSDocumentEntryEventCodeListScheme	event
$XDSDocumentEntryFormatCode	format
$XDSDocumentEntryCreationTimeFrom	created (ge)
$XDSDocumentEntryCreationTimeTo	created (le)
$XDSDocumentEntryServiceStartTimeFrom	period (ge)
$XDSDocumentEntryServiceStopTimeTo	period (le)

10.5 Error Responses

Error codes used in the CHA Broker document query service conform to those listed in IHE ITI TF Volume 3 Section 4.1.13, as summarized below.

Error Code	Description
XDSRegistryError	Error from the registry in processing the query (e.g., invalid query criteria).
XDSRegistryBusy	Too much activity.
XDSRegistryOutOfResources	Resources are low.
XDSTooManyResults	The query resulted in too many results.
XDSUnknownStoredQuery	The Query ID provided in the request is not recognized.
XDSStoredQueryMissingParam	A required parameter to a stored query is missing.
XDSStoredQueryParamNumber	A parameter which only accepts a single value is coded with multiple values.

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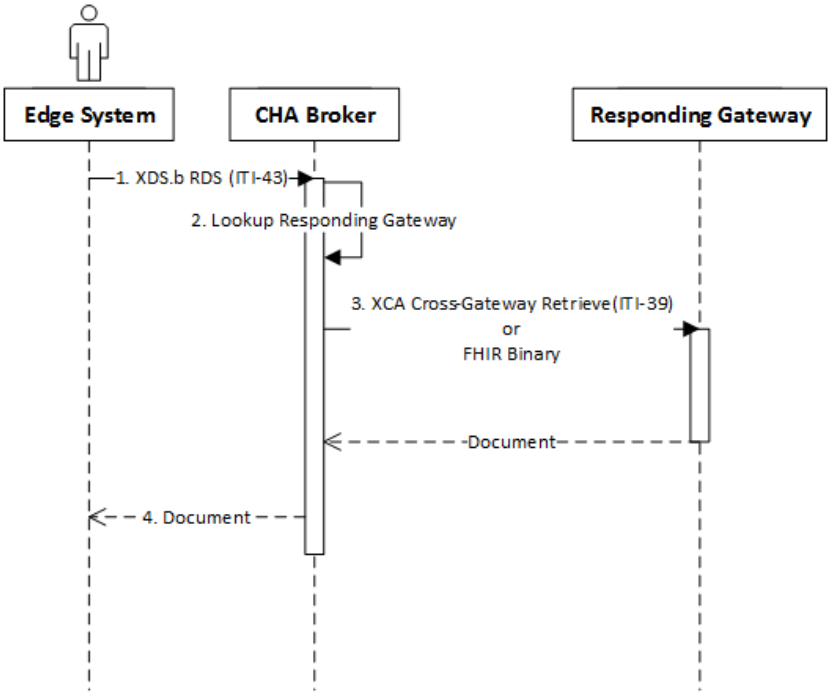
Error Code	Description
XDSUnknownPatientId	The Patient ID specified is no longer valid.

10.6 Document Retrieval

The document retrieval transaction allows an Edge System to retrieve one or more documents found via the document query transaction described in the previous section.



1. The Edge System sends the CHA Broker a Retrieve Document Set (ITI-43) request message which includes the required identifiers: *HomeCommunityId, RepositoryUniqueId,* and *DocumentUniqueId*. In this example, the Edge System sends an ITI-43 request but a comparable ITI-39 Cross Gateway Retrieve could have been sent instead.

2. The CHA Broker looks up the Responding Gateway configuration for the Organization corresponding to the requested document.

3. The CHA Broker sends a Cross-Gateway Retrieve (ITI-39) request to the XCA Community's Responding Gateway service endpoint.

4. Once the document is received from the Responding Gateway, the CHA Broker forwards the response to the Edge System.

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10.6.1 Retrieval of a document from a FHIR responding gateway

CommonWell supports DocumentRetrieve from from FHIR Responding Gateways for member Organizations which support FHIR DocumentReference and Binary resource retrieval. If Binary is supported, then DocumentReference must also be supported.

10.6.2 XCA to FHIR and FHIR to XCA

When the HomeCommunityId, RepositoryUniqueId, and DocumentUniqueId identify a document that is to be found at a FHIR rResponding gGateway, then CHA Broker will look up the correct URL to use as a FHIR Binary request. CHABroker will contact the Organization's OAuth server to get a token that can be used for a Binary request, and then use the URL to get the document from the Responding Gateway.

When the FHIR gateway responds, the result will be converted to an XCA response, which will be returned to the Edge System. See Appendix I for details of the field mappings.

Sample Request: Retrieve Document Set (ITI-43)

```
POST https://chabroker.api.commonwellalliance.org/v1/rds HTTP/1.1
Content-Type: text/xml;charset=UTF-8
SOAPAction: "http://rest.api.commonwellalliance.org/v1/rds"
Host: rest.api.commonwellalliance.org
Content-Length: 956

<s:Envelope xmlns:s="http://www.w3.org/2003/05/soap-envelope"
xmlns:a="http://www.w3.org/2005/08/addressing">
   <s:Header>
      <a:Action s:mustUnderstand="1">urn:ihe:iti:2007:CrossGatewayRetrieve</a:Action>
      <a:MessageID>urn:uuid:0fbfdced-6c01-4d09-a110-2201afedaa02</a:MessageID>
    <a:To s:mustUnderstand="1"
>http://broker.api.commonwellalliance.org/XCASerivce/xca.svc</a:To>
   </s:Header>
   <s:Body>
      <RetrieveDocumentSetRequest xmlns="urn:ihe:iti:xds-b:2007">
         <DocumentRequest>
            <homeCommunityId>urn:oid:1.2.3.4</homeCommunityId>
            <RepositoryUniqueId>1.3.6.1.4...1000</RepositoryUniqueId>
            <DocumentUniqueId>1.3.6.1.4...2300</DocumentUniqueId>
         </DocumentRequest>
         <DocumentRequest>
            <homeCommunityId>urn:oid:1.2.3.4</homeCommunityId>
            <RepositoryUniqueId>1.3.6.1.4...1000</RepositoryUniqueId>
            <DocumentUniqueId>1.3.6.1.4...2301</DocumentUniqueId>
         </DocumentRequest>
      </RetrieveDocumentSetRequest>
   </s:Body>
</s:Envelope>
```

Sample Response: Document Set

```
HTTP/1.1 200 OK
Content-Type: text/xml; charset=utf-8
Date: Thu, 02 May 2013 03:33:58 GMT
Content-Length: 423

<s:Envelope xmlns:s="http://www.w3.org/2003/05/soap-envelope"
xmlns:a="http://www.w3.org/2005/08/addressing">
   <s:Header>
      <a:Action s:mustUnderstand="1">urn:ihe:iti:2007:CrossGatewayRetrieveResponse</a:Action>
      <a:RelatesTo>urn:uuid:0fbfdced-6c01-4d09-a110-2201afedaa02</a:RelatesTo>
```


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```
   </s:Header>
   <s:Body>
      <RetrieveDocumentSetResponse xmlns="urn:ihe:iti:xds-b:2007"
      xmlns:lcm="urn:oasis:names:tc:ebxml-regrep:xsd:lcm:3.0"
      xmlns:query="urn:oasis:names:tc:ebxml-regrep:xsd:query:3.0"
      xmlns:rim="urn:oasis:names:tc:ebxml-regrep:xsd:rim:3.0"
      xmlns:rs="urn:oasis:names:tc:ebxml-regrep:xsd:rs:3.0">
         <rs:RegistryResponse
         status="urn:oasis:names:tc:ebxml-regrep:ResponseStatusType:Success"/>
         <DocumentResponse>
            <homeCommunityId>urn:oid:1.2.3.4</homeCommunityId>
            <RepositoryUniqueId>1.3.6.1.4...1000</RepositoryUniqueId>
            <DocumentUniqueId>1.3.6.1.4...2300</DocumentUniqueId>
            <mimeType>text/xml</mimeType>
            <Document>UjBsR09EbGhjZ0dTQUxNQUFBUUNBRU1tQ1p0dU1GUXhEUzhi</Document>
         </DocumentResponse>
         5 NHIN Retrieve Documents Web Service Interface Specification
         v3.0
         Page 15 of 16
         <DocumentResponse>
            <homeCommunityId>urn:oid:1.2.3.4</homeCommunityId>
            <RepositoryUniqueId>1.3.6.1.4...1000</RepositoryUniqueId>
            <DocumentUniqueId>1.3.6.1.4...2300</DocumentUniqueId>
            <mimeType>text/xml</mimeType>
            <Document>UjBsR09EbGhjZ0dTQUxNQUFBUUNBRU1tQ1p0dU1GUXhEUzhi</Document>
         </DocumentResponse>
      </RetrieveDocumentSetResponse>
   </s:Body>
</s:Envelope>
```

Sample Response: Document Set from FHIR Responding Gateway

```
HTTP/1.1 200 OK
Content-Type: text/xml; charset=utf-8
Date: Thu, 02 May 2013 03:33:58 GMT
Content-Length: 423

<?xml version="1.0" encoding="utf-16"?>
<DocumentRepository_RetrieveDocumentSetResponse xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <RetrieveDocumentSetResponse>
    <RegistryResponse status="urn:oasis:names:tc:ebxml-regrep:ResponseStatusType:Success"
xmlns="urn:oasis:names:tc:ebxml-regrep:xsd:rs:3.0" />
    <DocumentResponse xmlns="urn:ihe:iti:xds-b:2007">
      <HomeCommunityId>urn:oid:2.16.840.1.113883.15.12</HomeCommunityId>
      <RepositoryUniqueId>2.16.840.1.113883.15.13</RepositoryUniqueId>
      <DocumentUniqueId>urn:uuid:260f09cb-6995-4614-b9c6-9f638bd4a023</DocumentUniqueId>
      <mimeType>application/xml</mimeType>
      <Document>PD94bWwtc3R5bGVzaGVldCB0eXBlPSJ0ZXh0L3hzbCIgaHJlZj0iQ0RBX0FSUkEyLnhzbCI/=</Document>
    </DocumentResponse>
  </RetrieveDocumentSetResponse>
</DocumentRepository_RetrieveDocumentSetResponse>
```

10.7 Image Retrieval

The Image Retrieval transaction allows an Edge System that supports Image Exchange to retrieve one or more images (or other DICOM instances) referenced in an Image Manifest. The Image Manifest may have be discovered and retrieved using mechanisms described elsewhere in this document.

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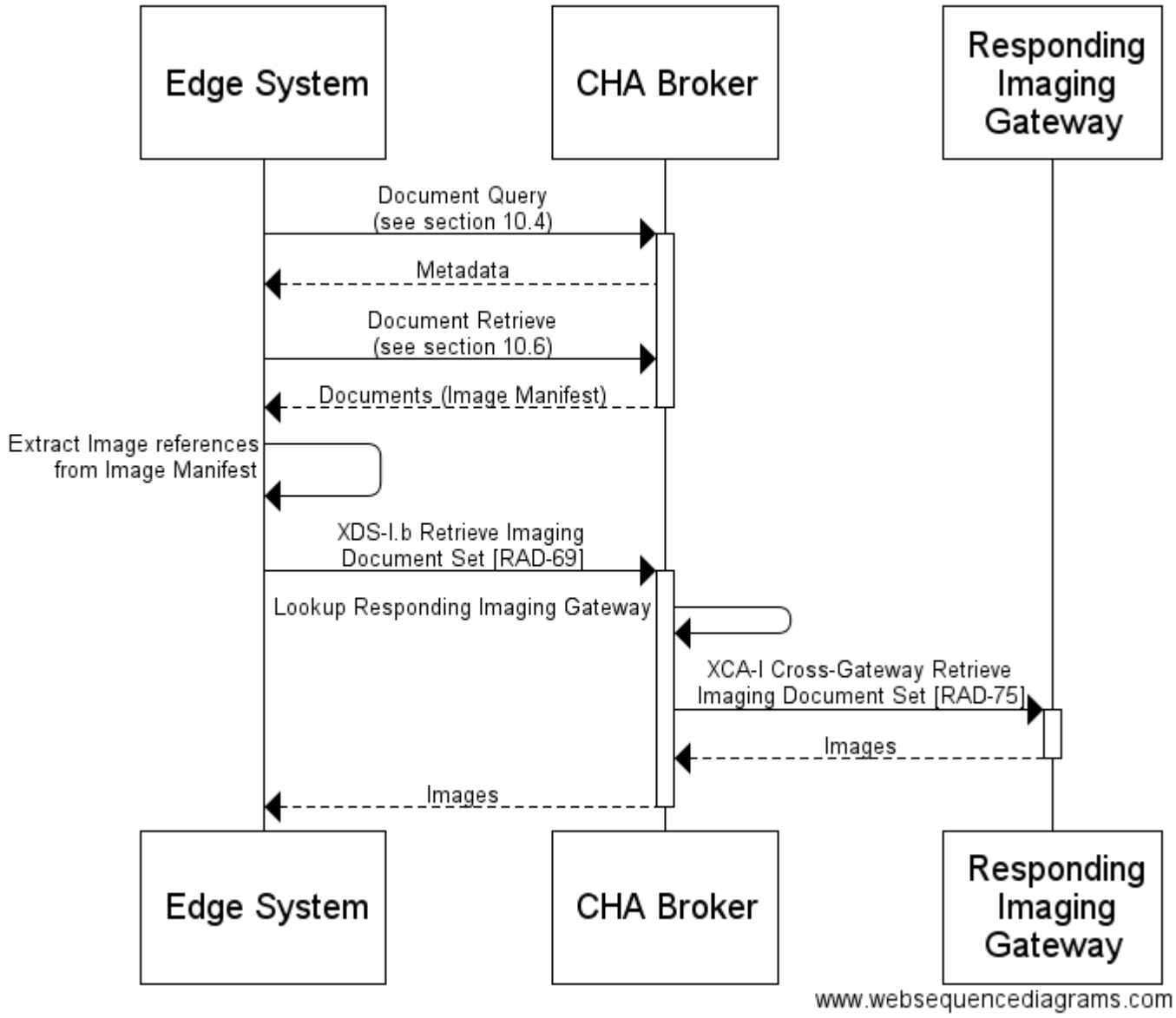

1. The Edge System queries for, and obtains, an Image Manifest document. Although the diagram shows use of CommonWell-brokered XCA, the actual mechanism for discovery and retrieval of the Image Manifest are outside the scope of the Image Retrieval transaction.

2. The Image Manifest is a DICOM Key Object Selection file that lists images (or other DICOM instances), and applicable retrieval information. The Edge System extracts from the Image Manifest the retrieval information for the DICOM instances of interest .

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3. The Edge System sends the CHA Broker a Retrieve Imaging Document Set (RAD-69) request message or Cross-Gateway Retrieve Imaging Document Set (RAD-75) request message, which includes the required identifiers for each requested DICOM instance:

   - *homeCommunityId*
   - *repositoryUniqueId* from the instance's *RetrieveLocation UID* attribute extracted from the Image Manifest)[2]
   - *documentUniqueId* from the instance's *SOP Instance UID* attribute extracted from the Image Manifest
   - the instance's *Study Instance UID* and *Series Instance UID* extracted from the Image Manifest
   - the *Transfer Syntax UID*s that the Edge System is capable of processing[3]

   In this example, the Edge System sends a RAD-69 request but a comparable RAD-75 could have been sent instead.

4. The CHA Broker looks up the Responding Imaging Gateway configurations for the Organizations' homeCommunityIds referenced in the image set request.

5. The CHA Broker sends Cross-Gateway Retrieve Imaging Document Set (RAD-75) requests to the communities' Responding Imaging Gateway service endpoints.

6. The CHA Broker combines the responses from the Responding Imaging Gateways, and returns a response to the Edge System

Because of the large size of DICOM instances, HTTP compression should be used. Edge Systems should request compression. The CHA Broker shall request compression. Responding Imaging Gateways should honour compression requests. The CHA Broker shall honor compression requests, unless the Broker determines compression is less efficient. A system that supports compression shall support at least gzip compression. The HTTP header *Accept-Encoding* is used to request compression, the HTTP header *Content-Encoding* is used to indicate if the response has been compressed.

As mentioned above, individual DICOM instances can be large, with a theoretical maximum of 4 GB per file; for the most common large image type (Breast Tomosynthesis), a size of 0.5 GB would not be exceptional). A single imaging study may contain thousands of instances, and an Image Manifest is not restricted to listing the instances of a single study, nor is an Edge System restricted to requesting instances from only a single Image Manifest.

---

[2] Although XCA permits deriving the *repositoryUniqueId* from the *Retrieve AE Title* attribute, using that approach requires that the Edge System know that mapping for each image archive in all remote communities. Since it is impractical for an Edge System to maintain mappings for each of the CommonWell-accessible archives, and since AE Title is not guaranteed to be unique, use of the *Retrieve Location UID* attribute is recommended instead.

[3] Without prior arrangement between endpoints, Edge Systems are cautioned against requesting, and Responding Imaging Gateways are cautioned against returning instances encoded in the JPIP Referenced or JPIP Referenced Deflate Transfer Syntaxes, since securing retrieval of the pixel data between the endpoints is not CommonWell-mediated.

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Therefore, the response to an imaging retrieval request be very large. Responding Imaging Gateways or the CHA Broker may impose limits on the size of a response. If the CHA Broker limits the size of a response, it shall respond with the XDSRepositoryOutOfResources error code, and the the error context shall include either "Instance 1.2.3.4 is too large." (replacing 1.2.3.4 with appropriate SOP Instance UID) or "Response is too large." depending on whether individual instances are over the limit, or whether the combined response is over the limit. Responding Imaging Gateways should also indicate these conditions with these error codes. The behavior of an Edge System that receives these error codes and context messages is not specified, although the information could be used to craft smaller requests for the failed instances.

A Responding Imaging Gateway may not be able to return requested instances immediately; for example, images may need to be retrieved from near-line storage. A Responding imaging Gateway may indicate that an instance is being retrieved by responding with the XDSRepositoryBusy error code; the error context should include "Instance 1.2.3.4 being retrieved. Estimated availability is 300 seconds." (substituting the appropriate SOP instance UID, and estimated delay in seconds, or omitting the second sentence if no estimate is available). A Responding Imaging Gateway should begin providing a response before the *Imaging Retrieve Responding Imaging Gateway Individual Request Timeout* (see section 12F.2). The behavior of an Edge System that receives this error code and context message is not specified, although it could retry the request after the indicated period.

```
Sample Request: Retrieve Imaging Document Set (RAD-69)POST https://chabroker.api.commonwellalliance.org/v1/rids
HTTP/1.1
Content-Type: text/xml;charset=UTF-8
SOAPAction: "http://rest.api.commonwellalliance.org/v1/rids"
Host: rest.api.commonwellalliance.org
Content-Length: 956

<s:Envelope xmlns:s=http://www.w3.org/2003/05/soap-envelope
   xmlns:a="http://www.w3.org/2005/08/addressing">
   <s:Header>
      <a:Action s:mustUnderstand="1">urn:ihe:rad:2009:RetrieveImagingDocumentSet</a:Action>
      <a:MessageID>urn:uuid:0fbfdced-6c01-4d09-a110-2201afedaa02</a:MessageID>
      <a:ReplyTo s:mustUnderstand="1">
         <a:Address>http://www.w3.org/2005/08/addressing/anonymous</a:Address>
      </a:ReplyTo>
      <a:To >http://localhost:2647/XdsService/IHEXDSIDocSource.svc</a:To>
   </s:Header>
   <s:Body>
      <RetrieveImagingDocumentSetRequest xmlns:iherad="urn:ihe:rad:xdsi-b:2009"
         xmlns:ihe="urn:ihe:iti:xds-b:2007">
         <StudyRequest studyInstanceUID="1.3.6.1.4...101">
            <SeriesRequest seriesInstanceUID="1.3.6.1.4...201">
               <ihe:DocumentRequest>
                  <ihe:RepositoryUniqueId>1.3.6.1.4...1000</ihe:RepositoryUniqueId>
                  <ihe:DocumentUniqueId>1.3.6.1.4...2300</ihe:DocumentUniqueId>
               </ihe:DocumentRequest>
               <ihe:DocumentRequest>
                  <ihe:RepositoryUniqueId>1.3.6.1.4...1000</ihe:RepositoryUniqueId>
                  <ihe:DocumentUniqueId>1.3.6.1.4...2301</ihe:DocumentUniqueId>
               </ihe:DocumentRequest>
            </SeriesRequest>
         </StudyRequest>
         <TransferSyntaxUIDList>
            <TransferSyntaxUID> 1.2.840.10008.1.2.1</TransferSyntaxUID>
            <TransferSyntaxUID> 1.2.840.10008.1.2.4.57</TransferSyntaxUID>
            <TransferSyntaxUID> 1.2.840.10008.1.2.4.70</TransferSyntaxUID>
         </TransferSyntaxUIDList>
      </RetrieveImagingDocumentSetRequest>
   </s:Body>
</s:Envelope>
```


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Sample Response: Retrieve Imaging Document Set (RAD-69)

```
HTTP/1.1 200 OK
Content-Type: text/xml; charset=utf-8
Date: Thu, 02 May 2013 03:33:58 GMT
Content-Length: 423

<s:Envelope xmlns:s="http://www.w3.org/2003/05/soap-envelope" xmlns:a="http://www.w3.org/2005/08/addressing">
   <s:Header>
      <a:Action s:mustUnderstand="1">urn:ihe:iti:2007:RetrieveDocumentSetResponse</a:Action>
      <a:RelatesTo>urn:uuid:0fbfdced-6c01-4d09-a110-2201afedaa02</a:RelatesTo>
   </s:Header>
   <s:Body>
      <RetrieveDocumentSetResponse xmlns="urn:ihe:iti:xds-b:2007"
         xmlns:lcm="urn:oasis:names:tc:ebxml-regrep:xsd:lcm:3.0"
         xmlns:query="urn:oasis:names:tc:ebxml-regrep:xsd:query:3.0"
         xmlns:rim="urn:oasis:names:tc:ebxml-regrep:xsd:rim:3.0"
         xmlns:rs="urn:oasis:names:tc:ebxml-regrep:xsd:rs:3.0">
         <rs:RegistryResponse status="urn:oasis:names:tc:ebxml-regrep:ResponseStatusType:Success"/>
         <DocumentResponse>
            <RepositoryUniqueId>1.3.6.1.4...1000</RepositoryUniqueId>
            <DocumentUniqueId>1.3.6.1.4...2300</DocumentUniqueId>
            <mimeType>application/dicom</mimeType>
            <Document>UjBsR09EbGhjZ0dTQUxNQUFBUUNBRU1tQ1p0dGUXhEUzhi</Document>
         </DocumentResponse>
         <DocumentResponse>
            <RepositoryUniqueId>1.3.6.1.4...1000</RepositoryUniqueId>
            <DocumentUniqueId>1.3.6.1.4...2301</DocumentUniqueId>
            <mimeType>application/dicom</mimeType>
            <Document>UjBsR09EbGhjZ0dTQUxNQUFBUUNBRU1tQ1p0dU1GUCx4hu</Document>
         </DocumentResponse>
      </RetrieveDocumentSetResponse>
   </s:Body>
</s:Envelope>
```

Note that this example shows two unrealisticly short DICOM instances included base-64 encoded inline in the response. A typical instance would more likely be several of megabytes long, and the response would typically use multi-part MIME and MTOM-XOP. The example response is not compressed.

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12 Acknowledgments

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Appendix A Person Enrollment Workflow Scenarios

A.1 Person Enrollment Workflow

The primary workflow for enrolling a person in CommonWell begins by establishing whether or not a Person Record exists in CommonWell and is linked to the local Patient Record. The CommonWell Person API allows Edge Systems to search for persons using strong identifiers. Because persons may be enrolled in CommonWell without associated strong identifiers, the CommonWell APIs also provide a way to locate Person Records indirectly using patient demographic information stored with CommonWell. This mechanism works by providing the known Patient Identifier to CommonWell in the Person search request. This approach aims to mitigate the risk of exposing the person data store to ad-hoc demographic searches.

The following sections describe workflows for enrollment using the CommonWell APIs with two alternative pre-conditions: 1) where the Edge System has access to the local Patient Identifier, or 2) where the Edge System does NOT have access to the local Patient Identifier.

A.2 Patient Identifier Known

If the Edge System has access to the Patient Identifier, it may follow the workflow diagrammed below to determine whether or not a patient is registered with CommonWell as a person. This base workflow begins with accessing the local Patient Record stored in CommonWell.

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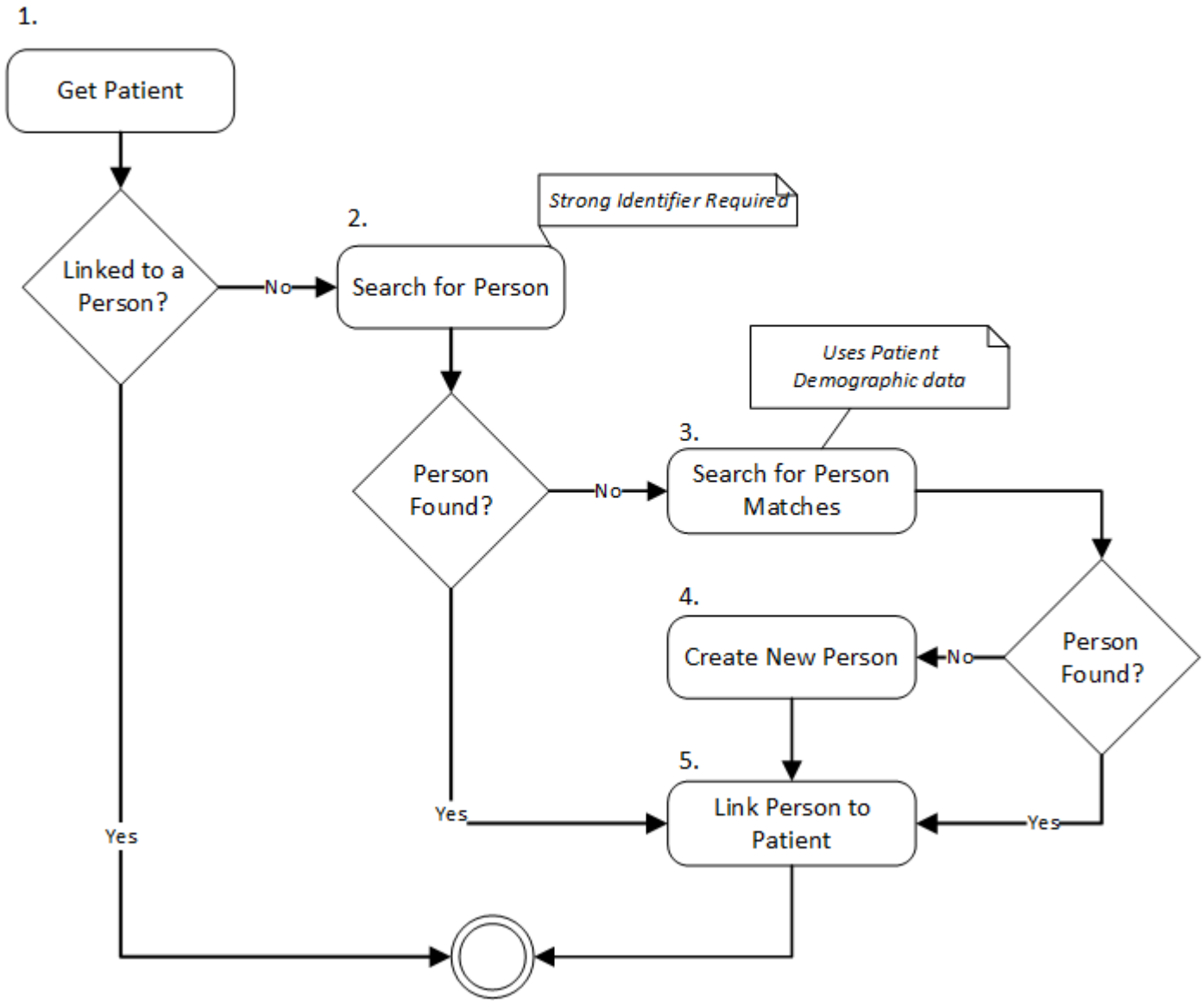
Person Enrollment Activity



1. The Edge System gets the Patient resource using the known Patient Identifier.

```
GET /v1/org/{orgId}/patient/{patientId}
```

The Edge System should evaluate the link relations included in the returned Patient resource to determine the next step in the workflow.

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a. If a “Person” link relation is included, this indicates the state of the Patient is “linked to a Person,” and this completes the workflow.

```
"person": {"href": "/v1/person/{personId}"}}
```

b. If the Patient Record is not linked to a Person, and the presenting patient has a strong identifier, the Edge System should search for a matching Person using the strong identifier (Step 2).

2. The Edge System queries CommonWell for the Person Record using a strong identifier. This is supported using a HTTP GET request with the appropriate query string parameters identifying the strong identifier value (key) and assigning system.

```
GET /v1/person?key={key}&system={system}
```

a. If the search is successful, the Edge System may link the Person to the Patient (Step 5).
b. If the query does not return a Person Record, the Edge System may search for Person Records based on the demographic data in the Patient Record (Step 3).

3. The Edge System queries CommonWell for a matching Person Record based on the demographic data in the Patient Record. This is supported using an HTTP GET request rooted in the patient CommonWell URI.

```
GET /v1/org/{orgId}/patient/{patientId}/person
```

Note that this URI is provided in the link relation named “personMatch” in the Patient resource representation returned in Step 1.

a. If the query returns a matching Person Record, the Edge System should link the Person to the Patient Record (Step 5).
b. If there is no matching Person Record, the Edge System should create a new Person Record (Step 4).

4. The Edge System creates a new Person Record.

```
POST https://.../v1/person

{
   "details": {
      "address": [{
         "zip": "60610",
         "state":  "Il",
         "line": ["511 Oswego St"],
         "city": "Chicago"}],
      "name": [{
         "given": ["Frank"],
         "family": ["Nolan"]}],
      "gender": {
         "code": "M"},
      "birthDate": "1945-09-24",
      "identifier": [{
         "key": "12345ABCD",
         "system": "urn:oid:2.16.840.1.113883.4.3.17",
         "period": {
            "start": "2011-06-08"}}]
}}
```


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5. Once the Person Record has been discovered via search or created, the Edge System will link the Patient to the Person by creating a new “PatientLink” resource.

```
POST https://.../v1/person/c21cc31d-6c57-442b-8e76-5de498903334/patientLink

{
   "patient": "https://.../v1/org/2.16.840.1.113883.4.3.17/patient/9876%5E%5E%5E%262.16.840.1.113883.3.4%26ISO",
   "identifier": {
      "key": "Z1234567"},
      "period": {
         "start": "2010-09-12"}},
      "system": "urn:oid:2.16.840.1.113883.4.3.17"}
}}
```

A.3 Patient Identifier Known – Starting with Person Search

As an alternative to the primary workflow above, the diagram below illustrates a variation wherein the workflow begins with a Person search based on strong identifier.

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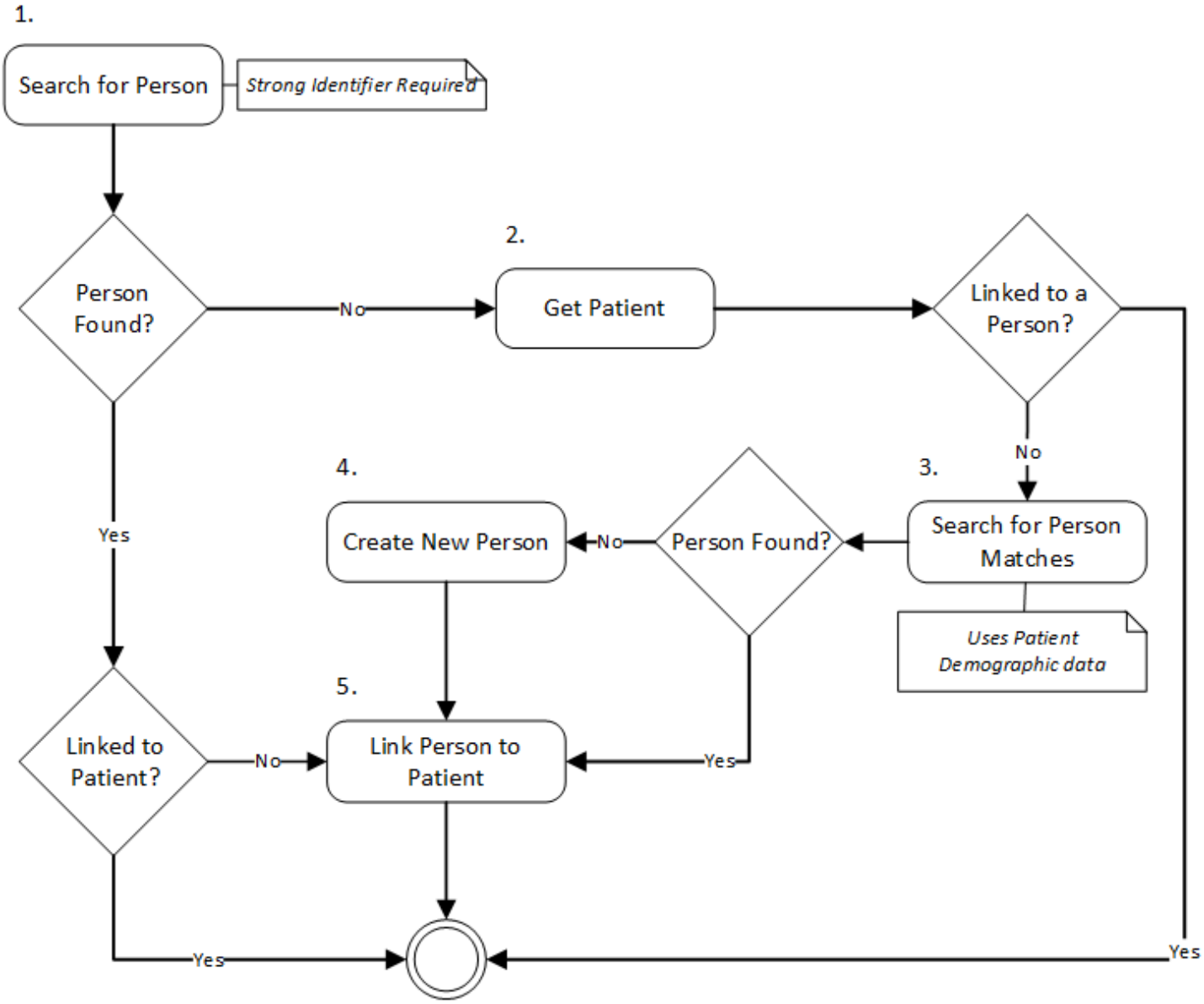
Person Enrollment Activity – Alternative



1. An Enrollment workflow may begin with a Person search based on a strong identifier. This is supported using a HTTP GET operation with the appropriate query string parameters identifying the strong identifier value (key) and assigning system.

```
GET /v1/person?key={key}&system={system}
```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a. If the search is successful, the Edge System may examine the Patient Links in the returned Person resource to learn whether or not the Person is linked to the Patient.

```
GET /v1/person/{personId}/patientLink
```

I. If the subject Patient Record is included in the list of Patient Links, the workflow is completed.
II. If the Patient is not linked to the Person, the Edge System must link the Person to the Patient (see Step 5 below).

b. If no Person Record is found, the Edge System should acquire the Patient Record from CommonWell.

2. The Edge System gets the Patient resource using the known Patient Identifier.

```
GET /v1/org/{orgId}/patient/{patientId}
```

The Edge System should evaluate the link relations included in the returned Patient resource to determine the next step in the workflow.

a. If a "Person" link relation is included, this indicates the state of the Patient is "linked to a Person," and this completes the workflow.

```
"person": {"href": "/v1/person/{personId}"}}
```

b. If, instead, a "personMatch" link relation is included, this indicates the state of Patient is "not linked to a Person." The Edge System should dereference the associated hyperlink to execute a search for Person Records matching the patient demographics.

```
"personMatch": {"href": "/v1/org/{orgId}/patient/{patientId}/person"}}
```

Because link relations indicate the available state transitions for a given resource, the "person" and "personMatch" link relations will NEVER appear together in the same Patient resource representation.

3. As described in Step b above, the Edge System dereferences the "personMatch" link to query CommonWell for Person Records that match the specified Patient Record demographics.
   a. If CommonWell returns a matching Person Record, the Edge System should link the Person to the Patient Record (Step 5).
   b. If the query returns no matching Person Record, the Edge System should add a new Person Record (Step 4).
4. The Edge System creates a new Person Record.
5. The Edge System links the Person to the Patient.

A.4 Patient Identifier Unknown

When the Edge System does NOT have access to the local Patient Identifier, the workflow includes a mechanism for locating the Patient Record using demographic search. This may apply to a third-party application acting on behalf of any number of CommonWell organizations such as the Person Enrollment web application.

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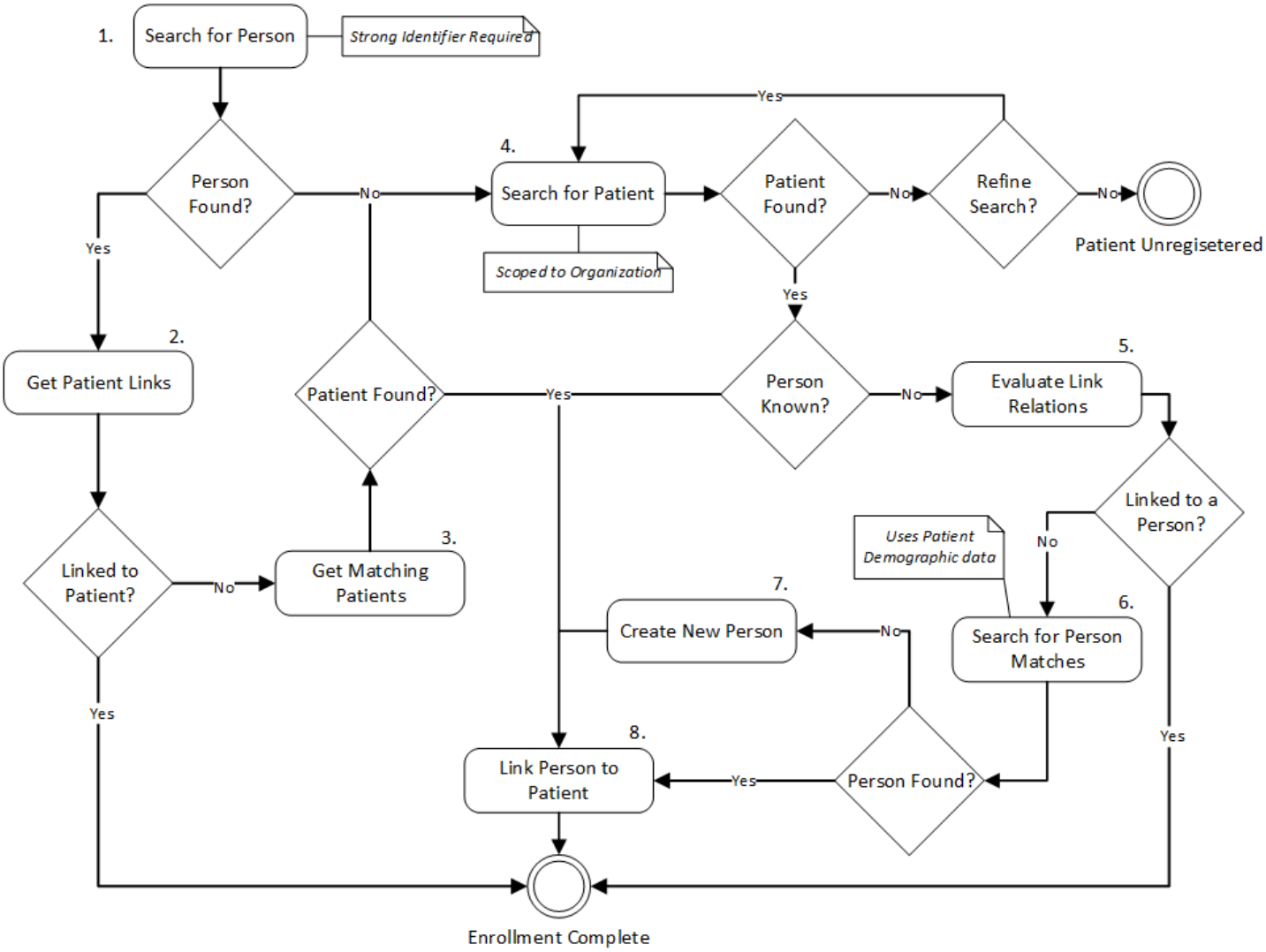
Person Enrollment Activity – Patient ID Unknown



1. If the presenting patient has a strong identifier, the workflow may begin with a Person search based on that strong identifier. This is supported using a HTTP GET operation with the appropriate query string parameters identifying the strong identifier value and assigning system.

```
GET /v1/person?key={key}&system={system}
```

   a. If the search is successful, the Edge System may examine the Patient Links in the returned Person resource to learn whether or not the Person is linked to the Patient (Step 2).
   b. If the Person search returns no results, the Edge System may use the Patient API to search for the Patient (Step 4).
2. The Edge System requests the Patient Links associated with the returned Person.

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```
GET /v1/person/{personId}/patientLink
```

a. If the subject Patient Record is included in the list of Patient Links, the workflow is completed.
b. If the subject Patient Record is not linked to the Person, the Edge System must find the local Patient (Step 3).

3. The Edge System requests a list of local Patient Records matching the Person.

```
GET /v1/person/{personId}/patientMatch?orgId={orgId}
```

a. If the search is successful, users of the Edge System should examine the returned Patients to locate the Patient Record representing the presenting patient. If the Patient Record is located in the list of match results, the Edge System can link the Person to the found Patient Record (Step 7).
b. If no matching Patient Records are located, the Edge System may search for the local Patient Records using the Patient search API (Step 4).

4. The SEdge ystem searches for the Patient Record using the Patient search API. This is supported using an HTTP GET operation with the required first name, last name and date of birth input parameters submitted as query string parameters.

```
GET /v1/org/{orgId}/patient?fname={fname}k&lname={lname}&DoB={DoB}
```

a. If no patient matches are returned, the Edge System can refine its search criteria or determine that the Patient Record has not been registered with CommonWell. If the latter, this represents an unsuccessful end to the workflow.
b. If the Patient Record is found, the Edge System proceeds based on the current state of the workflow.
   i. If the patient search was entered after finding a Person by strong ID, followed by a failure to get a matching Patient Record (from Step 3), the Edge System may link the located Patient Record to the known Person (Step 8).
   ii. If the patient search was entered after a failed Person search by strong ID (from Step 1), the Edge System should examine the link relations included in the Patient resource to determine the next step in the workflow (Step 5).

5. The Edge System examines the link relations included in the found Patient Record to determine the next step in the workflow.
   a. If a “Person” link relation is included, this indicates the state of the Patient is “linked to a Person,” and this completes the workflow.

```
"person": {"href": "/v1/person/{personId}"}}
```

b. If instead a “personMatch” link relation is included, this indicates the state of Patient is “not linked to a Person.” The Edge System should dereference the associated hyperlink to execute a search for Person Records matching the patient demographics.

```
"personMatch": {"href": "/v1/org/{orgId}/patient/{patientId}/person"}}
```

Because link relations indicate the available state transitions for a given resource, the “person” and “personMatch” link relations will NEVER appear together in the same Patient resource representation.

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6. As described in Step b above, the Edge System dereferences the “personMatch” link to query CommonWell for Person Records that match the specified Patient Record demographics.
   a. If CommonWell returns a matching Person Record, the Edge System should link the Person to the Patient Record (Step 8).
   b. If the query returns no matching Person Record, the Edge System should add a new Person Record (Step 7).
7. The Edge System creates a new Person Record.
8. The Edge System links the Person to the Patient.

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Appendix B PIX v2 to Patient Resource Data Mapping

The following table provides a mapping of HL7 2.5/2.6 segments to their Patient resource equivalent.

PIX V2	Patient Resource	Comments
	patient.active	
Not mapped	patient.identifier.use	Infer based on the type code and assigning authority
PID-2.5	patient.identifier.label	
PID-2.4	patient.identifier.system	
PID-2.1	patient.identifier.key	
PID-2.7	patient.identifier.period.start	
PID-2.8	patient.identifier.period.end	
Not mapped	patient.identifier.assigner	
Not mapped	patient.details.identifier.use	Infer based on the type code
PID-3.5	patient.details.identifier.label	
PID-3.4, PID-20.2	patient.details.identifier.system	
PID-3.1,PID-20.1	patient.details.identifier.key	PID 20 DL
PID-3.7	patient.details.identifier.period.start	
PID-3.8, PID-20.3	patient.details.identifier.period.end	
Not mapped	patient.details.identifier.name.use	
Not mapped	patient.details.identifier.name.text	Full name
PID-5.1	patient.details.identifier.name.family	
PID-5.2	patient.details.identifier.name.given	
PID-5.5	patient.details.identifier.name.prefix	
PID-5.4	patient.details.identifier.name.suffix	

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PIX V2	Patient Resource	Comments
PID-5.12	patient.details.identifier.period.start	
PID-5.13	patient.details.identifier.period.end	
Not mapped	patient.details.telecom.system	Not critical for identity match
PID-13.1, PID 14	patient.details.telecom.value	
PID-13.2, PID 14	patient.details.telecom.use	
	patient.details.telecom.period.start	
	patient.details.telecom.period.end	
Not mapped	patient.details.gender.system	Not critical for identity match
PID-8	patient.details.gender.code	
PID-8	patient.details.gender.display	
PID-7	patient.details.birthDate	
PID-11.7	patient.details.address.use	
PID-11.1,11.2	patient.details.address.line[]	
PID-11.3	patient.details.address.city	
PID-11.4	patient.details.address.state	
PID-11.5	patient.details.address.zip	
PID-11.6	patient.details.address.country	
PID-16-3	patient.details.maritialStatus.coding.system	
PID-16-1	patient.details.maritialStatus.coding.code	
PID-16-2	patient.details.maritialStatus.coding.display	
PID-16-1	patient.details.maritialStatus.text	
Not mapped	patient.details.maritialStatus.primary	Not critical for identity match
Visit information		

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PIX V2	Patient Resource	Comments
Pv2-3,pv2-4	visit.type.coding	We could use it if we have all the values, otherwise, we will just update the text field with combined information.
	visit.type.coding.system	
	visit.type.coding.code	
	visit.type.coding.display	
Pv1-3 + Pv1-4, pv2-12	visit.type.text	
	visit.type.primary	
PV1.44/45	visit.date.start	
	visit.date.end	

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Appendix C Terminology Bindings

The table below contains the terminology bindings used in this specification. For a full list of the FHIR terminology bindings, see http://www.hl7.org/implement/standards/fhir/terminologies-bindings.htm.

Name	Definition	Type	Reference
AddressUse	The use of an address	Code List	http://hl7.org/fhir/address-use
AdministrativeGender	The gender of a person used for administrative purposes	Value Set	http://hl7.org/fhir/vs/administrative-gender
ContactSystem	What kind of contact this is	Code List	http://hl7.org/fhir/contact-system
ContactUse	How to use this address	Code List	http://hl7.org/fhir/contact-use
VisitClass	Classification of the visit	Code List	http://hl7.org/fhir/visit-class
IdentifierUse	Identifies the use for this identifier, if known	Code List	http://www.hl7.org/fhir/identifier-use
MimeType	The mime type of an attachment	Reference	BCP 13 (RFCs 2045, 2046, 2047, 4288, 4289 and 2049) (http://www.rfc-editor.org/bcp/bcp13.txt)
NameUse	The use of a human name	Code List	http://hl7.org/fhir/name-use
PractitionerRole	The role a person plays representing an organization	Value Set	http://hl7.org/fhir/vs/practitioner-role

The associated value sets and code lists are detailed in the following sections.

C.1 Address Use Codes

The use of an address. This value set defines its own terms in the system http://hl7.org/fhir/address-use.

Code	Display	Definition
home		A communication address at a home.
work		An office address. First choice for business-related contacts during business hours.

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Code	Display	Definition
temp		A temporary address. The period can provide more detailed information.
old		This address is no longer in use (or was never correct, but retained for records).

C.2 Administrative Gender Codes

This value set defines the set of codes that can be used to indicate the administrative gender of a person.

Code	Display	Definition
F	Female	Female
M	Male	Male
UN	Undifferentiated	The gender of a person could not be uniquely defined as male or female, such as hermaphrodite.

C.3 Contact System Codes

Describes the kind of contact. This value set defines its own terms in the system http://hl7.org/fhir/contact-system.

Code	Display	Definition
phone		The value is a telephone number used for voice calls. Use of full international numbers starting with + is recommended to enable automatic dialing support but not required.
fax		The value is a fax machine. Use of full international numbers starting with + is recommended to enable automatic dialing support but not required.
email		The value is an email address.
url		The value is a url. This is intended for various personal contacts including blogs, Twitter, Facebook, etc. Do not use for email addresses.

C.4 Contact Use Codes

How to use this address. This value set defines its own terms in the system http://hl7.org/fhir/contact-use.

Code	Display	Definition
home		A communication contact at a home; attempted contacts for business purposes might intrude privacy and chances are one will contact family or other household members instead of the person

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Code	Display	Definition
		one wishes to call. Typically used with urgent cases, or if no other contacts are available.
work		An office contact. First choice for business-related contacts during business hours.
temp		A temporary contact. The period can provide more detailed information.
old		This contact is no longer in use (or was never correct, but retained for records).
mobile		A telecommunication device that moves and stays with its owner. May have characteristics of all other use codes, suitable for urgent matters, not the first choice for routine business.
home		A communication contact at a home; attempted contacts for business purposes might intrude privacy and chances are one will contact family or other household members instead of the person one wishes to call. Typically used with urgent cases, or if no other contacts are available.

C.5 Practitioner Role Codes

This example value set defines a set of codes that can be used to indicate the role of a Practitioner. This value set defines its own terms in the system http://hl7.org/fhir/practitioner-role.

Code	Display	Definition
doctor		
nurse		
pharmacist		
researcher		
teacher	Teacher/educator	
ict	ICT professional	

C.6 Patient Role and Purpose of Use Codes

These values are defined in the HITSP Clinical Document and Message Terminology Component (HITSP C80) version 2.0 found at https://ushik.ahrq.gov/portals/hitsp/reference_documents/HITSP_V2.0_2010_C80_-_Clinical_Document_and_Message_Terminology.pdf. The accepted codes are defined in Table 2-155 Author Role Value Set Definition.

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The expected Purpose Of Use Code for all patient initiated transactions is REQUEST to represent a request of an individual based on NHIN 3.0.1 standards.

Code	Role	Purpose of Use
see Table 2-155 for provider codes	any provider from Table 2-155 Author Role Value Set Definition	Treatment
116154003	patient	Patient Access
307785004	insurance specialist	Coverage

C.7 Visit Class Code

Classification of the encounter. This value set defines its own terms in the system http://hl7.org/fhir/visit-class.

Code	Display	Definition
inpatient		A patient that stays overnight.
outpatient		
ambulatory		
emergency		
home		
field		
acute		
non-acute		
daytime		
virtual		

C.8 Identifier Use Codes

Identifies the use for an identifier, if known. This value set defines its own terms in the system http://hl7.org/fhir/identifier-use.

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Code	Display	Definition
usual		The identifier recommended for display and use in real-world interactions.
official		The identifier considered to be most trusted for the identification of this item.
temp		A temporary identifier.

C.9 Name Use Codes

The value set definition for use of a human name. This value set defines its own terms in the system http://hl7.org/fhir/vs/name-use.

Code	Display	Definition
usual		Known as/conventional/the one you normally use.
official		The formal name as registered in an official (government) registry, but which name might not be commonly used. May be called "legal name."
temp		A temporary name. A name valid time can provide more detailed information. This may also be used for temporary names assigned at birth or in emergency situations.
nickname		A name that is used to address the person in an informal manner, but is not part of their formal or usual name.
anonymous		Anonymous assigned name, alias, or pseudonym (used to protect a person's identity for privacy reasons).
old		This name is no longer in use (or was never correct, but retained for records).
maiden		A name used prior to marriage. Marriage naming customs vary greatly around the world. This name use is for use by applications that collect and store "maiden" names. Though the concept of maiden name is often gender specific, the use of this term is not gender specific. The use of this term does not imply any particular history for a person's name, nor should the maiden name be determined algorithmically.

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Appendix D Upload of Historical Patient Identity Data

This appendix describes the requirements for providing an initiating feed of patient historical data to the CommonWell service. As described in the main body of this specification, CommonWell provides two primary interfaces for managing Patient Identity data: 1) HL7 V2.x ADT; and 2) a REST-based service.

For each type of interface, CommonWell will provide a dedicated endpoint for this type of data feed.

D.1 PIX Historical Feed

When delivering a history of patient data to the CommonWell PIX service, the sending system should provide this data in the form of an ADT A08 message. This should also include available encounter information.

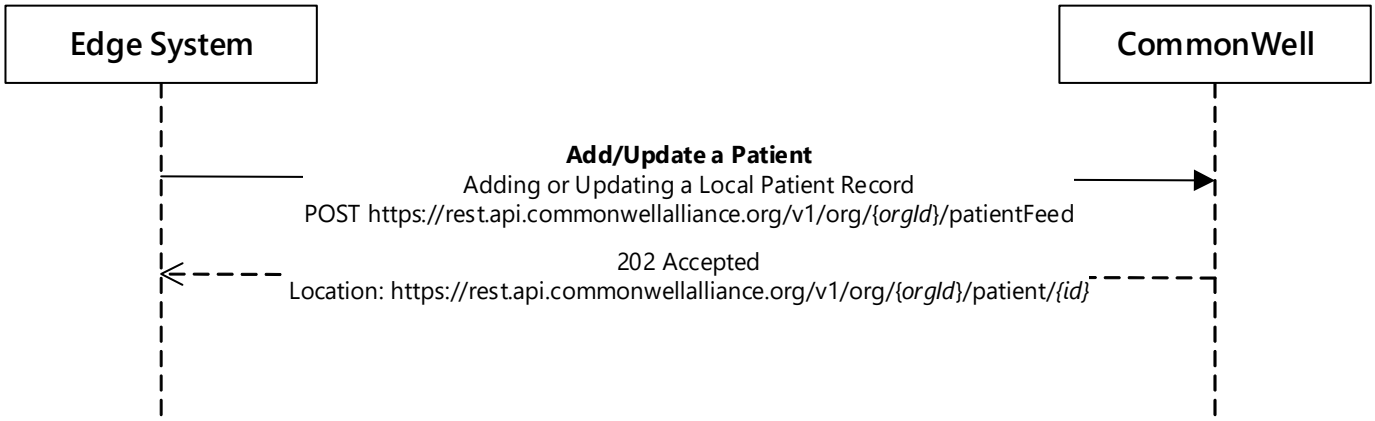
Sample Message

```
MSH|^~\&|Resonance^2.16.840.1.113883.3.13.3.3^ISO|Cli_Facility|CW_App|CW_Facility|201307080944||ADT^A08|5616|D|2
.5
EVN|A08|201202150937
PID|1||4933^^^&1.3.6.1.4.1.29928&ISO||Nolan^Frank||19450924|M|||8123 Hawthorne
Ave^^Chicago^IL^60612^US^P^042||(708)555-1234|(312)555-3456|E^ENGLISH^CLAN
PD1||||15014^Geiger^Jeffrey
PV1||O|128
~355~C~PMA^^^^^^^^^^||||15014^Geiger^Geoffrey^^^^||||||||||||201202178||||||||||||||||||||||||||201202150937||||||
1233443234
```

The CommonWell server will perform basic data validation (see Section 9.2 Message Constraints). If no errors are found, CommonWell will commit the message to safe storage and return an accept acknowledgment to the sending Edge System. This acknowledgement releases the sending Edge System from the need to resend the message.

The endpoint for the PIX Historical Feed will be different from the one used for ongoing Patient administration events. The dedicated historical feed endpoint will only accept A08 messages and will operate exclusively in PIX Enhanced mode.

D.2 REST-based Historical Feed



POST https://rest.api.commonwellalliance.org/v1/org/{*orgId*}/patientFeed

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The URL template for adding patient historical data includes the Organization identifier. This identifies the Patient Identity Domain owned by the Organization represented by the Edge System.

The body of the post message is a Patient resource. In order for the patient data to be indexed in the CommonWell service, the following parameters are required.

Required Parameters

- identifier
  - key
  - system
- patient
  - details
    - name
      - family
      - given
    - birthDate
    - gender
      - code
    - address
      - zip

Sample Request

```
POST https://rest.api.commonwellalliance.org/v1/org/2.16.840.1.113883.3.4/patientFeed HTTP/1.1
Content-Type: application/json
Host: rest.api.commonwellalliance.org
Content-Length: 363

{
   "identifier": [{
      "use": "internal",
      "label": "Oswego MRN",
      "key": "9876",
      "system": "urn:oid:2.16.840.1.113883.3.4",
      "assigner": "Oswego Health System"}],
   "details": {
      "name": [{
         "family": ["Nolan"],
         "given": ["Frank"],
         "use": "usual"}],
      "address": [{
         "line": ["511 Oswego St"],
         "city": "Chicago",
         "state":  "Il",
         "zip": "60610"}],
      "birthDate": "1945-09-24",
      "gender": {
         "code": "M"},
      "telecom": [{
         "system": "phone",
         "use": "home",
         "value": "(708) 555 6473"}]
   }
}
```


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If any of the required fields are missing, the service returns an HTTP 400 (Bad Request) response code. This will also include an error resource detailing the reason the request was rejected.

Sample Error Response

```
HTTP/1.1 400 Bad Request
Content-Length: 67
Content-Type: application/json; charset=UTF-8
Date: Wed, 06 Feb 2013 20:54:59 GMT

{
   "message": "The patient resource was missing a required date of birth value.",
   "code": XXXX,
   "help": {"href": "http://rest.api.commonwellalliance.org/help/#patient"}
}
```

If the message is accepted for processing, the response from the CommonWell service will include an HTTP Location header for the URL of the resulting Patient resource. This will be based on the Patient Identifier value and the namespace provided in the posted Patient resource.

Sample Response

```
HTTP/1.1 202 Accepted
Location:
https://rest.api.commonwellalliance.org/v1/org/2.16.840.1.113883.3.4/patient/9876%5E%5E%5E2.16.840.1.113883.3.4/
Date: Wed, 06 Feb 2013 20:54:44 GMT
```

The endpoint for the REST Historical Feed will be different from the one used for ongoing Patient administration events.

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Appendix E CommonWell Document Metadata

This documents the proposed set of coding systems and values to be used for document metadata by systems participating in CommonWell.

The set of document metadata attributes is documented by IHE in the IHE IT Infrastructure Technical Framework Volume 3 (http://www.ihe.net/uploadedFiles/Documents/ITI/IHE_ITI_TF_Vol3.pdf) (IHE ITI TF-3:4 and, in particular, see Table 4.2.3.2-1: DocumentEntry Metadata Attribute Definition).

The table below shows those document metadata elements of Data Type Code, plus mimeType, as these are the properties that communities must define.

In selecting the proposed set of coding systems and values for each of the metadata elements, the following sources were considered:

- IHE Patient Care Coordination Technical Framework, Volume 2 (http://www.ihe.net/uploadedFiles/Documents/PCC/IHE_PCC_TF_Vol2.pdf) (see 5.1.1 Format Codes)
- The Sequoia Project (formerly HealtheWay) NHIN Document Submission Production Web Service Interface Specification v 2.0 (https://sequoiaproject.org/wp-content/uploads/2014/11/nhin-web-services-registry-production-specification-v2.0.pdf)
- HITSP Clinical Document and Message Terminology Component, HITSP/C80 (http://www.hitsp.org/Handlers/HitspFileServer.aspx?FileGuid=886331bd-2eba-4ded-a1ed-24b35ecebb62) (see 2.2.3.15 DOCUMENT METADATA)
- IHE Connectathon Codes (http://ihexds.nist.gov:12080/xdsref/codes/codes.xml)
- Classifying Documents in XDS (http://motorcycleguy.blogspot.com/2013/05/classifying-documents-in-xds.html)
- What is the purpose of XDS Format Code (http://motorcycleguy.blogspot.com/2013/12/what-is-purpose-of-xds-formatcode.html)
- MIME Types (http://en.wikipedia.org/wiki/Internet_media_type)
- IHE Radiology Technical Framework, Volume 3 (http://www.ihe.net/uploadedFiles/Documents/Radiology/IHE_RAD_TF_Vol3.pdf) (RAD TF-3: 4.68 Provide and Register Imaging Document Set – MTOM/XOP)

In proposing coding systems, the use of existing, standards-based, HITSP- and IHE-documented coding systems are used.

CommonWellDocumentMetadataCodes.xml (located in the CommonWell Community, which is a private site for CommonWell deploying members) contains entries for the values documented for all of the coded metadata properties and is the official, versioned, list of value sets.

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E.1 classCode

This code specifies the high-level use classification of the document; contrast with typeCode which species the precise document type from the user perspective.

Coding System: 2.16.840.1.113883.6.1

Values: A CommonWell-selected set of LOINC codes based upon the set as specified by HITSP/C80 Table 2-144 Document Class Value Set Definition.

Example:

```
<Classification id="cl02"
   classificationScheme="urn:uuid:41a5887f-8865-4c09-adf7-e362475b143a"
   classifiedObject="theDocument"
   nodeRepresentation="34133-9">
   <Slot name="codingScheme">
      <ValueList>
         <Value>2.16.840.1.113883.6.1</Value>
      </ValueList>
   </Slot>
   <Name>
      <LocalizedString value="Summarization of episode note"/>
   </Name>
</Classification>
```

There are newer proposals for classCode with some growing momentum to use a more simple list, for example:

- Report
- Summary
- Images
- Prescribed Treatment
- Dispensations
- Treatment Plan or Protocol
- Health Certificates and Notifications
- Patient Expression and Preferences
- Workflow Management

However, there is no currently accepted, standards-based coding system and set of codes for this list. This, coupled with the current HealtheWay (NwHIN) specification that refers to HITSP, are reason to stay with the HITSP-recommended set.

For the exchange of radiology reports, the value 47045-0 (‘Study report’) should be used. For the exchange of imaging manifests, a specialty-appropriate value is recommended, such as 18726-0 (‘Radiology Studies’) or 26441-6 (‘Cardiology Studies’).

Value List:

From HITSP/C80 Table 2-144 Document Class Value Set Definition.

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See classCode concept list in CommonWellDocumentMetadataCodes (located in the CommonWell Community, which is a private site for CommonWell deploying members).

E.2 confidentialityCode

The code specifying the level of confidentiality of the Document.

Coding System: 2.16.840.1.113883.5.25

Values: A CommonWell-selected set of HL7 V3 Confidentiality codes based upon the set as specified by HITSP/C80 Table 2-151 Confidentiality Value Set Reference Listing.

Example:

```
<Classification id="cl03"
   classificationScheme="urn:uuid:f4f85eac-e6cb-4883-b524-f2705394840f"
   classifiedObject="theDocument"
   nodeRepresentation="N">
   <Slot name="codingScheme">
      <ValueList>
         <Value>2.16.840.1.113883.5.25</Value>
      </ValueList>
   </Slot>
   <Name>
      <LocalizedString value="Normal"/>
   </Name>
</Classification>
```

Value List:

From HITSP/C80 Table 2 151 Confidentiality Value Set Reference Listing.

See confidentialityCode concept list in CommonWellDocumentMetadataCodes (located in the CommonWell Community, which is a private site for CommonWell deploying members).

E.3 eventCodeList

This list of codes represents the main clinical acts. It is also used in conjunction with the BPPC Profile to populate the set if Patient Privacy Identifiers that have been acknowledged within a document.

For the exchange of radiology reports and image manifests, a value for each aquisition modality, shall be included. Modality values are drawn from DICOM Content Mapping Resource (DICOM PS3.16) Context Group CID 29; the schema shall be 'DCM'.

For the exchange of radiology reports and image manifests, a value for each body part imaged should be included. Anatomic region values should be drawn from DICOM Content Mapping Resource (DICOM PS3.16) Context Group CID 4 (and referenced context groups). Additionally, values for body parts examined may be include, drawn from DICOM Content Mapping Resource (DICOM PS3.16) Appendix L. For both sets of values the schema shall be 'DCM'.

No additional recommendations are made at this time.

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E.4 formatCode

This is the code specifying the format of the document. Along with the typeCode, it should provide sufficient information to allow any potential document consumer to know if it will be able to process the document. The code shall be sufficiently specific to ensure processing/display by identifying a document encoding, structure and template

Coding System: 1.3.6.1.4.1.19376.1.2.3

Values: A CommonWell-selected set of codes based upon the set as specified by HITSP/C80 Table 2-153 Format Code Value Set Definition. This table includes the IHE PCC-defined values, plus additional values for NwHIN. IHE Radiology-defined values are used to identify radiology reports.

For documents based upon the Consolidated CDA (CCDA) specification, see formatCode concept list in CommonWellDocumentMetadataCodes (located in the CommonWell Community, which is a private site for CommonWell deploying members).

Example:

```
<Classification id="cl04"
   classificationScheme="urn:uuid:a09d5840-386c-46f2-b5ad-9c3699a4309d"
   classifiedObject="theDocument"
   nodeRepresentation="urn:ihe:pcc:xds-ms:2007">
   <Slot name="codingScheme">
      <ValueList>
         <Value>1.3.6.1.4.1.19376.1.2.3</Value>
      </ValueList>
   </Slot>
   <Name>
      <LocalizedString value="XDS Medical Summaries"/>
   </Name>
</Classification>
```

Or, equivalently (because the HITSP C80 and the IHE PCC Framework are not in complete alignment on display names):

```
<Classification id="cl04"
   classificationScheme="urn:uuid:a09d5840-386c-46f2-b5ad-9c3699a4309d"
   classifiedObject="theDocument"
   nodeRepresentation="urn:ihe:pcc:xds-ms:2007">
   <Slot name="codingScheme">
      <ValueList>
         <Value>1.3.6.1.4.1.19376.1.2.3</Value>
      </ValueList>
   </Slot>
   <Name>
      <LocalizedString value="Medical Summaries (XDSMS)"/>
   </Name>
</Classification>
```

Radiology reports shall either use the XDS-I CDA-Wrapped Text Report format code, or the XDS-I PDF format code, as shown below. For XDS-I CDA-Wrapped Text Report:

```
<Classification id="cl04"
   classificationScheme="urn:uuid:a09d5840-386c-46f2-b5ad-9c3699a4309d"
   classifiedObject="theDocument"
   nodeRepresentation="urn:ihe:rad:TEXT">
```


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```
   <Slot name="codingScheme">
      <ValueList>
         <Value>1.3.6.1.4.1.19376.1.2.3</Value>
      </ValueList>
   </Slot>
   <Name>
      <LocalizedString value= CDA-Wrapped Plain Text
   </Name>
</Classification>
```

For XDS-I PDF reports:

```
<Classification id="cl04"
   classificationScheme="urn:uuid:a09d5840-386c-46f2-b5ad-9c3699a4309d"
   classifiedObject="theDocument"
   nodeRepresentation="urn:ihe:rad:PDF">
   <Slot name="codingScheme">
      <ValueList>
         <Value>1.3.6.1.4.1.19376.1.2.3</Value>
      </ValueList>
   </Slot>
   <Name>
      <LocalizedString value="PDF Report"/>
   </Name>
</Classification>
```

Image manifests shall use the XDS-I Image manifest format code, as shown:

```
<Classification id="cl04"
   classificationScheme="urn:uuid:a09d5840-386c-46f2-b5ad-9c3699a4309d"
   classifiedObject="theDocument"
   nodeRepresentation="1.2.840.10008.5.1.4.1.1.88.59">
   <Slot name="codingScheme">
      <ValueList>
         <Value>1.2.840.10008.2.6.1</Value>
      </ValueList>
   </Slot>
   <Name>
      <LocalizedString value="Imaging Manifest (XDS-I)"/>
   </Name>
</Classification>
```

Value List:

From HITSP/C80 Table 2 153 Format Code Value Set Definition, with additions for CCDA and IHE Radiology-defined formats.

See formatCode concept list in CommonWellDocumentMetadataCodes (located in the CommonWell Community, which is a private site for CommonWell deploying members).

E.5 healthcareFacilityTypeCode

This is the code representing the type of organizational setting where the clinical encounter, service, interaction, or treatment occurred.

Coding System: 2.16.840.1.113883.6.96

Values: A CommonWell-selected set of SNOMED codes based upon the set as specified by HITSP/C80 Table 2-146 Healthcare Facility Type Value Set.

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Example:

```
<Classification id="cl05"
   classificationScheme="urn:uuid:f33fb8ac-18af-42cc-ae0e-ed0b0bdb91e1"
   classifiedObject="theDocument"
   nodeRepresentation="11424001">
   <Slot name="codingScheme">
      <ValueList>
         <Value>2.16.840.1.113883.6.96</Value>
      </ValueList>
   </Slot>
   <Name>
      <LocalizedString value="Ambulance-based care"/>
   </Name>
</Classification>
```

Value List:

From HITSP/C80 Table 2 147 Healthcare Facility Type Value Set

See healthcareFacilityTypeCode concept list in CommonWellDocumentMetadataCodes (located in the CommonWell Community, which is a private site for CommonWell deploying members).

E.6 practiceSettingCode

The code specifying the clinical specialty where the act that resulted in the document was performed

(e.g., Family Practice, Laboratory, Radiology). HISTP/C80 defines this as a set of SNOMED CT concepts of clinical specialty values.

Coding System: 2.16.840.1.113883.6.96

Values: A CommonWell-selected set of SNOMED CT codes based upon the set as specified by HITSP/C80 Table 2-148 Cinical Specialty Value Set.

Example:

```
<Classification id="cl06"
   classificationScheme="urn:uuid:cccf5598-8b07-4b77-a05e-ae952c785ead"
   classifiedObject="theDocument" nodeRepresentation="394814009">
   <Slot name="codingScheme">
      <ValueList>
         <Value>2.16.840.1.113883.6.96</Value>
      </ValueList>
   </Slot>
   <Name>
      <LocalizedString value="General practice"/>
   </Name>
</Classification>
```

Value List:

From HITSP/C80 Table 2 149 Clinical Specialty Value Set Definition

See practiceSettingCode concept list in CommonWellDocumentMetadataCodes (located in the CommonWell Community, which is a private site for CommonWell deploying members).

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E.7 typeCode

This code specifies the precise type of document from the user perspective. Whereas the classCode. HITSP defines this as the set of classCode entries plus the set of LOINC codes where the SCALE is DOC in the LOINC database.

For radiology reports and image manifests, the type Code should indicate the type of the performed procedure with which the report or images are associated, e.g. 35991-9 ('Foot CT').

Coding System: 2.16.840.1.113883.6.1

Values: A CommonWell-selected set of LOINC codes based upon the set as specified by HITSP/C80.

Example:

```
<Classification id="cl02"
   classificationScheme="urn:uuid:f0306f51-975f-434e-a61c-c59651d33983"
   classifiedObject="theDocument"
   nodeRepresentation="34133-9">
   <Slot name="codingScheme">
      <ValueList>
         <Value>2.16.840.1.113883.6.1</Value>
      </ValueList>
   </Slot>
   <Name>
      <LocalizedString value="Summarization of episode note"/>
   </Name>
</Classification>
```

Value List:

From HITSP/C80 Table 2 145 Document Type Value Set.

See typeCode concept list in CommonWellDocumentMetadataCodes (located in the CommonWell Community, which is a private site for CommonWell deploying members).

E.8 mimeType

Officially listed in XDS as a data type of MIME type.

IANA maintains the official list.

Coding System: n/a

Values: CommonWell adopts a small subset based primarily upon Connectathon experiences.

Example:

```
<ExtrinsicObject id="theDocument"
   mimeType="text/xml"
   objectType="urn:uuid:7edca82f-054d-47f2-a032-9b2a5b5186c1">
```

Value List:

From a list of commonly used and Connectathon-tested values.

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See mimeType concept list in CommonWellDocumentMetadataCodes (located in the CommonWell Community, which is a private site for CommonWell deploying members).

E.9 title

Identifies the title of the document.

For radiology reports and image manifests, this attribute should contain the study description.

No additional recommendations are made at this time.

E.10 referenceIdList

This list of codes records various identifiers relevant to the shared document, such as other pertinent documents, or study identifiers.

The data type for each item in the list is CXi, as defined in IHE ITI TF-3: Table 4.2.3.1.7-2, and the specific type of reference indicated in the CXi.5 segment.

Values:

For radiology reports and image manifests, this element should include the accession number of the associated imaging study. The CXi.5 segment shall be urn:ihe:iti:xds:2013:accession; the CXi.4 segment shall be an OID identifying the accession number issuer; and the CXi.1 segment shall be the accession number value.

No additional recommendations at this time.

Example:

```
<rim:Slot name="urn:ihe:iti:xds:2013:referenceIdList ">
    <rim:ValueList>
        <rim:Value>
            642356235^^^&1.2.3.4.5.6&ISO^urn:ihe:iti:xds:2013:accession
        </rim:Value>
        <rim:Value>
            STN-238432^^^&1.2.3.4&ISO^^urn:ihe:iti:xds:2013:accession
        </rim:Value>
    </rim:ValueList>
</rim:Slot>
```


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Appendix F CommonWell Health Alliance Performance Targets and Timeout Settings

The CommonWell Health Alliance has agreed on standard performance targets for the main categories of services currently provided by CommonWell. Additionally, the CHA Broker has set timeouts for the document query and document retrieve functionality for both the Integration and Production environments.

F.1 Performance Targets

Pilot Performance Targets	CommonWell Service Provider Targets	CommonWell Member Targets
Non bulk-load PIX and CommonWell REST transactions	99% within 1 second	N/A
CHA Broker document query	99% within 6 seconds	99% within 3 seconds
CHA Broker document retrieve	90% within 10 seconds	90% within 5 seconds
CHA Broker image retrieve	90% within 240 seconds	90% within 120 seconds

F.2 CHA Broker Timeout Settings for Integration and Production

These timeout settings are subject to change based on member feedback and discussion. The timeout settings listed below are accurate as of this writing.

Environment	Document Query Responding Gateway Individual Request Timeout	Document Query Total Timeout	Document Retrieve Timeout	Imaging Retrieve Responding Imaging Gateway Individual Request Timeout	Imaging Retrieve Total Timeout
Integration	20 seconds	25 seconds	30 seconds	5 minutes	10 minutes
Production	20 seconds	25 seconds	30 seconds	5 minutes	10 minutes

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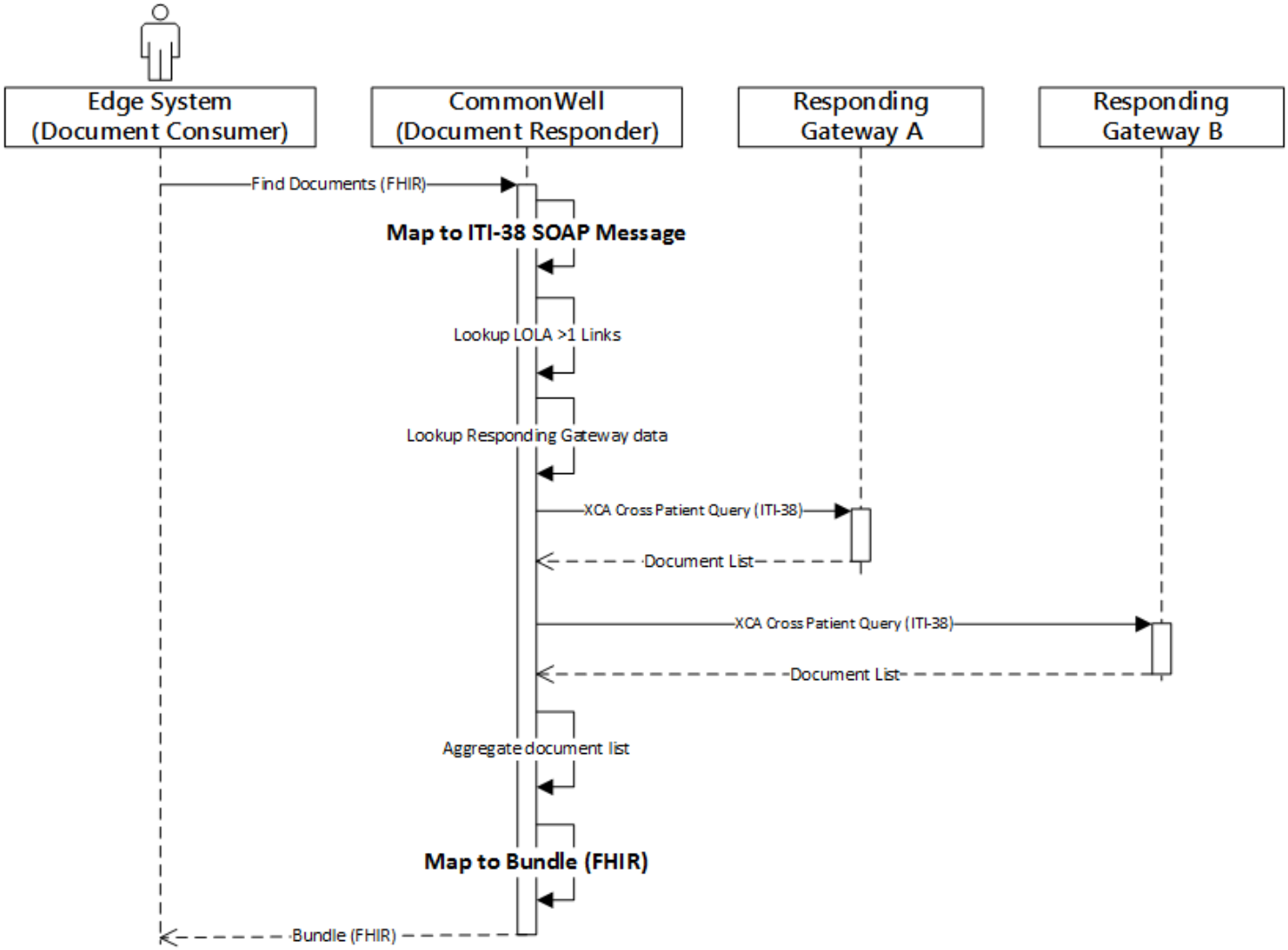
Appendix G REST-based Document Query and Retrieve

CommonWell incorporates services for bridging REST-based document query and retrieve requests to XDS Responding Gateways. The purpose of the appendix is to describe the technical implementation of the façade service including an overview of the transaction flow and the field-level mappings of the SOAP-based XDS messages and the corresponding DocumentReference resource defined in the HL7 FHIR standard.

At this time, there is no defined REST-based mechanism for Image Exchange; although, Image Manifests and radiology report documents may be queried and retrieved like other documents.

G.1 Transaction Flow

Find Documents



The REST-based *Find Documents* transaction follows the same functional flow as described in section 10.4. The additional data-mapping steps in the transaction are shown in bold in the diagram above: at the top of the

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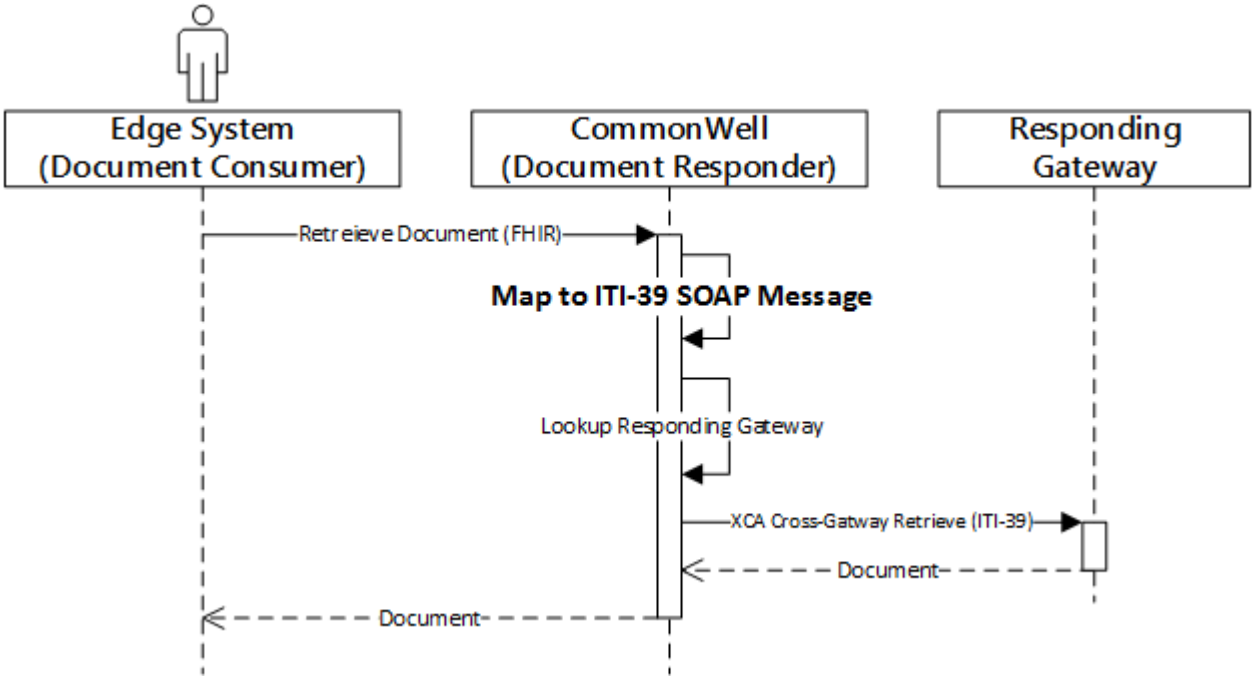
transaction, building the ITI-38 SOAP message from the Find Documents query parameters; and at the end of the transaction, converting the aggregated document list into a *Bundle* resource that is then returned to the Edge System acting as the document consumer.

Rertrieve Document



The REST-based *Retrieve Document* transaction follows the same functional flow as described in section 10.6. The additional data-mapping step, where the GET request is mapped into the corresponding SOAP ITI-39 message is shown in bold in the diagram above.

G.2 Mapping DocumentEntry Classification to FHIR CodeableConcept

Example: DocumentEntry Classification using typeCode

```
<rim:Classification classificationScheme="urn:uuid:f0306f51-975f-434e-a61c-c59651d33983"
classifiedObject="ExampleDocument" nodeRepresentation="34108-1" id="IdExample_053"
objectType="urn:oasis:names:tc:ebxml-
 regrep:ObjectType:RegistryObject:Classification">
           <rim:Name>
                      <rim:LocalizedString value="Outpatient Note"/>
           </rim:Name>
           <rim:Slot name="codingScheme">
                      <rim:ValueList>
                         <rim:Value>urn:oid:2.16.840.1.113883.6.1</rim:Value>
                      </rim:ValueList>
           </rim:Slot>
</rim:Classification>
```

Example: DocumentReference CodeableConcept using type

```
"type": {
   "coding": [
```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```
      {
      "system": "http://loinc.org",
      "code": "34108-1",
      "display": "Outpatient Note"
      }
    ]
}
```

Case 1: Coding System is well known

Coding Systems

System	OID	FHIR URI
LOINC	urn:oid:2.16.840.1.113883.6.1	http://loinc.org
SNOMED	urn:oid:2.16.840.1.113883.6.96	http://snomed.info/sct

Element Mappings

DocumentEntry Classification Path	FHIR CodeableConcept	Notes
rim:Classification@nodeRepresentation	coding.code	
rim:Classification/rim:Name/rim:LocalizedString@value	coding.display	
rim:Classification/rim:Slot[@name="codingScheme"]/rim:ValueList/rim:Value	coding.system	Use translation from Table Coding Systems

Case 2: Coding System is implementation defined, or is NOT well known

If rim:Classification/rim:Name/rim:LocalizedString@value is present and not empty then:

DocumentEntry Classification Path	FHIR CodeableConcept	Notes
rim:Classification/rim:Name/rim:LocalizedString@value	type.text	From example above, type is parent of the coding

If rim:Classification/rim:Name/rim:LocalizedString@value is not present or is empty then:

DocumentEntry Classification Path	FHIR CodeableConcept	Notes
rim:Classification@nodeRepresentation	type.text	From example above, type is parent of the coding

G.3 General Approach for Contained versus Linked Resources

Normally, the FHIR model would contain links to resources, like the author in the DocumentEntry Metadata.

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```
<author>
   <reference value="Practitioner/10226"/>
</author>
```

The DocumentEntry metadata received from a Responding Gateway will not have a link, so the Author is returned as a "contained resource." Example:

```
 "contained": [
      {
         "resourceType": "Practitioner",
         "_id": "a1",
         "name": {
            "family": [
               "Dopplemeyer"
            ],
            "given": [
               "Sherry"
            ]
         },
         "telecom": [
            {
               "system": "email",
               "value": "john.doe@healthcare.example.org"
            }
         ],
         "organization": {
            "display": "Cleveland Clinic"
         },
         "role": [
            {
               "text": "Primary Surgeon"
            }
         ],
         "specialty": [
            {
               "text": "Orthopedic"
            }
         ]
      }
   ]
"author": [
 {
   "reference": "#a1"
}
]
```

- The # symbol indicates this is a local reference inside the current document.
- The reference value needs to be unique for the document.
- The reference may be used more than once in a given document.

status-availabilityStatus

FHIR	XDS
`"status": "current"`	`<ExtrinsicObject id="urn:uuid:fbeacdb7-5421-4474-9267-985007cd8855" objectType="urn:uuid:7edca82f-054d-47f2-a032-9b2a5b5186c1" status="urn:oasis:names:tc:ebxml-regrep:StatusType:Approved" >`

"urn:uuid:7edca82f-054d-47f2-a032-9b2a5b5186c1" designates XDSDocumentEntry.

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FHIR Value	XDS Value
current	urn:oasis:names:tc:ebxml-regrep:StatusType:Approved
superceded	urn:oasis:names:tc:ebxml-regrep:StatusType:Deprecated
entered in error	NO EQUIVALENT VALUE
NO EQUIVALENT VALUE	urn:oasis:names:tc:ebxml-regrep:StatusType:Submitted

confidentiality-confidentialityCode

Follow mapping concepts in G.1 Mapping DocumentEntry Classification to FHIR Codeable Concept.

FHIR

```
"confidentiality": [
   {
      "coding": [
         {
            "system": "SCHEME_VALUE",
            "code": "CODE_VALUE",
            "display": "DISPLAY_VALUE"
         }
      ]
   }
   ]
```

XDS

```
<rim:Classification classificationScheme="urn:uuid:f4f85eac-
e6cb-4883-b524-f2705394840f"
               classifiedObject="ExampleDocument"
               id="IdExample_046"
               objectType="urn:oasis:names:tc:ebxml-
regrep:ObjectType:RegistryObject:Classification"
               nodeRepresentation="CODE_VALUE">
   <rim:Name>
      <rim:LocalizedString value="DISPLAY_VALUE"/>
   </rim:Name>
   <rim:Slot name="codingScheme">
      <rim:ValueList>
         <rim:Value>SCHEME_VALUE</rim:Value>
      </rim:ValueList>
   </rim:Slot>
</rim:Classification>
```

urn:uuid:f4f85eac-e6cb-4883-b524-f2705394840f designates XDSDocumentEntry.confidentialityCode.

CreationTime

FHIR

```
"created": "2005-12-24T09:35:00Z"
```

XDS

```
<Slot name="creationTime">
< ValueList>
   <Value>20051224093500</Value>
< /ValueList>
< /Slot>
```

FHIR Format	XDS Format
yyyy-mm-ddThh:nn:ss(TZ)	YYYY[MM[DD[HH[MM[SS[.S[S[S[S]]]]]]]]]+/-ZZZZ

hash-hash

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FHIR

```
"hash":
"fbe2351a6a8ceba1a04ba3f832a12a53befeb04c"
```

XDS

```
<rim:Slot name="hash">
< rim:ValueList>
<rim:Value>fbe2351a6a8ceba1a04ba3f832a12a53befeb04c</ri
m:Value>
< /rim:ValueList>
< /rim:Slot>
```

class-classCode

Follow mapping concepts in [G.1 Mapping DocumentEntry Classification to FHIR Codeable Concept](#).

FHIR

```
"class": {
        "coding": [
           {
              "system": "SCHEME_VALUE",
              "code": "CODE_VALUE",
              "display": "DISPLAY_VALUE"
           }
        ]
     }
```

XDS

```
<rim:Classification classificationScheme="urn:uuid:41a5887f-
8865-4c09-adf7-e362475b143a"
           classifiedObject="Document01"
           nodeRepresentation="CODE_VALUE"
           objectType="urn:oasis:names:tc:ebxml-
regrep:ObjectType:RegistryObject:Classification"
           id="id_3">
   <rim:Slot name="codingScheme">
      <rim:ValueList>
         <rim:Value>SCHEME_VALUE</rim:Value>
      </rim:ValueList>
   </rim:Slot>
   <rim:Name>
      <rim:LocalizedString value="DISPLAY_VALUE"/>
   </rim:Name>
</rim:Classification>
```

format-formatCode

See "formatCode Coding Systems" for other well known coding systems.

FHIR

```
"format": [
   "urn:ihe:iti:bppc:2007"
]
```

XDS

```
<Classification classificationScheme="urn:uuid:a09d5840-386c-46f2-b5ad-
9c3699a4309d"
      classifiedObject="Document01"
      nodeRepresentation="urn:ihe:iti:bppc:2007"
      objectType="urn:oasis:names:tc:ebxml-
regrep:ObjectType:RegistryObject:Classification"
      id="id_5">
   <Slot name="codingScheme">
      <ValueList>
         <Value>1.3.6.1.4.1.19376.1.2.3</Value>
      </ValueList>
   </Slot>
   <Name>
      <LocalizedString value="Basic Patient Privacy Consents (BPPC)"/>
   </Name>
</Classification>
```

urn:uuid:a09d5840-386c-46f2-b5ad-9c3699a4309d is the designated *XDSDocumentEntry.formatCode*.

If *nodeRepresenation* is not a valid URN, the format code cannot be mapped to DocumentReference.

formatCode Coding Systems

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Coding System	OID	FHIR URI
XDS Document Format Codes	2.16.840.1.113883.6.1	urn:oid:2.16.840.1.113883.6.1

Context

healthcareFacilityTypeCode, eventCodeList, serviceStartTime, and *serviceStopTime* map to DocumentReference under the same *context* entry.

FHIR

```
"context": {
```

```
 "facilityType": {
...
},
```

```
   "period": {
      "start": "2004-12-23T08:00:00",
      "end": "2004-12-23T08:01:00"
   }
```

XDS

```
<Classification classificationScheme="urn:uuid:f33fb8ac-18af-
42cc-ae0e-ed0b0bdb91e1" ... >
     ...
</Classification>
```

```
   <Slot name="serviceStartTime">
      <ValueList>
         <Value>200412230800</Value>
      </ValueList>
   </Slot>
   <Slot name="serviceStopTime">
      <ValueList>
         <Value>200412230801</Value>
      </ValueList>
   </Slot>
```

event-eventCodeList

Follow mapping concepts in G.1 Mapping DocumentEntry Classification to FHIR Codeable Concept.

FHIR

```
"event": [
{
  "coding": [
   {
     "system": "SCHEME_VALUE",
     "code": "CODE_VALUE",
     "display": "DISPLAY_VALUE"
   }
  ]
}
]
```

XDS

```
<Classification classificationScheme="urn:uuid:2c6b8cb7-8b2a-4051-b291-
b1ae6a575ef4"
      classifiedObject="urn:uuid:a3767774-f91b-4d2c-9a17-ce8a2c96e6e2"
      id="urn:uuid:816c7010-6bc6-47e4-98f5-2c312717ec4b"
      nodeRepresentation="CODE_VALUE"
      objectType="urn:oasis:names:tc:ebxml-
regrep:ObjectType:RegistryObject:Classification">
   <Slot name="codingScheme">
      <ValueList>
         <Value>SCHEME_VALUE</Value>
      </ValueList>
   </Slot>
   <Name>
      <LocalizedString value="DISPLAY_VALUE"/>
   </Name>
</Classification>
```

facilityType-healthcareFacilityTypeCode

Follow mapping concepts in G.1 Mapping DocumentEntry Classification to FHIR Codeable Concept.

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FHIR **XDS**

```
 "facilityType": {
        "coding": [
           {
              "system":
"http://snomed.info/sct",
              "code": "224687002",
              "display": "Hospital-prison"
           }
        ]
     },
```

```
<Classification classificationScheme="urn:uuid:f33fb8ac-18af-
42cc-ae0e-ed0b0bdb91e1"
      classifiedObject="Document01"
      nodeRepresentation="224687002"
      objectType="urn:oasis:names:tc:ebxml-
regrep:ObjectType:RegistryObject:Classification"
      id="id_6">
   <Slot name="codingScheme">
      <ValueList>
         <Value>urn:oid:2.16.840.1.113883.6.96</Value>
      </ValueList>
   </Slot>
   <Name>
      <LocalizedString value="Hospital-prison"/>
   </Name>
</Classification>
```

language-languageCode

FHIR **XDS**

```
"primaryLanguage": "en-US"
```

```
<Slot name="languageCode">
< ValueList>
   <Value>en-US</Value>
< /ValueList>
< /Slot>
```

mimeType

FHIR **XDS**

```
"mimeType": "text/plain"
```

```
<ExtrinsicObject id="Document01" mimeType="text/plain"
      objectType="urn:uuid:7edca82f-054d-47f2-a032-9b2a5b5186c1">
```

In XDS, the mime type is located at the start of the DocumentEntry metadata in the ExtrinsicObject attribute mimeType.

"urn:uuid:7edca82f-054d-47f2-a032-9b2a5b5186c1" designates XDSDocumentEntry.

identifier-entryUUID

FHIR **XDS**

```
"identifier": [
  {
   "use": "official",
   "system": "urn:ietf:rfc:3986",
   "value": "urn:uuid:a6e06ca8-0c75-4064-
9e5c-88b9045a96f6"
  }
],
```

```
<rim:ExtrinsicObject mimeType="application/pdf"
id="urn:uuid:a6e06ca8-0c75-4064-9e5c-
88b9045a96f6"
     objectType="urn:uuid:7edca82f-054d-47f2-a032-
9b2a5b5186c1">
     ...
</rim:ExtrinsicObject>
```

In XDS, the entryUUID is at the start of the DocumentEntry metadata in the ExtrinsicObject attribute id. entryUUID is a globally unique identifier (UUID).

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authenticator-legalAuthenticator

Follow mapping concepts in General Approach for Contained versus Linked.

FHIR

```
 "contained": [
{
  "resourceType": "Practitioner",
  "id": "legalAuth1",
  "name": {
   "family": [
     "Welby"
   ],
   "given": [
     "Marcus"
   ],
   "prefix": [
     "Dr"
   ],
   "suffix": [
     "MD"
   ]
  }
}
],
"authenticator": {
"reference": "#legalAuth1"
}
```

XDS

```
<rim:Slot name="legalAuthenticator">
   <rim:ValueList>
      <rim:Value>^Welby^Marcus^^^Dr^MD</rim:Value>
   </rim:ValueList>
</rim:Slot>
```

author-author

Follow mapping concepts in General Approach for Contained versus Linked. For FHIR coded entries, follow G.1 Mapping DocumentEntry Classification to FHIR Codeable Concept where coded entries like authorRole follow the same rules as Classifications.

FHIR

```
"contained": [
   {
      "resourceType": "Organization",
      "id" : "orgRef1",
      "name": "Some Hospital",
      "identifier": [
         {
         "value": "1.2.3.5.8.9.1789.45"
         }
      ],
   },
   {
      "resourceType": "Practitioner",
      "id" : "authRef1",
      "name": {
         "family": [
            "Welby"
         ],
         "given": [
```

XDS

```
<rim:Classification
classificationScheme="urn:uuid:93606bcf-9494-43ec-
9b4e-a7748d1a838d"
      classifiedObject="ExampleDocument"
      id="IdExample_045"
      objectType="urn:oasis:names:tc:ebxml-
 regrep:ObjectType:RegistryObject:Classification"
    nodeRepresentation="">
   <!-- nodeRepresentation intentionally left blank-->
   <rim:Slot name="authorPerson">
      <rim:ValueList>
         <rim:Value>^Welby^Marcus^^^Dr</rim:Value>
      </rim:ValueList>
   </rim:Slot>
   <rim:Slot name="authorInstitution">
      <rim:ValueList>
         <rim:Value>Some
Hospital^^^^^^^^^1.2.3.5.8.9.1789.45</rim:Value>
      </rim:ValueList>
```


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FHIR

```
            "Marcus"
         ],
      "prefix": [
            "Dr"
         ]
      },
      "organization": {
         "reference": "#orgRef1"
      },
      "role": [
         {
            "coding": [
               {
                  "system": "AuthRoleOIDofAA",
                  "code": "AuthRoleIdNumber"
               }
            ]
         }
      ],
      "communication": [
         {
            "coding": [
               {
                  "system": "email",
                  "code":
"john.doe@healthcare.example.org"
               }
            ]
         }
      ],
   }
]

"author": {
   "reference": "#authRef1"
 },
```

XDS

```
   </rim:Slot>
   <rim:Slot name="authorRole">
      <rim:ValueList>

   <rim:Value>AuthRoleIdNumber^^^&AuthRoleOIDofAA&ISO<
/rim:Value>
      </rim:ValueList>
   </rim:Slot>
   <rim:Slot name="authorSpecialty">
      <rim:ValueList>

   <rim:Value>AuthSpecIdNumber^^^&AuthSpecOIDofAA&ISO<
/rim:Value>
      </rim:ValueList>
   </rim:Slot>
   <rim:Slot name="authorTelecommunication">
      <rim:ValueList>

   <rim:Value>^^Internet^john.doe@healthcare.example.o
rg</rim:Value>
      </rim:ValueList>
   </rim:Slot>
</rim:Classification>
```

DocumentEntry Author HL7 Datatypes

authorPerson (XCN)

```
<ID Number (ST)> ^ <Family Name (FN)> ^ <Given Name (ST)> ^ <Second and Further Given Names or Initials Thereof
(ST)> ^ <Suffix (e.g., JR or III)(ST)> ^ <Prefix (e.g., DR) (ST)> ^ <DEPRECATED-Degree (e.g., MD) (IS)> ^
<Source Table (IS)> ^ <Assigning Authority (HD)> ^ <Name Type Code (ID)> ^ <Identifier Check Digit (ST)> ^
<Check Digit Scheme (ID)> ^ <IdentifierType Code (ID)> ^ <Assigning Facility (HD)> ^ <Name Representation
Code(ID)> ^ <Name Context (CE)> ^ <DEPRECATED-Name Validity Range (DR)> ^<Name Assembly Order (ID)> ^ <Effective
Date (TS)> ^ <Expiration Date(TS)> ^ <Professional Suffix (ST)> ^ <Assigning Jurisdiction (CWE)> ^<Assigning
Agency or Department (CWE)>
```

FHIR

```
   "name": {
      "family": [
         "FamilyName"
      ],
      "given": [
         "GivenName"
      ],
      "prefix": [
         "Prefix"
      ],
      "suffix": [
```

XCN

```
^FamilyName^ GivenName^^Prefix^Suffix
```

Notes

see Section 1.13.0.12 HumanName

FHIR *HumanName* limits fields from HL7 2.x that can be mapped.

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FHIR	XCN	Notes

```
        "Suffix"
      ]
  }
```

authorInstitution (XON)

This type provides the name and identification of an organization. This specification restricts the coding to the following fields:

- XON.1 – Organization Name (required)
- XON.6.2 – Assigning Authority Universal Id (required if XON.10 is present and NOT an OID)
- XON.6.3 – Assigning Authority Universal Id Type (required if XON.10 is present and not an OID and shall have the value "ISO")
- XON.10 – Organization Identifier (optional)

No other fields shall be specified. The XON data type in Document Sharing metadata results in a valid encoding of an HL7 v2.5 XON encoding with the exception of length limitations. Component length restrictions are unobserved; however, the total length including delimiters shall not exceed the limit of the ebXML Slot Value. It is common for organizations to be uniquely identified by an OID. In such cases, the Organization (Identifier component 10) may contain the organization's OID. If the Organization Identifier is not an OID, the metadata use assumes that it has been assigned so that the composite Id created by combining components 6 and 10 is a unique identifier for the organization. "

Examples:

Some Hospital

Some Hospital^^^^^^^^^1.2.3.4.5.6.7.8.9.1789.45

Some Hospital^^^^^&1.2.3.4.5.6.7.8.9.1789&ISO^^^^45

authorSpecialty (CX)

This is an identifier. HL7 Identifier type CX consists of several components, but this specification restricts them to the use of two components, the Id Number and the Assigning Authority (AA). The Assigning Authority identifies the "domain" over which the Id Number represents a unique entity. Furthermore, the AA is characterized by a Universal Id and Universal Id Type. In Document Sharing profiles, ISO Object Identifiers (see OID below) must be used as Universal Id. Therefore, Universal Id Type is always ISO. The required format is:

IdNumber^^^&OIDofAA&ISO

authorRole (CX)

This is an identifier. HL7 Identifier type CX consists of several components, but this specification restricts them to the use of two components, the Id Number, and the Assigning Authority (AA). The Assigning Authority identifies the "domain" over which the Id Number represents a unique entity. Furthermore, the AA is characterized by a Universal

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Id and Universal Id Type. In Document Sharing profiles, ISO Object Identifiers (see OID below) must be used as Universal Id. Therefore, Universal Id Type is always ISO. The required format is:

IdNumber^^^&OIDofAA&ISO

authorTelecommunication (XTN)

XTN.3 – The type of telecommunication address. For example, e-mail addresses will have this valued with "Internet."

XTN.4 – The telecommunications address, e.g., name@example.com

No other fields shall be specified and both of these fields shall be present.

Type of Telecommunications mappings

FHIR	HL7 Table 0202 Value	HL7 Description
phone	BP	Beeper
phone	CP	Cellular Phone
fax	FX	Fax
email	Internet	
	MD	Modem
phone	PH	Telephone
phone	TDD	Telecommunications Device for the Deaf
	TTY	Teletypewriter

Extension-practiceSettingCode

"urn:uuid:cccf5598-8b07-4b77-a05e-ae952c785ead" designates XDSDocumentEntry.practiceSettingCode.

Follow mapping concepts in G.1 Mapping DocumentEntry Classification to FHIR Codeable Concept.

Case 1 - Coding System is well known

FHIR

```
"extension": [
  {
    "url": "URL_TBD",
    "valueCodeableConcept": {
      "coding": [
```

XDS

```
<rim:Classification classificationScheme="urn:uuid:cccf5598-
8b07-4b77-a05e-ae952c785ead"
      classifiedObject="doc1" nodeRepresentation="394802001">
   <rim:Name>
      <rim:LocalizedString value="General Medicine"/>
```


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FHIR

```
        {
           "system":
"http://snomed.info/sct",
           "code": "394802001",
           "display": "General Medicine"
        }
     ]
     }
   }
]
```

XDS

```
   </rim:Name>
   <rim:Slot name="codingScheme">
      <rim:ValueList>
         <rim:Value>urn:oid:2.16.840.1.113883.6.96</rim:Value>
      </rim:ValueList>
   </rim:Slot>
</rim:Classification>
```

Case 2 - Coding System is not well known

FHIR

```
 "extension": [
     {
        "url": "URL_TBD",
        "valueString" : "General Medicine"
     }
   }
]
```

XDS

```
<Classification classificationScheme="urn:uuid:cccf5598-
8b07-4b77-a05e-ae952c785ead"
        classifiedObject="Document01"
nodeRepresentation="General Medicine">
   <Name>
      <LocalizedString value="General Medicine"/>
   </Name>
   <Slot name="codingScheme">
      <ValueList>
         <Value>NotWellKnownScheme</Value>
      </ValueList>
   </Slot>
</Classification>
```

If no Name/LocalizedString@value exists:

FHIR

```
 "extension": [
     {
     "url": "URL_TBD",
     "valueString" : "General Medicine"
     }
   }
]
```

XDS

```
<Classification classificationScheme="urn:uuid:cccf5598-8b07-
4b77-a05e-ae952c785ead"
      classifiedObject="Document01" nodeRepresentation="General
Medicine">
   <Slot name="codingScheme">
      <ValueList>
         <Value>NotWellKnownScheme</Value>
      </ValueList>
   </Slot>
</Classification>
```

Patient

Follow mapping concepts in [General Approach for Contained versus Linked](#).

Example Field Mapping

FHIR

```
   "contained": [
     {
        "resourceType": "Patient",
        "id": "patRef1",
        "identifier": [
           {
              "system":
"urn:oid:1.3.6.1.4.1.21367.2005.3.7",
```

XDS

```
<ExternalIdentifier identificationScheme="urn:uuid:58a6f841-
87b3-4a3e-92fd-a8ffeff98427"
   value="76cc765a442f410^^^&amp;1.3.6.1.4.1.21367.2005.3.7&a
mp;ISO"
   objectType="urn:oasis:names:tc:ebxml-
regrep:ObjectType:RegistryObject:ExternalIdentifier"
   id="id_9"
   registryObject="Document01">
```


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FHIR

```
                "value": "76cc765a442f410"
            },
            {
                "system": "urn:oid:3.4.5",
                "value": "89765a87b"
            },
            {
                "system":
"urn:oid:1.3.6.1.4.1.21367.2005.3.7",
                "value": "DTP-1"
            }
        ],
        "name": [
            {
                "family": [
                    "Chalmers"
                ],
                "given": [
                    "Peter"
                ]
            }
        ],
        "gender": {
            "coding": [
                {
                    "system":
"http:\/\/hl7.org\/implement\/standards\/fhir\/val
ueset-administrative-gender.html",
                    "code": "M"
                }
            ]
        },
        "birthDate": "1965-01-20",
        "address": [
            {
                "line": [
                    "100 Main St"
                ],
                "city": "Burlington",
                "state": "MA",
                "zip": "01803",
                "country": "USA"
            }
        ]
    }
  ],

"subject": {
     "reference": "#patRef1"
 },
```

XDS

```
    <Name>
        <LocalizedString value="XDSDocumentEntry.patientId"/>
    </Name>
</ExternalIdentifier>
<Slot name="sourcePatientId">
    <ValueList>
        <Value>89765a87b^^^&amp;3.4.5&amp;ISO</Value>
    </ValueList>
</Slot>
<Slot name="sourcePatientInfo">
    <ValueList>
        <Value>PID-3|DTP-
1^^^&amp;1.3.6.1.4.1.21367.2005.3.7&amp;ISO</Value>
        <Value>PID-5|Chalmers^Peter^^^</Value>
        <Value>PID-7|19650120</Value>
        <Value>PID-8|M</Value>
        <Value>PID-11|100 Main
St^^Burlington^MA^01803^USA</Value>
    </ValueList>
</Slot>
```

Note that if the identifiers in the XDSDocumentEntry.patientId, sourcePatientId, and sourcePatientInfo do not match, then all should be included in the JSON Identifier array.

urn:uuid:58a6f841-87b3-4a3e-92fd-a8ffeff98427 designates XDSDocumentEntry.patientId.

sourcePatientInfo

sourcePatientInfo should include values for:

- PID-3 source patient identifier list. (CX)

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Components:

<ID Number (ST)> ^ <Check Digit (ST)> ^ <Check Digit Scheme (ID)> ^ <Assigning Authority (HD)> ^ <Identifier Type Code (ID)> ^ <Assigning Facility (HD)> ^ <Effective Date (DT)> ^ <Expiration Date (DT)> ^ <Assigning Jurisdiction (CWE)> ^ <Assigning Agency or Department (CWE)>

- A list uses the repetition separator ~, for example:

DTP 1^^^&1.3.6&ISO~XTP1^^^&1.3.11&ISO

- PID-5 (source patient name) (XPN)

Components:

<Family Name (FN)> ^ <Given Name (ST)> ^ <Second and Further Given Names or Initials Thereof (ST)> ^ <Suffix (e.g., JR or III) (ST)> ^ <Prefix (e.g., DR) (ST)> ^ <Degree (e.g., MD) (IS)> ^ <Name Type Code (ID)> ^ <Name Representation Code (ID)> ^ <Name Context (CE)> ^ <Name Validity Range (DR)> ^ <Name Assembly Order (ID)> ^ <Effective Date (TS)> ^ <Expiration Date (TS)> ^ <Professional Suffix (ST)>

FHIR	XCN

`"name": {`
`  "family": [`
`  "FamilyName"`
`  ],`
`  "given": [`
`  "GivenName"`
`  ],`
`  "prefix": [`
`  "Prefix"`
`  ],`
`  "suffix": [`
`  "Suffix"`
`  ]`
`}`
	`FamilyName^ GivenName^^Suffix^Prefix^`

- PID-7 (source patient date of birth)
- PID-8 (source patient gender)

  M – Male

  F – Female

  O – Other

  U – Unknown

sourcePatientInfo should not include values for PID-2 (patient id), PID-4 (alternate patient id), PID-12 (country code), or PID-19 (social security number).

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Gender Translation

FHIR	XDS (HL7 2.5)
code=M system=http://hl7.org/implement/standards/fhir/valueset-administrative-gender.html	M
code=F system=http://hl7.org/implement/standards/fhir/valueset-administrative-gender.html	F
code=O system=http://hl7.org/implement/standards/fhir/valueset-administrative-gender.html	A
code=UNK system=http://hl7.org/implement/standards/fhir/v3/NullFlavor/	U
code=OTH system=http://hl7.org/implement/standards/fhir/v3/NullFlavor/	O
code=NA system=http://hl7.org/implement/standards/fhir/v3/NullFlavor/	N

masterIdentifier-XDSDocumentEntry.uniqueId

FHIR

```
 "masterIdentifier": {
   "system": "urn:ietf:rfc:3986",
   "value":
"1.2.3.4.5.6.78901.2345.6.7^123456"
 }
```

XDS

```
<rim:ExternalIdentifier identificationScheme="urn:uuid:2e82c1f6-
a085-4c72-9da3-8640a32e42ab"
      value="1.2.3.4.5.6.78901.2345.6.7^123456" id="IdExample_054"
      objectType="urn:oasis:names:tc:ebxml-
regrep:ObjectType:RegistryObject:ExternalIdentifier"
      registryObject="DocumentEntry01">
   <rim:Name>
      <rim:LocalizedString value="XDSDocumentEntry.uniqueId"/>
   </rim:Name>
</rim:ExternalIdentifier>
```

size-size

FHIR

```
"size": 4309
```

XDS

```
<Slot name="size">
    <ValueList>
          <Value>4309</Value>
    </ValueList>
< /Slot>
```


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description-title

FHIR

```
"description": "Example Document Title"
```

XDS

```
<rim:ExtrinsicObject id="ExampleDocument"
   objectType="urn:uuid:7edca82f-054d-47f2-a032-9b2a5b5186c1"
   mimeType="application/pdf">
< rim:Name>
   <rim:LocalizedString value="Example Document Title"/>
< /rim:Name>
 ...
< /rim:ExtrinsicObject>
```

"urn:uuid:7edca82f-054d-47f2-a032-9b2a5b5186c1" designates XDSDocumentEntry.

type-typeCode

Follow mapping concepts in G.1 Mapping DocumentEntry Classification to FHIR Codeable Concept.

FHIR

```
"type": {
   "coding": [
   {
      "system": "http://loinc.org",
      "code": "34108-1",
      "display": "Outpatient Note"
   }
   ]
 }
```

XDS

```
<rim:Classification classificationScheme="urn:uuid:f0306f51-975f-434e-
a61c-c59651d33983"
   classifiedObject="ExampleDocument"
   nodeRepresentation="34108-1"
   id="IdExample_053"
   objectType="urn:oasis:names:tc:ebxml-
regrep:ObjectType:RegistryObject:Classification">
   <rim:Name>
      <rim:LocalizedString value="Outpatient Note"/>
   </rim:Name>
   <rim:Slot name="codingScheme">
      <rim:ValueList>
         <rim:Value>urn:oid:2.16.840.1.113883.6.1</rim:Value>
      </rim:ValueList>
   </rim:Slot>
</rim:Classification>
```

urn:uuid:f0306f51-975f-434e-a61c-c59651d33983 indicates DocumentEntry.typeCode

urn:oid:2.16.840.1.113883.6.1 is the OID for LOINC. FHIR uses system URI http//loinc.org.

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Appendix H FHIR Gateway Mappings

H.1 DocumentQuery Request to FHIR DocumentReference Request

DSTU2 (Argonaut)

XDS Slot name	FHIR
$XDSDocumentEntryClassCode	class.system
$XDSDocumentEntryClassCodeScheme	class.value
$XDSDocumentEntryHealthcareFacilityTypeCode	facility
$XDSDocumentEntryType	type
$XDSDocumentEntryEventCodeList	event (comma separated list of "EventCodeListScheme|EventCode"}
$XDSDocumentEntryEventCodeListScheme	event
$XDSDocumentEntryFormatCode	format
$XDSDocumentEntryCreationTimeFrom	created (ge)
$XDSDocumentEntryCreationTimeTo	created (le)
$XDSDocumentEntryServiceStartTimeFrom	period (ge)
$XDSDocumentEntryServiceStopTimeTo	period (le)

STU3 (US Core)

There are no differences in the DocumentQuery Request mappings from DSTU2 to STU3.

H.2 DocumentQuery Response to FHIR DocumentReference Response

DSTU2 (Argonaut)

The response from a DocumentReference request must be a Bundle.

The entry field in the bundle must contain a list of DocumentReference objects.

DocumentReference Object

FHIR	XDS

DocumentReference Resource
 	
{
"resource": {
"resourceType": "DocumentReference",
	<ExtrinsicObject id="…" status="<<mappedStatus>>"
	home="2.16.840.1.113883.15.12" objectType="urn:uuid:7edca82f-054d-47f2-a032-9b2a5b5186c1"
	mimeType="<<mimeType>>" >

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FHIR	XDS

`"id": "… ",`
`"description": "<<description>>",`
`"contained": [ "*** List of Contained references here ***" ],`
`"subject": {`
`"*** contained or included ***"`
`},`
`"author": [`
`"*** May be contained or included ***"`
`],`
`"status": "<<status>>",`
`"content": [`
`{`
`"attachment": {`
`"contentType": "<<mimeType>>",`
`"language": "<<languageCode>>",`
`"creation": "<<creationTime>>",`
`"url": "<<attachmentUrl>>"`
`},`
`"format": [`
`{`
`"system": "<<formatSystem>>",`
`"code": "<<formatCode>>",`
`"display": "<<formatDisplay>>"`
`},`
`"masterIdentifier": {`
`"system": "urn:ietf:rfc:3986",`
`"value": "<<masterIdentifierValue>>"`
`}`
`}`
`],`
`"context": {`
`"period": {`
`"start": "<<startDate>>"`
`},`
`"facilityType": {`
`"coding": [`
`{`
`"system": "<<facilitySystem>>",`
`"code": "<<facilityCode>>",`
`"display": "<<facilityDisply>>"`
`}`
`]`
`},`
	`<Name>`
	`<LocalizedString value="<<name>>" />`
	`</Name>`
	
	`<Slot name="repositoryUniqueId">`
	`<ValueList>`
	`<Value>2.16.840.1.113883.15.13</Value>`
	`</ValueList>`
	`</Slot>`
	
	`<Slot name="serviceStartTime">`
	`<ValueList>`
	`<Value><<startDate>></Value>`
	`</ValueList>`
	`</Slot>`
	
	`<Slot name="languageCode">`
	`<ValueList>`
	`<Value><<languageCode>></Value>`
	`</ValueList>`
	`</Slot>`
	
	`<Slot name="creationTime">`
	`<ValueList>`
	`<Value><<creationTime>></Value>`
	`</ValueList>`
	`</Slot>`
	
	`<Slot name="sourcePatientId">`
	`<ValueList>`
	`<Value><<patientIdFromTheFhirRequest>></Value>`
	`</ValueList>`
	`</Slot>`
	
	`<Classification classificationScheme=`
	`"urn:uuid:f0306f51-975f-434e-a61c-c59651d33983"`
	`nodeRepresentation="<<typeCode>>">`
	`<Slot name="typeCodingScheme">`
	`<ValueList>`
	`<Value><<typeCodingSystem>></Value>`
	`</ValueList>`
	`</Slot>`
	`<Name>`
	`<LocalizedString value="<<typeDisplayName or "Unknown">>" />`
	`</Name>`
	`</Classification>`
	
	`<Classification classificationScheme=`
	`"urn:uuid:a09d5840-386c-46f2-b5ad-9c3699a4309d"`
	`nodeRepresentation="<<formatCode>>">`
	`<Slot name="typeCodingScheme">`
	`<ValueList>`
	`<Value><<formatSystem>></Value>`
	`</ValueList>`
	`</Slot>`
	`<Name>`
	`<LocalizedString value="<<formatDisplay>>" />`
	`</Name>`
	`</Classification>`
	
	`<Classification classificationScheme=`
	`"urn:uuid:f33fb8ac-18af-42cc-ae0e-ed0b0bdb91e1"`

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FHIR	XDS

	`nodeRepresentation="<<facilityCode>>">`
	`<Slot name="codingScheme">`
	`<ValueList>`
	`<Value><<facilitySystem>></Value>`
	`</ValueList>`
	`</Slot>`
	`<Name>`
	`<LocalizedString value="<<facilityDisplay>>" />`
	`</Name>`
	`</Classification>`

`"type": {`
`"coding": [`
`{`
`"system": "<<typeCodeSystem>>",`
`"code": "<<typeCode>>",`
`"display": "<<typeCodeDisplay>>"`
`}`
`]`
`},`
	`<Classification classificationScheme="urn:uuid:f0306f51-975f-434e-a61c-c59651d33983" nodeRepresentation="<<typeCode>>">`
	`<Slot name="codingScheme">`
	`<ValueList>`
	`<Value><<typeCodeSystem>></Value>`
	`</ValueList>`
	`</Slot>`
	`<Name>`
	`<LocalizedString value="<<typeCodeDisplay>>" />`
	`</Name>`
	`</Classification>`

`"class": {`
`"coding": [`
`{`
`"system": "<<classSystem>>",`
`"code": "<<classCode>>",`
`"display": "<<classDisplay>>"`
`}`
`]`
`},`
	`<Classification classificationScheme="urn:uuid:41a5887f-8865-4c09-adf7-e362475b143a" nodeRepresentation="<<classCode>>">`
	`<Slot name="codingScheme">`
	`<ValueList>`
	`<Value><<classSystem>>></Value>`
	`</ValueList>`
	`</Slot>`
	`<Name>`
	`<LocalizedString value="<<classDisplay>>" />`
	`</Name>`
	`</Classification>`

`"securityLabel": {`
`"coding": [`
`{`
`"system": "<<securityLabelSystem>>",`
`"code": "<<securityLabelCode>>",`
`"display": "<<securityLabelDisplay>>"`
`}`
`]`
`},`
	`<Classification classificationScheme="urn:uuid:f4f85eac-e6cb-4883-b524-f2705394840f" nodeRepresentation="<<securityLabelCode>>">`
	`<Slot name="codingScheme">`
	`<ValueList>`
	`<Value><<securityLabelSystem>></Value>`
	`</ValueList>`
	`</Slot>`
	`<Name>`
	`<LocalizedString value="<<securityLabelDisplay>>" />`
	`</Name>`
	`</Classification>`

`"format": [`
`{`
`"system": "<<formatSystem>>",`
`"code": "<<formatCode>>",`
`"display": "<<formatDisplay>>"`
`}`
`]`
`},`
`}`
	`<Classification classificationScheme="urn:uuid:a09d5840-386c-46f2-b5ad-9c3699a4309d" nodeRepresentation="<<formatCode>>">`
	`<Slot name="codingScheme">`
	`<ValueList>`
	`<Value><<formatSystem>></Value>`
	`</ValueList>`
	`</Slot>`
	`<Name>`
	`<LocalizedString value="<<formatDisplay>>" />`
	`</Name>`
	`</Classification>`
	
	`<ExternalIdentifier id="120ec891-b991-438f-a352-58930bf490cf" objectType="urn:oasis:names:tc:ebxml-regrep:ObjectType:RegistryObject:ExternalIdentifier"`

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FHIR	XDS
	`registryObject="urn:uuid:76f606e9-e1a0-4593-84c3-7e40e06ab883" identificationScheme="urn:uuid:2e82c1f6-a085-4c72-9da3-8640a32e42ab" value="<<masterIdentifierValue>>">` `  <Name>` `  <LocalizedString value="XDSDocumentEntry.uniqueId" />` `  </Name>` `  </ExternalIdentifier>` ` <ExternalIdentifier id="a2024427-3b25-4715-866c-5c26d7038f22" objectType="urn:oasis:names:tc:ebxml-regrep:ObjectType:RegistryObject:ExternalIdentifier" registryObject="urn:uuid:76f606e9-e1a0-4593-84c3-7e40e06ab883" identificationScheme="urn:uuid:58a6f841-87b3-4a3e-92fd-a8ffeff98427" value="<<patientIdFromTheFhirRequest">` ` <Name>` ` <LocalizedString value="XDSDocumentEntry.patientId" />` ` </Name>` ` </ExternalIdentifier>` `</ExtrinsicObject>`

Author

Author information may be pulled from either a Practitioner or Organization resource. If both are present, Practitioner will be used.

Author may be a contained resource in the DocumentReference, or it may be an included resource in the bundle.

Practitioner as Author

If the DocumentReference has an Practitioner resource that is the author, then that will be used. If that does not exist, then the fallback will be to look for an author resource which is an Organization.

FHIR	XDS

`"entry": [`
`{`
`  "resource": {`
`  "resourceType": "DocumentReference",`
`  "author": [`
`  {`
`  "reference": "#<<authorId>>",`
`  }`
`  ],`
 	
`  "contained": [`
`  {`
`  "resourceType": "Practitioner",`
`  "id": "<<authorId>>",`
`  "identifier": [{`
`  "system": "<<identifyierSystem>>",`
`  "value": "<<identifierValue>>"`
`  }],`
`  "active": "isActive",`
 	
`  "name": {`
`  "family": ["<<lastName>>"],`
`  "given":`
	`<?xml version="1.0" encoding="utf-16"?>`
	`<RespondingGateway_CrossGatewayQueryResponse ...>`
	`<AdhocQueryResponse ...>`
	`<RegistryObjectList ...>`
	`<ExtrinsicObject ...>`
	
	`<Classification classificationScheme=`
	`  "urn:uuid:93606bcf-9494-43ec-9b4e-a7748d1a838d"`
	`  classifiedObject="Document01" nodeRepresentation="">`
	
	`  <Slot name="authorPerson">`
	`  <ValueList>`
	
	`<Value>^<<lastName>>^<<firstName>>^^^<<prefix>>^<<suffix>></Value>`
	`  </ValueList>`
	`  </Slot>`
	`  <Slot name="authorInstitution">`
	`  <ValueList>`
	`  <Value><<orgName1>>^^^^^^^^^<<orgId1>></Value>`
	`  <Value><<orgName2>>^^^^^^^^^<<orgId2>></Value>`
	`  </ValueList>`
	`  </Slot>`
	`  <Slot name="authorRole">`

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FHIR	XDS

``
["<<firstName>>","<<middleName>>"]
"prefix": "<<prefix>>",
"suffix": "<<suffix>>"
},
"telecom": [
{
"system": "<<telecomSystem1>>",
"value": "<<telecomValue1>>",
},
{
"system": "<<telecomSystem2>>",
"value": "<<telecomValue2>>",
}
],
"practitionerRole": [
{
"managingOrganization":
{
"reference": "#orgRef1"
},
"role": {
"coding": {
"system": "<<roleCodingSystem1>>",
"code": "<<roleCodingValue1>>",
},
},
"specialty": [
{
"coding": {
"system": "<<specialtyCodeSystem1>>",
"code": "<<specialtyCode1>>",
}
},
{
"coding": {
"system": "<<specialtyCodeSystem2>>",
"code": "<<specialtyCode2>>",
}
}
],
},
{
"managingOrganization":
{
"reference": "#orgRef2"
},
"role": {
"coding": {
"system": "<<roleCodingSystem2>>",
"code": "<<roleCodingValue2>>",
},
},
"specialty": [
{
"coding": {
"system": "<<specialtyCodeSystem3>>",
"code": "<<specialtyCode3>>",
}
},
{
"coding": {
"system": "<<specialtyCodeSystem4>>",
``
	``
	<ValueList>
	<Value><<roleCodingValue1>>^^^<<roleCodingSystem1>></Value>
	<Value><<roleCodingValue2>>^^^<<roleCodingSystem2>></Value>
	</ValueList>
	</Slot>
	<Slot name="authorSpecialty">
	<ValueList>
	<Value><<specialtyCode1>>^^^<<specialtyCodeSystem1>></Value>
	<Value><<specialtyCode2>>^^^<<specialtyCodeSystem2>></Value>
	<Value><<specialtyCode3>>^^^<<specialtyCodeSystem3>></Value>
	<Value><<specialtyCode4>>^^^<<specialtyCodeSystem4>></Value>
	</ValueList>
	</Slot>
	<Slot name="authorTelecommunication">
	<ValueList>
	<Value>^^<<telecomValue1>>^<<telecomSystem1>></Value>
	<Value>^^<<telecomValue2>>^<<telecomSystem2>></Value>
	</ValueList>
	</Slot>
	</Classification>
	
	</ExtrinsicObject>
	</RegistryObjectList>
	</AdhocQueryResponse>
	</RespondingGateway_CrossGatewayQueryResponse>
	``

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FHIR	XDS

`"code": "<<specialtyCode4>>",`
`}`
`}],`
`},`
`]`
`},`	

Organization as Author

FHIR	XDS

`"entry": [`
`{`
`"resource": {`
`"resourceType": "DocumentReference",`
`"author": [`
`{`
`"reference": "#crs0",`
`}`
`],`
`"contained": [`
`{`
`"resourceType": "Organization",`
`"id": "crs0",`
`"identifier": [`
`{`
`"value": "<<authorIdentifier>>"`
`}`
`],`
`"active": true,`
`"name": "<<authorName>>",`
`]`
`}`
`],`
	`<?xml version="1.0" encoding="utf-16"?>`
	`<RespondingGateway_CrossGatewayQueryResponse ...>`
	`<AdhocQueryResponse ...>`
	`<RegistryObjectList ...>`
	`<ExtrinsicObject ...>`
	
	`<Classification classificationScheme=`
	`"urn:uuid:93606bcf-9494-43ec-9b4e-a7748d1a838d">`
	`<Slot name="authorInstitution">`
	`<ValueList>`
	`<Value>`
	`<<authorName>>^^^^^^^^^<<authorIdentifier>>`
	`</Value>`
	`</ValueList>`
	`</Slot>`
	`</Classification>`
	
	`</ExtrinsicObject>`
	`</RegistryObjectList>`
	`</AdhocQueryResponse>`
	`</RespondingGateway_CrossGatewayQueryResponse>`

Patient data

Data for the sourcePatientInfo slot can come from either the "sourcePatientInfo" or the "subject" fhir resource. In both cases, it is a "Patient" object on the FHIR side. If both are present, "sourcePatientInfo" will be used.

Either "sourcePatientInfo or "subject" may be either contained resources in the DocumentReference, or included resources in the bundle.

XCA sourcePatientInfo from FHIR sourcePatientInfo

FHIR	XDS

`{`
`"resource": {`
`"resourceType": "DocumentReference",`
`"context":`
`{`
`"sourcePatientInfo": {`
`"reference": "<<patRefId>>"`
`}`
`}`
	`<?xml version="1.0" encoding="utf-16"?>`
	`<RespondingGateway_CrossGatewayQueryResponse ...>`
	`<RegistryObjectList ...>`
	`<ExtrinsicObject ...>`
	
	`<Slot name="sourcePatientInfo">`
	`<ValueList>`
	`<Value>`
	`PID-3|<<pid3system>>^^^<<pid3value>>`

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FHIR	XDS

"contained":
[
{
"resourceType": "Patient",
"id": "<<patRefId>>",
"identifier": [{
"system": "<<pid3system>>",
"value": "<<pid3value>>"
}],
"name": [{
"family": "<<lastName>>",
"given": ["<<firstName>>",
"<<middleName>>"]
"prefix": "<<prefix>>",
"suffix": "<<suffix>>",
"use": "usual|official"
}],
"gender": {"code": "<<gender>>"},
"birthDate": "<<birthDate>>",
"address": {
"use": "home",
"line": ["<<address1>>",
<<address2>>],
"city": "<<city>>",
"state": "<<state>>",
"postalCode": "<<zipCode>>",
"country": "<<country>>",
}
}
}
]
}
},
	</Value>
	<Value>
	PID-5|<<lastName>>^<<firstName>>^<<middleName>>^<<suffix>>^<<prefix>>
	</Value>
	<Value>PID-7|<<birthDate>></Value>
	<Value>PID-8|<<gender>></Value>
	<Value>
	PID-
	11|<<address1>>^<<address2>>^<<city>>^<<state>>^<<zipCode>>^<<country>>
	</Value>
	</ValueList>
	</Slot>
	
	</ExtrinsicObject>
	</RegistryObjectList>
	</AdhocQueryResponse>
	</RespondingGateway_CrossGatewayQueryResponse>

XCA sourcePatientInfo from FHIR subject

FHIR	XDS

{
"resource": {
"resourceType": "DocumentReference",
"id": "… ",
"subject": {
"reference": "<<patientReferenceId>>"
}
}
},
{
"fullUrl": "<<baseUrl>>/<<patientReferenceId>>",
"resource": {
"resourceType": "Patient",
"id": "<<patientId>>",
"identifier": [
{
"system": "<<baseUrl>>",
"value": "<<patientId>>"
}
],
	Same mappings as from sourcePatientInfo above

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FHIR	XDS

`"active": true,`
`"name": [{`
`"family": "<<lastName>>",`
`"given": ["<<firstName>>",`
`"<<middleName>>"]`
`"use": "usual|official"`
`}],`
`"gender": {"code": "<<gender>>"},`
`"birthDate": "<<birthDate>>",`
`"address": {`
`"use": "home",`
`"line": ["<<address1>>",`
`<<address2>>],`
`"city": "<<city>>",`
`"state": "<<state>>",`
`"postalCode": "<<zipCode>>",`
`"country": "<<country>>",`
`}`
`],`
`}`	

STU3 (US Core)

Unless otherwise noted, the STU3 mappings are the same as the DSTU2 mappings.

DocumentReference Object

The same mappings as DSTU2, except:

content.format is a single item, so can only generate a single classification.

Author

The Practitioner class no longer has the practitionerRole field, so the information to map to the authorInstitution, authorRole, and authorSpecialty slots is not available with STU3.

FHIR	XDS

`"entry": [`
`{`
`"resource": {`
`"resourceType": "DocumentReference",`
`"author": [`
`{`
`"reference": "#<<authorId>>",`
`}`
`],`
 	
`"contained": [`
`{`
`"resourceType": "Practitioner",`
`"id": "<<authorId>>",`
`"name": [{`
`"family": "<<lastName>>",`
`"given":`
	`<?xml version="1.0" encoding="utf-16"?>`
	`<RespondingGateway_CrossGatewayQueryResponse ...>`
	`<AdhocQueryResponse ...>`
	`<RegistryObjectList ...>`
	`<ExtrinsicObject ...>`
	
	`<Classification classificationScheme=`
	`"urn:uuid:93606bcf-9494-43ec-9b4e-a7748d1a838d" >`
	
	`<Slot name="authorPerson">`
	`<ValueList>`
	`<Value>`
	`^<<lastName>>^<<firstName>>^^^<<prefix>>^<<suffix>>`
	`</Value>`
	`</ValueList>`
	`</Slot>`
	
	`<Slot name="authorTelecommunication">`

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FHIR	XDS

["<<firstName>>","<<middleName>>"]
"prefix": "<<prefix>>",
"suffix": "<<suffix>>",
"telecom<ContactPoint>": [
{
"system": "<<telecomSystem1>>",
"value": "<<telecomValue1>>",
},
{
"system": "<<telecomSystem2>>",
"value": "<<telecomValue2>>",
}
],
},
	<ValueList>
	<Value>^^<<telecomValue1>>^<<telecomSystem1>></Value>
	<Value>^^<<telecomValue2>>^<<telecomSystem2>></Value>
	</ValueList>
	</Slot>
	</Classification>
	
	</ExtrinsicObject>
	</RegistryObjectList>
	</AdhocQueryResponse>
	</RespondingGateway_CrossGatewayQueryResponse>

H.3 DocumentRetrieval Request to FHIR Binary Request

DSTU2 (Argonaut)

For a FHIR gateway, the *HomeCommunityId, RepositoryUniqueId,* and *DocumentUniqueId* will be used to look up the Binary resource URL which was returned during the DocumentReference query. This URL will be used in an HTTP GET call to retrieve the document.

If the mimeType is either JSON or XML, the fields will be mapped to the response. Any other mimeType

Binary

FHIR	XDS

{
"resourceType" : "**Binary**",
"contentType" : "<***mimeType***>",
"content" : "<***base64Binary***>"
}
	<?xml version="1.0" encoding="utf-16"?>
	<DocumentRepository_RetrieveDocumentSetResponse
	xmlns:xsi=http://www.w3.org/2001/XMLSchema-instance
	xmlns:xsd="http://www.w3.org/2001/XMLSchema">
	<RetrieveDocumentSetResponse>
	<RegistryResponse
	status="urn:oasis:names:tc:ebxml-regrep:ResponseStatusType:Success"
	xmlns="urn:oasis:names:tc:ebxml-regrep:xsd:rs:3.0" />
	<DocumentResponse xmlns="urn:ihe:iti:xds-b:2007">
	<HomeCommunityId>{***homeCommunityIdFromRequest***}</HomeCommunityId>
	<RepositoryUniqueId>{***repositoryUniqueIdFromRequest***}</RepositoryUniqueId>
	<DocumentUniqueId>{***documentUniqueIdFromRequest***}</DocumentUniqueId>
	<mimeType>{***mimeType***}</mimeType>
	<Document>{**base64Binary**}</Document>
	</DocumentResponse>
	</RetrieveDocumentSetResponse>
	</DocumentRepository_RetrieveDocumentSetResponse>

OperationOutcome

When a Binary request is returned with an OperationOutcome message, an XDS RegistryError with a severity of "urn:oasis:names:tc:ebxml-regrep:ErrorSeverityType:Error" will be returned, with the IssueType Mapped to an XDS Error Code

OperationOutCome.IssueType	XDS Error Code

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NotFound	XDSRegistryError
NoStore	XDSRepositoryError
Timeout	XDSRepositoryBusy
TooCostly	XDSRepositoryOutOfResources
Duplicate	XDSTooManyResults
Unknown	XDSUnknownStoredQuery
Incomplete	XDSStoredQueryMissingParam
Value	XDSStoredQueryParamNumber
Invalid	XDSDocumentUniqueIdError
Forbidden	XDSUnavailableCommunity

STU3 (US Core)

There are no changes between DSTU2 and STU3 for response mappings.

H.4 DocumentRetrieval Response to FHIR Binary Response

DSTU2 (Argonaut)

The Slot values from the DocumentRepository_RetrieveDocumentSetRequest will be converted to FHIR search parameters as follows:

XDS Slot name	FHIR query parameter
$XDSDocumentEntryClassCode	class.system
$XDSDocumentEntryClassCodeScheme	class.value
$XDSDocumentEntryHealthcareFacilityTypeCode	facility
$XDSDocumentEntryType	type
$XDSDocumentEntryEventCodeList	event (comma separated list of "EventCodeListScheme|EventCode"}
$XDSDocumentEntryEventCodeListScheme	event (see above)
$XDSDocumentEntryFormatCode	format
$XDSDocumentEntryCreationTimeFrom	created (ge)
$XDSDocumentEntryCreationTimeTo	created (le)

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$XDSDocumentEntryServiceStartTimeFrom	period (ge)
$XDSDocumentEntryServiceStopTimeTo	period (le)

STU3 (US Core)

There are no changes between DSTU2 and STU3 as far as search parameters go.

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