

Integrating the Healthcare Enterprise



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**IHE Radiology  
Technical Framework Supplement**

10

**Cross-Community Web-Based Image Access  
(XC-WIA)**

**For review and comment only.**

**DO NOT implement this public comment version.**

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**Revision 1.0 – Draft for Public Comment**

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**Please verify you have the most recent version of this document. See [here](#) for Trial Implementation and Final Text versions and [here](#) for Public Comment versions.**

## Foreword

30 This is a supplement to the IHE Radiology Technical Framework V22.0. Each supplement undergoes a process of public comment and trial implementation before being incorporated into the volumes of the Technical Frameworks.

This supplement is published on February 20, 2025 for Public Comment. Comments are invited and can be submitted at [https://www.ihe.net/Radiology\\_Public\\_Comments](https://www.ihe.net/Radiology_Public_Comments). In order to be considered in development of the Trial Implementation version of the supplement, comments 35 must be received by March 24, 2025.

This supplement describes changes to the existing technical framework documents.

“Boxed” instructions like the sample below indicate to the Volume Editor how to integrate the relevant section(s) into the relevant Technical Framework volume.

<i>Amend section X.X by the following:</i>
--

40 Where the amendment adds text, make the added text **bold underline**. Where the amendment removes text, make the removed text **~~bold strikethrough~~**. When entire new sections are added, introduce with editor’s instructions to “add new text” or similar, which for readability are not bolded or underlined.

45 General information about IHE can be found at [IHE.net](https://www.ihe.net).

Information about the IHE Radiology domain can be found at [IHE Domains](#).

Information about the organization of IHE Technical Frameworks and Supplements and the process used to create them can be found at [Profiles](#) and [IHE Process](#)

50 The current version of the Radiology Technical Framework can be found at [Radiology Technical Framework](#).

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## Introduction to this Supplement

100 The Cross-Community Web-based Access for Imaging (XC-WIA) Integration Profile specifies actors and transactions to query and retrieve patient-relevant medical imaging data being held by other communities in a multi-community healthcare information-sharing setup.

105 A community is defined as a combination of healthcare organizations/facilities/enterprises that have agreed to work together using a common set of policies for the purpose of sharing clinical information via an established mechanism. Facilities/enterprises may host any type of healthcare application such as PACS/RIS, EHR, PHR, etc. A community is identifiable by a globally unique identifier called the homeCommunityId. Membership of a facility/enterprise in one community does not preclude it from being a member of another community. Such communities exist on regional, state, national, or multi-national scales. They may be XDS Affinity Domains which define document sharing using the XDS Profile or any other communities, no matter what their internal sharing structure. This profile addresses sharing imaging information between such communities.

110 Similar to the XCA-I integration Profile, the XC-WIA Profile extends the IT Infrastructure XCA Profile. XCA Profile provides the means to access Diagnostic reports and Imaging Manifests, and XC-WIA provides the means to access the imaging objects referenced in the Manifests by the means of the RESTful web-services standardized by DICOM as WADO-RS. The reader of XC-WIA is expected to have read and understood the XCA Profile, including the meaning of terms such as Community, homeCommunityId, etc.

## Open Issues and Questions

#	Issue / Answer
1.	Q: Is the community and repository IDs syntax in the URL resource path OK?
2.	Q: XC-WIA enables retrieval of all four types of content in RAD-107 (instances, rendered instances, metadata, bulkdata). Should that be restricted in any way?
3.	Q: What caching requirements, if any, should the profile define for the Gateways to avoid timeouts for requesting sources?
4.	Q: Are there any additional requirements that may be applicable for Federated Use Case?
5.	Q: What additional text about firewall issues might be useful in Section X.1.1.2?

## Closed Issues

#	Issue / Answer
1.	Q: Should we introduce the new option and actors in existing XCA-I? A: No. The XCA-I Profile is in Final Text and places specific requirements for support of the XDS-I.b capabilities as a baseline behavior for all actors. That would be burdensome on the implementors of RESTful services to continue supporting outdated ebXML/MTOM Web-Services.

## 120 **IHE Technical Frameworks General Introduction**

The [IHE Technical Frameworks General Introduction](#) is shared by all of the IHE domain technical frameworks. Each technical framework volume contains links to this document where appropriate.

### **9 Copyright Licenses**

- 125 IHE technical documents refer to, and make use of, a number of standards developed and published by several standards development organizations. Please refer to the IHE Technical Frameworks General Introduction, [Section 9 - Copyright Licenses](#) for copyright license information for frequently referenced base standards. Information pertaining to the use of IHE International copyrighted materials is also available there.

## 130 **10 Trademark**

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135 **IHE Technical Frameworks General Introduction Appendices**

The [IHE Technical Framework General Introduction Appendices](#) are components shared by all of the IHE domain technical frameworks. Each technical framework volume contains links to these documents where appropriate.

140 *Update the following appendices to the General Introduction as indicated below. Note that these are **not** appendices to this domain’s Technical Framework (TF-1, TF-2, TF-3 or TF-4) but rather, they are appendices to the IHE Technical Frameworks General Introduction located [here](#).*

145 **[Appendix A – Actors](#)**

*Add the following **new or modified** actors to the [IHE Technical Frameworks General Introduction Appendix A](#):*

New (or modified) Actor Name	Description
Initiating Imaging Gateway	The Initiating Imaging Gateway Actor proxies <del>Imaging Document Set</del> Retrieve requests from an Image Document Consumer to a Responding Imaging Gateway with a <del>Cross Gateway Retrieve Imaging Document Set</del> separate Retrieve transaction.
Responding Imaging Gateway	The responding Imaging Gateway proxies <del>Cross Gateway</del> Retrieve <del>Imaging Document Set</del> requests from an Initiating Imaging Gateway to an Imaging Document Source with a separate <del>an Image Document Set</del> Retrieve request.

150

The table below lists *existing* actors that are utilized in this profile.

**Complete List of Existing Actors Utilized in this Profile**

Existing Actor Name	Definition
Imaging Document Consumer	A system that makes use of imaging data.
Imaging Document Source	Publishes imaging data and makes it available for retrieval.

155

## **Appendix B – Transactions**

*Add the following **new or modified** transactions to the [IHE Technical Frameworks General Introduction Appendix B](#):*

160

No new or modified transactions.

## **Appendix D – Glossary**

165

*Add the following **new or modified** glossary terms to the [IHE Technical Frameworks General Introduction Appendix D](#):*

No new or modified glossary terms.



170

## Volume 1 – Profiles

### Domain-specific additions

None.

175 

<i>Add new Section #</i>
--------------------------

## **X Cross-Community Web-Based Image Access (XC-WIA) Profile**

180 The Cross-Community Web-based Image Access (XC-WIA) Integration Profile is the Workflow Profile that specifies actors and transactions to query and retrieve patient-relevant medical imaging data being held by other communities.

Within a community, a group of facilities/enterprises shares clinical information via an established mechanism such as XDS, XDS-I (in which case the community can be referred to as an XDS Affinity Domain) or WIA. This profile addresses sharing between such communities using the DICOM WADO-RS mechanisms similar to those used by the WIA Profile.

185 The XC-WIA Profile extends the IT Infrastructure XCA Profile in a way that is similar to the XCA-I Profile. XCA provides access to Diagnostic reports and Imaging Manifests. XC-WIA provides access to the imaging objects referenced in the Manifests, by utilizing the Web-based Image Access mechanism not defined in the XCA-I Profile. The reader of XC-WIA is expected to have read and understood the XCA Profile, including the meaning of terms such as  
190 Community, homeCommunityId, etc.

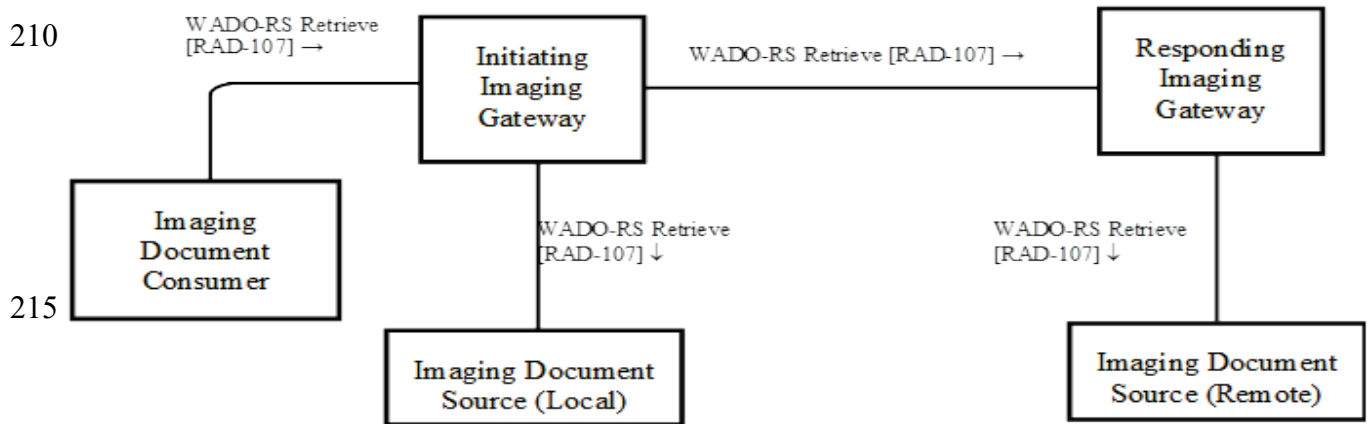
### **X.1 XC-WIA Actors, Transactions, and Content Modules**

This section defines the actors, transactions, and/or content modules in this profile. General definitions of actors are given in the Technical Frameworks General Introduction Appendix A. IHE Transactions can be found in the Technical Frameworks General Introduction Appendix B.  
195 Both appendices are located at <https://profiles.ihe.net/GeneralIntro/index.html>.

Figure X.1-1 shows the actors directly involved in the XC-WIA Profile and the relevant transactions between them. For context, the Imaging Document Consumer obtains the Imaging Manifests through grouping with the XDS.b Document Consumer. The actors and transactions of the XCA Profile that are indirectly involved in those transactions are not shown in this diagram.

200

205



**Figure X.1-1: XC-WIA Actor Diagram**

220 Table X.1-1 lists the transactions for each actor directly involved in the XC-WIA Profile. To claim compliance with this profile, an actor shall support all required transactions (labeled “R”) and may support the optional transactions (labeled “O”).

**Table X.1-1: XC-WIA Profile - Actors and Transactions**

Actors	Transactions	Initiator or Responder	Optionality	Reference
Imaging Document Consumer	WADO-RS Retrieve [RAD-107]	Initiator	R	RAD TF-2: 4.107
Initiating Imaging Gateway	WADO-RS Retrieve [RAD-107]	Initiator Responder	R	RAD TF-2: 4.107
Responding Imaging Gateway	WADO-RS Retrieve [RAD-107]	Initiator Responder	R	RAD TF-2: 4.107
Imaging Document Source	WADO-RS Retrieve [RAD-107]	Responder	R	RAD TF-2: 4.107

225 **X.1.1 Actor Descriptions and Actor Profile Requirements**

Most requirements are documented in RAD TF-2 Transactions. This section documents any additional requirements on the profile’s actors.

**X.1.1.1 Imaging Document Consumer**

230 The Imaging Document Consumer is the system that retrieves images from one or more communities.

235 The Imaging Document Consumer obtains the Imaging Manifest(s) identifying DICOM Studies interest using XCA transactions to search and retrieve such Imaging Manifest(s). Those Transactions do not appear in this profile because the Imaging Document Consumer is required to be grouped with an XDS.b Document Consumer in the XCA Profile. Using these Imaging Manifests, the Imaging Document Consumer determines which DICOM objects are needed for their application.

The Imaging Document Consumer issues a WADO-RS Retrieve [RAD-107] transaction in the Requestor role to the Initiating Imaging Gateway to retrieve the objects from remote XDS Affinity Domains served by one or more Responding Imaging Gateways.

240 The Imaging Document Consumer will form the WADO-RS Request URL by using the following metadata elements from the retrieved Imaging Manifests:

- The homeCommunityId identifying the Responding Imaging Gateway
- The repositoryUniqueId identifying each Imaging Document Source
- Study Instance UID
- 245 • Series Instance UID
- The documentUniqueId identifying the imaging document (DICOM SOP Instance UID) within the Imaging Document Source

250 The Imaging Document Consumer shall create as many requests as there are discrete DICOM entities it will retrieve. A DICOM entity may be a study, series, or instance from a specific repository within a specific community. In other words, it is expected that to retrieve all instances of a study from the same location (identified by homeCommunityId+repositoryUniqueId), the Imaging Document Consumer will use a single request rather than as one request per instance.

255 Imaging Document Consumer shall also be aware of the fact that the list of instances of one study obtained from an Imaging Manifest may not include all the instances of that study available at a particular location. In this case, the number of instances retrieved by using the study request may be larger than the number of instances known to the Document Consumer.

260 The value of the <location> component of the WADO-RS URL for the WADO-RS Retrieve [RAD-107] transaction shall be formatted by the Imaging Document Consumer from the Initiating Imaging Gateway hostname, an optional port address, and a path consisting of homeCommunityId and repositoryUniqueId, as follows:

```
<hostname[:port]>/<WADO-RS endpoint path>/homeCommunityId/<homeCommunityId>/  
repositoryUniqueId/<repositoryUniqueId>
```

265 Note: When an Imaging Document Consumer recognizes that the homeCommunityId in a query response is its local community, it may initiate a WADO-RS Retrieve [RAD-107] directly to the Imaging Document Source(s) in its local community rather than retrieving local studies via the Initiating Imaging Gateway. In doing so, it uses the <location> component of the URL known for the Imaging Document Source.

### X.1.1.2 Initiating Imaging Gateway

270 The Imaging Initiating Gateway is the system that facilitates retrieving images from one or more communities by communicating with the Responding Imaging Gateway.

The Initiating Imaging Gateway uses the homeCommunityId value to determine where to retrieve the requested DICOM entities.

275 Depending on whether the homeCommunityId is recognized as the local community's identifier, it may have to initiate a WADO-RS Retrieve [RAD-107] request to its local Imaging Document Source(s) or a Responding Imaging Gateway.

- When initiating the request to the local Imaging Document Source, the Initiating Imaging Gateway uses the <location> component of the URL known for the Imaging Document Source and combines it with the other components of Imaging Document Consumer's WADO-RS request.
- 280 • When initiating the request to the remote Responding Imaging Gateway, the Initiating Imaging Gateway only replaces the <hostname[:port]> part of the <location> component of the WADO-RS request with the appropriate parameters of the Responding Imaging Gateway. It shall keep the homeCommunityId, repositoryUniqueId, and other  
285 components of the WADO-RS URL intact to allow the Responding Imaging Gateway to verify that the request can be properly serviced.

Initiating Imaging Gateway may generate the request by one of three means:

- Use HTTP Redirect response to the Imaging Document Consumer instructing the Imaging Document Consumer to connect to the destination. This way of redirecting the request may only have practical use when the destination is the local Imaging Document Consumer. The  
290 redirect to the Responding Imaging Gateways will potentially involve changing firewall configurations and security policies of the local community as discussed in Section X.5.
- Act as a reverse proxy. In this configuration, the Initiating Imaging Gateway will re-write the portion of the URL and forward the request to the destination. The Imaging Document  
295 Consumer is not aware of the actual destination URL, even if that is the Imaging Document Source in the local Community. When implementing this approach, the Initiating Imaging Gateway may have to also modify the content of HTTP headers to comply with the authentication, authorization and security requirements of the Responding Imaging Gateway.
- Synchronously initiate a new [RAD-107] transaction to the Responding Imaging Gateway and use the result of that transaction to complete the transaction initiated by the Imaging  
300 Document Consumer. See Section X.4.1 for further discussion of considerations related to this approach.

### X.1.1.3 Responding Imaging Gateway

305 The Responding Imaging Gateway is the system that facilitates retrieving images from the Imaging Document Source Actors from its local community by communicating with the Imaging Document Source Actor(s).

The Responding Imaging Gateway processes the WADO-RS Retrieve [RAD-107] request from the Initiating Imaging Gateway to verify that it can resolve the homeCommunityId and repositoryUniqueId to identify the local Imaging Document Source.

310 If successful, the Responding Imaging Gateway initiates a WADO-RS Retrieve [RAD-107] transaction to the Imaging Document Source identified by the repositoryUniqueId within the request.

315 When initiating the request to the local Imaging Document Source, the Responding Imaging Gateway uses the location component of the URL known for the Imaging Document Source while leaving the other components of the Imaging Document Consumer WADO-RS request intact.

Responding Imaging Gateway may generate the request by one of two means:

- Act as a reverse proxy so that the Initiating Imaging Gateway is unaware of the destination URL.
- Synchronously initiate a new [RAD-107] transaction to Imaging Document Source and use the result of that transaction to complete the transaction initiated by Initiating Imaging Gateway. See Section X.4.1 for further discussion of considerations related to this approach.

### X.1.1.4 Imaging Document Source

325 The Imaging Document Source receives a WADO-RS Retrieve [RAD-107] transaction request from an Imaging Document Consumer, Initiating Imaging Gateway or Responding Imaging Gateway to retrieve the requested objects and sends them to the requestor depending on the redirect option used.

330 The Imaging Document Source that belongs to the same community as the Imaging Document Consumer (Local Imaging Document Source) will send the WADO-RS Retrieve response either to the Initiating Imaging Gateway or directly to the Imaging Document Consumer. The latter case will occur if the Initiating Imaging Gateway selects to use HTTP Redirect response to the original WADO-RS Retrieve request from the Imaging Document Consumer.

335 Remote Imaging Document Source will send the WADO-RS response to the Responding Imaging Gateway. The response to the Imaging Document Consumer will traverse through the Initiating Imaging Gateway.

## X.2 XC-WIA Actor Options

Options that may be selected for each actor in this profile, if any, are listed in the Table X.2-1. Dependencies between options, when applicable, are specified in notes.

**Table X.2-1: <Profile Name> – Actors and Options**

Actor	Option Name	Reference
Imaging Document Consumer	No options defined	--
Initiating Imaging Gateway	No options defined	--
Responding Imaging Gateway	No options defined	--
Imaging Document Source	No options defined	--

340

## X.3 XC-WIA Required Actor Groupings

An actor from this profile (Column 1) shall implement all of the required transactions in this profile *in addition to all* of the requirements for the grouped actor (Column 2) of the Table X.3-1.

345

**Table X.3-1: XC-WIA - Required Actor Groupings**

XCA-I Actor	Actor(s) to be grouped with	Reference
Imaging Document Consumer	ITI XDS.b / Document Consumer	<a href="#">ITI TF-1: 10.1</a>
	ITI CT / Time Client	<a href="#">ITI TF-1: 7.1</a>
	ITI ATNA / Secure Node or Secure Application	<a href="#">ITI TF-1: 9.1</a>
Imaging Document Source	ITI ATNA / Secure Node or Secure Application	<a href="#">ITI TF-1: 9.1</a>
	ITI CT / Time Client	<a href="#">ITI TF-1: 7.1</a>
Initiating Imaging Gateway	ITI ATNA / Secure Node or Secure Application	<a href="#">ITI TF-1: 9.1</a>
	ITI CT / Time Client	<a href="#">ITI TF-1: 7.1</a>
Responding Imaging Gateway	ITI ATNA / Secure Node or Secure Application	<a href="#">ITI TF-1: 9.1</a>
	ITI CT / Time Client	<a href="#">ITI TF-1: 7.1</a>

## X.4 XC-WIA Overview

The XC-WIA Profile addresses sharing image data sets between communities.

### X.4.1 Concepts

#### 350 X.4.1.1 Inter-community sharing infrastructure

XC-WIA enables retrieval of imaging studies shared between the communities using RESTful services. XC-WIA can be used with different image-sharing infrastructures within each

community, including but not limited to XDS / XDS-I and DICOM / DICOMweb, provided each community implements both XCA and XC-WIA Initiating and Responding Gateways.

- 355 The Imaging Document Source returns imaging studies in response to retrieve requests. The source of the imaging studies is not constrained, and several models are possible. The Imaging Document Source can retrieve imaging studies from sources such as:
- Image Manager/Image Archive: The Imaging Document Source can have direct access to the Image Manager/Image Archive or communicate with one or more Image Managers/Image Archives via a standard mechanism such as the Retrieve Images [RAD-16] transaction.
  - XDS-I Imaging Document Source: The Imaging Document Source can have direct access to the XDS-I Imaging Document Source or communicate with one or more XDS-I Imaging Document Sources via retrieval mechanisms defined in XDS-I.
- 360
- 365 As a result, the Imaging Document Consumer can retrieve imaging studies from an Imaging Document Source through Imaging Initiating and Responding Gateways using a consistent mechanism, regardless of whether the imaging study is published to an XDS-I or non-XDS-I environment at the source location.

#### **X.4.1.2 Federated inter-community sharing infrastructure**

- 370 XC-WIA allows the Imaging Document Consumers to retrieve imaging studies from remote communities that may not be directly accessible to them. For example, for cross-country access, there may be a requirement that all cross-community retrieval requests be issued to a single country-specific Responding Imaging Gateway that also plays the role of Initiating Imaging Gateway, redirecting the received requests to specific regional Responding Gateways. The Regional Gateways will, in turn, retrieve the Imaging Studies from the Imaging Document Sources within the Regional Community.
- 375

#### **X.4.1.3 Intra-community sharing infrastructure**

- 380 XC-WIA allows the Imaging Document Consumers to retrieve imaging studies from remote communities and local community by issuing requests to the local Imaging Initiating Gateway, which provides a single retrieval endpoint. This allows the Imaging Document Consumer to avoid implementing additional logic of segregation of local and remote homeCommunityIDs. Furthermore, it supports multiple Repositories within the Home Community which may not be directly accessible to the Imaging Document Consumer.

- 385 On the other hand, XC-WIA Imaging Document Consumer can be implemented in grouping with the WIA Imaging Document Consumer. In this case, the retrieval of imaging studies from well-known and accessible Imaging Document Sources within the home community may be performed directly by using the WIA Profile communication.



#### X.4.1.4 Imaging Reports

390 XC-WIA focuses on retrieving imaging studies using RESTful services. Other imaging study-related documents, such as radiology reports, may be retrieved using the ITI MHD Actors grouped with XCA infrastructure. See [ITI TF-1:33.6.2](#).

#### X.4.1.5 WADO-RS URL

The WADO-RS URL used in the [RAD-107] transactions between different actors in the XC-WIA Profile is modified by each actor as needed.

395 The WADO-RS URL formatted by the Document Consumer starts with the endpoint of the local home community Imaging Initiating Gateway, with the addition of the sub-resources based on the discrete DICOM entity (study, series, or instance) to be retrieved. The Imaging Document Consumer may want to modify the WADO-RS URL further by including parameters. For example, it may modify the URL to retrieve a rendered object instead of the DICOM object  
400 itself, provided the Imaging Document Source supports the optional rendering transaction.

Note: Although the Imaging Document Consumer may request the rendered objects, it shall be aware of potential issues when doing so on the study or series level, as discussed in DICOM CP1978.

405 Each XC-WIA Imaging Gateway (both Initiating and Responding) modifies the URL by replacing the <location> component. It may also modify the content of HTTP headers as required by the security requirements of each community served by such gateway. Gateways do not modify the sub-resources or parameters of the URL.

#### X.4.1.6 Caching and Proxying at the Imaging Gateways

410 Both Initiating and Responding Imaging Gateways in the XC-WIA Profile can initiate the [RAD-107] transaction either as a reverse proxy or as a caching server, depending on security arrangements between different communities.

415 If the Imaging Gateway initiates the [RAD-107] transaction as a proxy, it overwrites the WADO-RS URL it received with the new location component and possibly modifies certain HTTP headers and forwards the request to the destination. A response from the destination is immediately forwarded back to the initiator of the transaction. The response should not be modified by the Imaging Gateway as it contains data that has to be delivered to the original requestor.

420 If the Imaging Gateway initiates [RAD-107] transactions as a caching server, it forms the new WADO-RS URL using the components of the received URL and the new <location> component. It does not respond to the original request until it gets a response from the final destination. An Imaging Gateway taking this approach has to account for the significant time that might be required to receive the response from the other Initiating Gateway (or Imaging Document Source) and take steps to avoid a timeout of the request from the original requestor.

#### X.4.2 Use Cases

- 425 The use cases below are based on the assumed sharing infrastructure that includes large geographic area, including separate administrative areas that have different arrangements on data sharing and form three separate communities or XDS Affinity Domain. The area includes Southeast Wisconsin and Greater Chicago regions. Within Southeast Wisconsin region, one community provides image sharing services for Greater Milwaukee region and one for Kenosha region.
- 430 In each community, a Health Information Exchange Service Provider (HIE-SP) provides:
- an XDS Infrastructure (an XDS Registry and an XDS Repository) for sharing reports and image manifests.
  - an Affinity Domain with a common patient identifier and common coded terminology for managing the sharing of images.
- 435
- Diagnostic Imaging Service Providers provide access to locally stored images in each community through transactions defined by the XC-WIA Integration Profile.
  - The communities agree to share patient records for urgent care using transactions defined in XC-WIA.
  - Kenosha Region Community does not have a direct sharing arrangement with the Greater Chicago Region but allows the Greater Milwaukee region to access and share its records with Greater Chicago.
- 440

#### **X.4.2.1 Use Case #1: Image Set sharing between communities**

##### **X.4.2.1.1 Image Set Sharing Between Communities Use Case Description**

445 A patient X, who receives her primary care in Kenosha, frequently travels to the Greater Milwaukee region for business. While visiting Milwaukee, patient X is admitted to the Milwaukee University Hospital (MUH) for urgent care. The attending physician places an imaging procedure order.

450 The local PACS, acting as an XDS.b Imaging Document Consumer, performs an automated query for relevant priors within the Greater Milwaukee region and to the Kenosha region through an XDS.b Stored Query transaction to the local HIE-SP's Initiating Gateway.

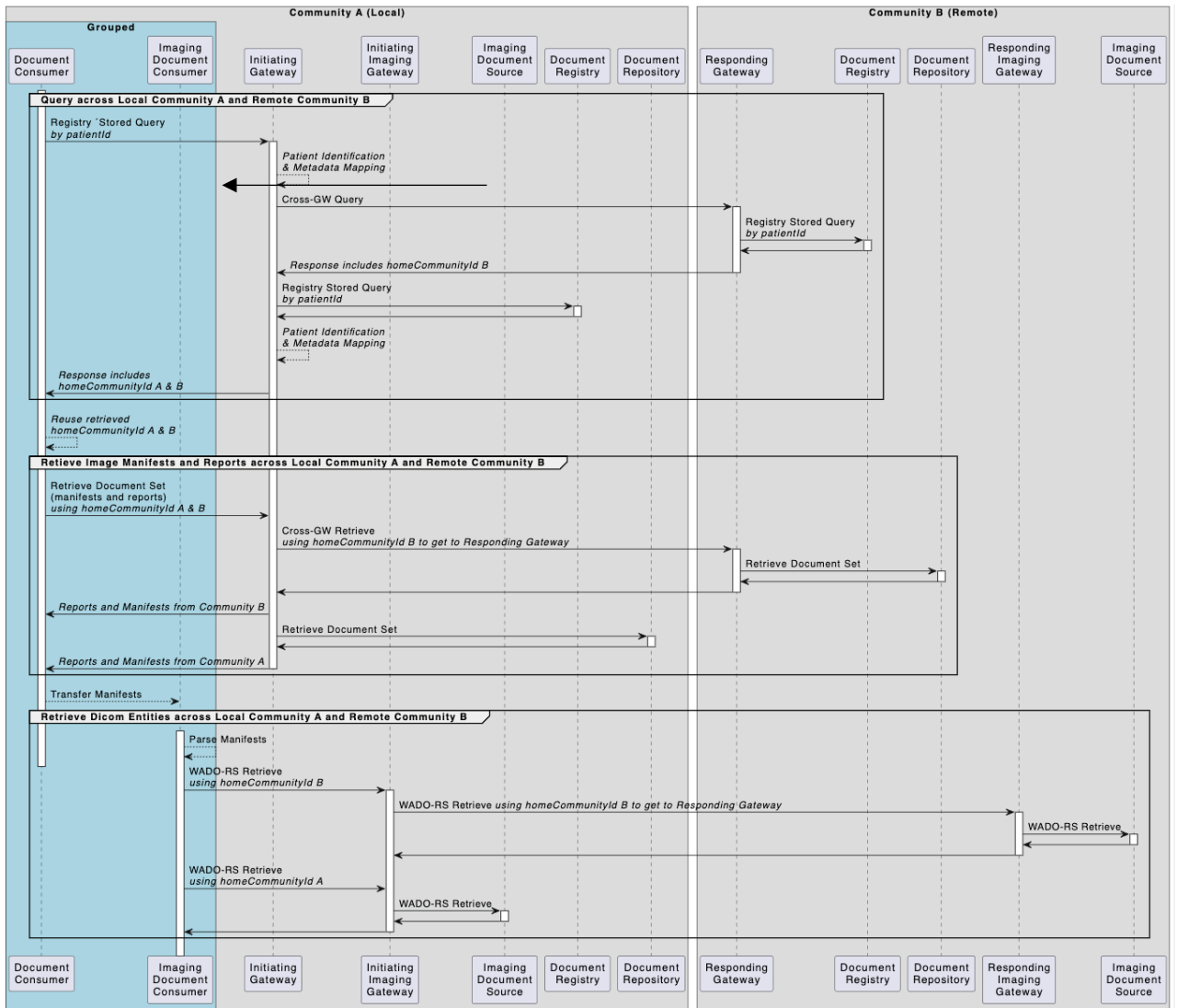
The Initiating Gateway in Greater Milwaukee queries both the local Document Registry and the Responding Gateway for Kenosha. Relevant priors are located in Kenosha and in the South Milwaukee Diagnostic Imaging Center. The South Milwaukee Diagnostic Imaging Center shares images using WIA as part of the Greater Milwaukee region.

455 The MUH PACS, acting as an Imaging Document Consumer, directly accesses images from the South Milwaukee Diagnostic Imaging Center via their XDS-I.b Imaging Document Source.

Images from the Kenosha region are retrieved through the Greater Milwaukee HIE-SP's XC-WIA Initiating Imaging Gateway, retrieving the images from the Kenosha HIE-SP's XC-WIA Responding Imaging Gateway. The Kenosha HIE-SP XCA-I Responding Imaging Gateway, in

460 turn, retrieves the images from Imaging Document Source imaging repositories in the Kenosha region.

### X.4.2.1.2 Image Set Sharing Between Communities Process Flow



465 **Figure X.4.2.2-1: Basic Process Flow in XC-WIA Profile**

The text in Figure X.4.2.4.2-2 was used to generate the diagram in Figure 42.4.2.4.2-1. Readers will generally find the diagram more informative. The text is included here to facilitate editing.

470 @startuml Basic Process Flow in XC-WIA  
!pragma teoz true

## IHE Radiology Technical Framework Supplement – Cross-Community Web-based Image Access (XC-WIA)

---

```
box "Community A (Local)"
box "Grouped" #LightBlue
participant "Document\nConsumer" as XDC
475 participant "Imaging\nDocument\nConsumer" as IDC
end box
participant "Initiating\nGateway" as IG
participant "Initiating\nImaging\nGateway" as IIG
participant "Imaging\nDocument\nSource" as LIDS
480 participant "Document\nRegistry" as LDReg
participant "Document\nRepository" as LDRepo
end box

box "Community B (Remote)"
485 participant "Responding\nGateway" as RG
participant "Document\nRegistry" as RDReg
participant "Document\nRepository" as RDRepo
participant "Responding\nImaging\nGateway" as RIG
participant "Imaging\nDocument\nSource" as RIDS
end box
490

activate XDC
group Query across Local Community A and Remote Community B
XDC->IG: Registry `Stored Query\n//by patientId//
activate IG
495 IG-->IG: //Patient Identification\n\n/& Metadata Mapping//
IG->RG: Cross-GW Query
activate RG
RG->RDReg: Registry Stored Query\n//by patientId//
500 activate RDReg
RDReg->RG
deactivate RDReg
RG->IG: //Response includes homeCommunityId B//
deactivate RG
505 IG->LDReg: Registry Stored Query\n//by patientId//
activate LDReg
LDReg->IG
deactivate LDReg
IG-->IG: //Patient Identification\n\n/& Metadata Mapping//
510 IG->XDC: //Response includes\n\n/homeCommunityId A & B//
end
XDC-->XDC: //Reuse retrieved\n\n/homeCommunityId A & B//
group Retrieve Image Manifests and Reports across Local Community A and Remote
Community B
515 XDC->IG: Retrieve Document Set\n(manifests and reports)\n//using homeCommunityId A &
B//
IG->RG: Cross-GW Retrieve\n//using homeCommunityId B to get to Responding Gateway//
activate RG
RG->RDRepo: Retrieve Document Set
520 activate RDRepo
RDRepo->RG
deactivate RDRepo
RG->IG
deactivate RG
525 IG->XDC: //Reports and Manifests from Community B//
IG->LDRepo : Retrieve Document Set
activate LDRepo
LDRepo->IG
deactivate LDRepo
```

```
530 IG->XDC: //Reports and Manifests from Community A//  
deactivate IG  
end  
XDC-->IDC: Transfer Manifests  
group Retrieve Dicom Entities across Local Community A and Remote Community B  
activate IDC  
535 IDC-->IDC: Parse Manifests  
deactivate XDC  
IDC->IIG: WADO-RS Retrieve\n//using homeCommunityId B//  
activate IIG  
540 IIG->RIG: WADO-RS Retrieve //using homeCommunityId B to get to Responding Gateway//  
activate RIG  
RIG->RIDS: WADO-RS Retrieve  
activate RIDS  
RIDS->RIG  
545 deactivate RIDS  
RIG->IIG  
deactivate RIG  
IDC->IIG: WADO-RS Retrieve\n//using homeCommunityId A//  
IIG->LIDS: WADO-RS Retrieve  
550 activate LIDS  
LIDS->IIG  
deactivate LIDS  
IIG->IDC  
deactivate IIG  
@enduml
```

555 **Figure X.4.2.4.2-2: Basic Process Flow in XC-WIA Profile Pseudocode**

Retrieval of imaging manifests for a patient uses the set of XCA transactions performed by the XDS.b Document consumer, with which the XC-WIA Imaging Document Consumer is grouped. As a result of queries performed by the Document Consumer, the Imaging Document Consumer obtains Imaging Manifests for the patient from both Local Community A and Remote  
560 Community B. See Section 29.3.2 for a detailed explanation.

Retrieval of Imaging Studies referenced in Manifests is performed in the following data flow:

**Imaging Document Consumer** *wants to retrieve the studies referenced in the Imaging Manifests:*

- 565 • The Imaging Document Consumer initiates a WADO-RS Retrieve [RAD-107] requests to the Initiating Imaging Gateway.
- 570 • The Imaging Document Consumer creates as many requests as there are discrete DICOM entities it is going to retrieve. An entity may be a study, series or an instance from a specific repository within a specific community. In other words, it is expected that to retrieve all series of a study from the same location (identified by homeCommunityId + repositoryUniqueId), the Imaging Document Consumer will use a single request rather than as many requests as there are series.

**Initiating Imaging Gateway** *processes WADO-RS Retrieve [RAD-107] –*

- 575
- The Initiating Imaging Gateway uses the homeCommunityId value to determine where to retrieve the requested DICOM entities from. It may have to initiate a WADO-RS Retrieve [RAD-107] request to its local Imaging Document Source(s) or to a Responding Imaging Gateway.

**Responding Imaging Gateway processes WADO-RS Retrieve [RAD-107] –**

- 580
- The Responding Imaging Gateway processes the WADO-RS Retrieve [RAD-107] request to verify that it can resolve the homeCommunityId and repositoryUniqueId to identify the local Imaging Document Source supporting WADO-RS Retrieve [RAD-107] and sends a WADO-RS Retrieve [107] request for data retrieval

Depending on the redirection options selected by Initiating Imaging Gateway and Responding Imaging Gateway, the WADO-RS Retrieve response containing requested DICOM objects can be sent to the Imaging Document Consumer either by:

- 585
- **Initiating Imaging Gateway** if it acts as a proxy or initiates separate request to the Responding Imaging Gateway.
  - **Responding Imaging Gateway** if Initiating Imaging Gateway uses HTTP Redirect to the Responding Imaging Gateway which in turn acts as a proxy or initiates a separate request to Imaging Document Source
- 590
- **Remote Imaging Document Source** if both gateways use the HTTPS redirect for allowing the request to traverse from the Imaging Document Consumer to Imaging Document Source.

## **X.4.2.2 Use Case #2: Federated Image Set sharing between communities**

### **X.4.2.2.1 Federated Image Set Sharing Between Communities Use Case Description**

595

Patient X, while on vacation in Chicago is admitted to Chicago General Hospital (CGH) for urgent care. The attending physician places an imaging procedure order.

600

The local PACS, acting as an XDS.b Imaging Document Consumer, performs an automated query for relevant priors within the Greater Chicago region and to the Greater Milwaukee region through an XDS.b Stored Query transaction to the local HIE-SP's XCA Initiating Gateway.

605

The Initiating Gateway in Greater Chicago queries both the local Document Registry and the Responding Gateway for Greater Milwaukee. Although no relevant priors are located in Greater Chicago region, they are located in Kenosha and in the South Milwaukee Diagnostic Imaging Center. The South Milwaukee Diagnostic Imaging Center shares images using WIA as part of the Greater Milwaukee region.

The CGH PACS, acting as an Imaging Document Consumer, sends requests for all relevant studies to Greater Chicago HIE-SP's XC-WIA Initiating Imaging Gateway which in turn contacts the Greater Milwaukee HIE-SP's XC-WIA Responding Imaging Gateway.

610 Images from the South Milwaukee Diagnostic Imaging Center retrieved from their XC-WIA Imaging Document Source.

615 Images from the Kenosha region are retrieved through the Greater Milwaukee HIE-SP’s XC-WIA Initiating Imaging Gateway, retrieving the images from the Kenosha HIE-SP’s XC-WIA Responding Imaging Gateway. The Kenosha HIE-SP XCA-I Responding Imaging Gateway, in turn, retrieves the images from Imaging Document Source imaging repositories in the Kenosha region.

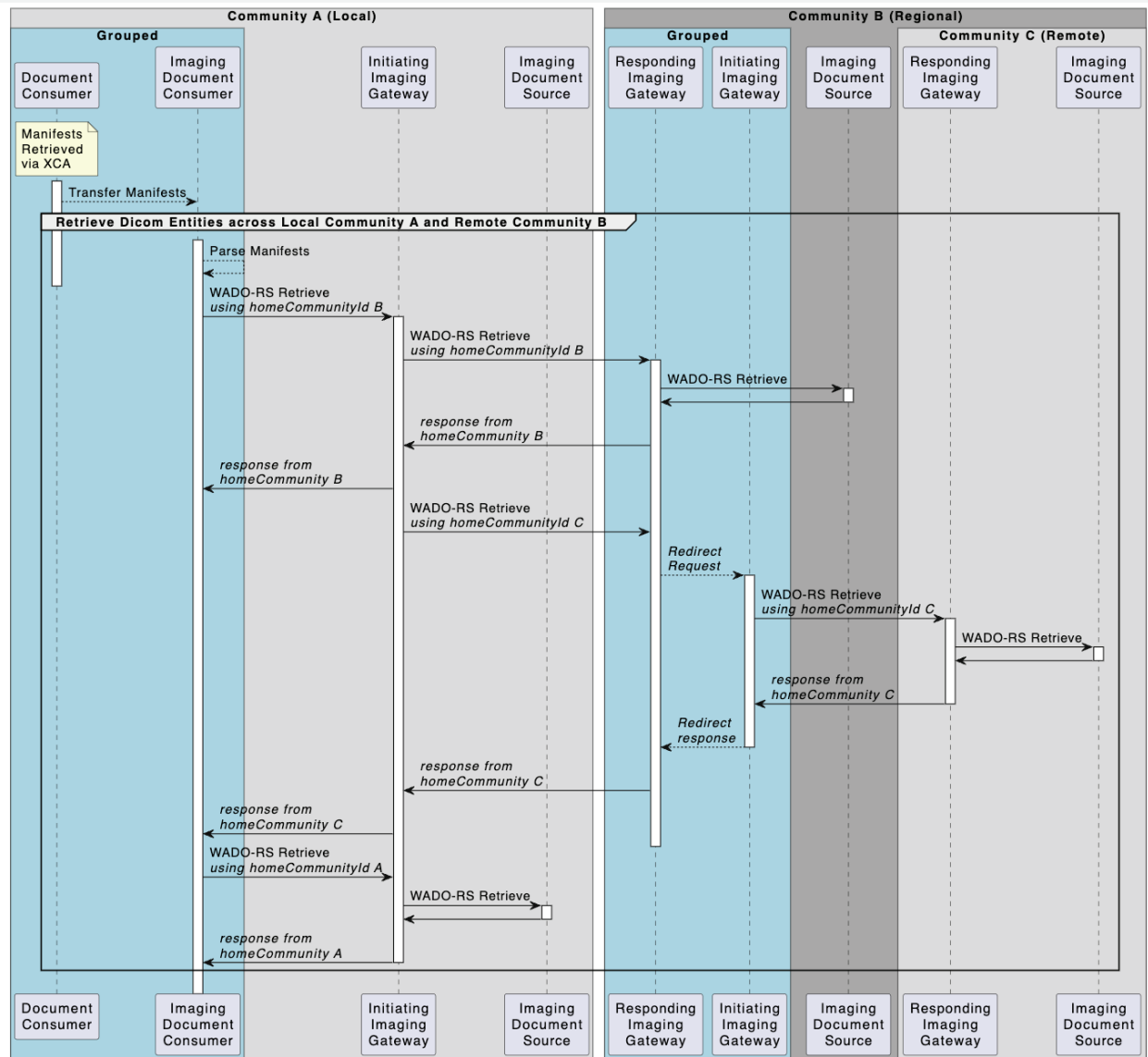


Figure X.4.2.2-3: Federated Process Flow in XC-WIA Profile



The text in Figure X.4.2.4.2-4 was used to generate the diagram in Figure 42.4.2.4.2-3. Readers will generally find the diagram more informative. The text is included here to facilitate editing.

620

```
@startuml Federated Process Flow in XC-WIA
```

```
!pragma teoz true
```

```
box "Community A (Local)"
```

625

```
box "Grouped" #LightBlue
```

```
participant "Document\nConsumer" as XDC
```

```
participant "Imaging\nDocument\nConsumer" as IDC
```

```
end box
```

```
participant "Initiating\nImaging\nGateway" as IIG
```

630

```
participant "Imaging\nDocument\nSource" as LIDS
```

```
end box
```

```
box "Community B (Regional)" #DarkGray
```

```
box "Grouped" #LightBlue
```

635

```
participant "Responding\nImaging\nGateway" as RIG
```

```
participant "Initiating\nImaging\nGateway" as IIG2
```

```
end box
```

```
participant "Imaging\nDocument\nSource" as RIDS
```

```
box "Community C (Remote)"
```

640

```
participant "Responding\nImaging\nGateway" as RIG2
```

```
participant "Imaging\nDocument\nSource" as RIDS2
```

```
end box
```

```
end box
```

645

```
note over XDC: Manifests\nRetrieved\nvia XCA
```

```
activate XDC
```

```
XDC-->IDC: Transfer Manifests
```

```
group Retrieve Dicom Entities across Local Community A and Remote Community B
```

```
activate IDC
```

650

```
IDC-->IDC: Parse Manifests
```

```
deactivate XDC
```

```
IDC->IIG: WADO-RS Retrieve\n//using homeCommunityId B//
```

```
activate IIG
```

```
IIG->RIG: WADO-RS Retrieve\n//using homeCommunityId B//
```

655

```
activate RIG
```

```
RIG->RIDS: WADO-RS Retrieve
```

```
activate RIDS
```

```
RIDS->RIG
```

```
deactivate RIDS
```

660

```
RIG->IIG://response from /\n//homeCommunity B//
```

```
IIG->IDC://response from /\n//homeCommunity B//
```

```
IIG->RIG: WADO-RS Retrieve\n//using homeCommunityId C//
```

```
RIG-->IIG2: //Redirect\n//Request//
```

```
activate IIG2
```

665

```
IIG2->RIG2: WADO-RS Retrieve\n//using homeCommunityId C//
```

```
activate RIG2
```

```
RIG2->RIDS2: WADO-RS Retrieve
```

```
activate RIDS2
```

```
RIDS2->RIG2
```

670

```
deactivate RIDS2
```

```
RIG2->IIG2://response from /\n//homeCommunity C//
```

```
deactivate RIG2
```

```
IIG2-->RIG://Redirect\n//response//
```

```
deactivate IIG2
```



```
675 RIG->IIG://response from //\n//homeCommunity C//  
IIG->IDC://response from //\n//homeCommunity C//  
deactivate RIG  
IDC->IIG: WADO-RS Retrieve\n//using homeCommunityId A//  
IIG->LIDS: WADO-RS Retrieve  
680 activate LIDS  
LIDS->IIG  
deactivate LIDS  
IIG->IDC://response from //\n//homeCommunity A//  
deactivate IIG  
685 @enduml
```

**Figure X.4.2.4.2-2: Basic Process Flow in XC-WIA Profile Pseudocode**

690 Retrieval of imaging manifests for a patient uses the set of XCA transactions performed by the XDS.b Document consumer, with which the XC-WIA Imaging Document Consumer is grouped. As a result of queries performed by the Document Consumer, the Imaging Document Consumer obtains Imaging Manifests for the patient from both Local Community A and Remote Communities B and C. See Section 29.3.2 (XCA-I) for a detailed explanation.

Retrieval of Imaging Studies referenced in Manifests is performed in the following data flow:

**Imaging Document Consumer** *wants to retrieve the studies referenced in the Imaging Manifests:*

- 695
- The Imaging Document Consumer initiates a WADO-RS Retrieve [RAD-107] requests to the Initiating Imaging Gateway.
  - The Imaging Document Consumer creates as many requests as there are discrete DICOM entities it is going to retrieve. An entity may be a study, series or an instance from a specific repository within a specific community. In other words, it is expected that to 700 retrieve all series of a study from the same location (identified by homeCommunityId + repositoryUniqueId), the Imaging Document Consumer will use a single request rather than as many requests as there are series.

**Initiating Imaging Gateway A** *processes WADO-RS Retrieve [RAD-107] –*

- 705
- The Initiation Imaging Gateway uses the homeCommunityId value to determine where to retrieve the requested DICOM entities from. Because there are no studies of interest identified in the local repositories of Community A, it initiates WADO-RS Retrieve [RAD-107] requests to the Responding Imaging Gateway of Community B as it is aware of that Responding Gateway to handle requests for the Communities B and C.

**Responding Imaging Gateway B** *processes WADO-RS Retrieve [RAD-107] –*

- 710
- The Responding Imaging Gateway processes the WADO-RS Retrieve [RAD-107] request to verify that it can resolve the homeCommunityId and repositoryUniqueId to identify the local Imaging Document Source supporting WADO-RS Retrieve [RAD-107] and sends a WADO-RS Retrieve request for data retrieval.

- 715
- If an inbound WADO-RS Retrieve request is directed to the Community C, the Responding Imaging Gateway B hands it off to the Initiating Gateway B that initiates the WADO-RS transaction to the Responding Gateway.

**Responding Imaging Gateway C processes WADO-RS Retrieve [RAD-107] –**

- 720
- The Responding Imaging Gateway processes the WADO-RS Retrieve [RAD-107] request to verify that it can resolve the homeCommunityId and repositoryUniqueId to identify the local Imaging Document Source supporting WADO-RS Retrieve [RAD-107] and sends a WADO-RS Retrieve request for data retrieval.

Ultimately, the responses from Imaging Document Sources in Communities B and C are sent back to the Imaging Document Consumer in Community A, traversing through the set of Imaging Responding Gateways.

725 **X.5 XC-WIA Security Considerations**

The XC-WIA Profile has similar security considerations to other IHE profiles that are based on HTTP or REST. See [ITI TF-2: Appendix Z.8](#) for recommendations for secure transportation, authentication, authorization, and securing patient identifiers in URLs. Implementers are encouraged to review that section for applicability to their product environment.

- 730
- All the XDS security requirements apply to an Imaging Document Consumer grouped with an XDS.b document consumer accessing XCA infrastructure. See [ITI TF-1: 10.7](#) for details.

735

Implementers may also consider implementing Cross-Origin Resource Sharing (CORS) (<https://www.w3.org/TR/cors/>) support to allow browser-based clients to retrieve information from distributed sources (for example, queries are performed on server A, and instances are downloaded from server B).

Deployments should consider whether or not:

- The Imaging Document Consumer performs user authentication to access patient data.
  - The Initiating Imaging Gateway, Responding Imaging Gateway and Imaging Document Source use credentials or tokens supplied by the Imaging Document Consumer in the WADO-RS Retrieve transaction.
  - Initiating Imaging Gateway and Responding Imaging Gateway use their own credentials or tokens when initiating the WADO-RS Retrieve transaction in response to the transaction they received.
  - The Imaging Document Consumer, Imaging Document Responder or the Imaging Document Source (or all) records access in an audit log.
- 740
- 745

This profile does not define how the Imaging Document Consumer supplies credentials to the Initiating Imaging Gateway to provide the user with a seamless "single sign-on" experience. The HTTP GET URL transaction allows for a range of authentication mechanisms, including HTTP basic authentication (over a secure connection to protect the cleartext credentials), digest

750 authentication, client certificate-based authentication, provision of a SAML assertion in an authentication header, or other mechanisms suitable for stateless atomic transactions.

The user authentication and authorization methods are outside the scope of the WIA Profile. Implementers should consider implementing the IHE ITI Profiles [Enterprise User Authentication \(EUA\)](#) and [Internet User Authorization \(IUA\)](#).

755 Implementations should also consider how availability and integrity will be protected, including intentional attacks such as maliciously crafted queries that interfere with service availability.

The WADO-RS transactions may include in their response a URL specifying where the corresponding objects can be retrieved. In the absence of protection, such as TLS, a malicious attacker may intercept the response and rewrite these URLs to a location of suspect origin. An

760 Imaging Document Consumer should verify that any received URL is valid and corresponds to a known secure location.

## **X.6 XC-WIA Cross Profile Considerations**

765 The XC-WIA Profile requires that the Initiating and Responding Imaging Gateways are used in conjunction with the XCA Initiating and Responding Gateways and be part of communities that support XDS-I.b.

XC-WIA initiating and responding communities use the XDS-I.b and XDS.b Integration Profiles to enable Imaging Document Set behavior.

Note: The XC-WIA Profile does not explicitly group the XC-WIA Initiating Imaging Gateway and XCA Initiating Gateway pair and the XC-WIA Responding Imaging Gateway and XCA Responding Gateway pair.

770

## Volume 2 – Transactions

Update Section 4.107

### 4.107 WADO-RS Retrieve [RAD-107]

#### 4.107.1 Scope

775 The WADO-RS Retrieve [RAD-107] transaction accesses DICOM SOP Instances via an HTTP interface.

#### 4.107.2 Actor Roles

The Roles in this transaction are defined in the following table and may be played by the actors shown here:

780

Table 4.107.2-1: Actor Roles

<b>Role:</b>	<b>Requester:</b> Submit retrieve DICOM object requests
<b>Actor(s):</b>	The following actors may play the role of Requester: Imaging Document Consumer <b><u>Initiating Imaging Gateway</u></b> <b><u>Responding Imaging Gateway</u></b>
<b>Role:</b>	<b>Responder:</b> Returns the requested DICOM object
<b>Actor(s):</b>	The following actors may play the role of Responder: Imaging Document Source <b><u>Initiating Imaging Gateway</u></b> <b><u>Responding Imaging Gateway</u></b>

Transaction text specifies behavior for each Role. The behavior of specific actors may also be specified when it goes beyond that of the general role.

...