

Integrating the Healthcare Enterprise



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IHE IT Infrastructure (ITI) Technical Framework Supplement 2009-2010

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Cross-Community Access (XCA)

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**Trial Implementation Supplement
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Foreword

70 Integrating the Healthcare Enterprise (IHE) is an initiative designed to stimulate the integration of the information systems that support modern healthcare institutions. Its fundamental objective is to ensure that in the care of patients all required information for medical decisions is both correct and available to healthcare professionals. The IHE initiative is both a process and a forum for encouraging integration efforts. It defines a technical framework for the implementation of established messaging standards to achieve specific clinical goals. It includes a rigorous testing process for the implementation of this framework. And it organizes educational sessions and exhibits at major meetings of medical professionals to demonstrate the benefits of this framework and encourage its adoption by industry and users.

75 The approach employed in the IHE initiative is not to define new integration standards, but rather to support the use of existing standards, HL7, DICOM, IETF, and others, as appropriate in their respective domains in an integrated manner, defining configuration choices when necessary. IHE maintain formal relationships with several standards bodies including HL7, DICOM and refers recommendations to them when clarifications or extensions to existing standards are necessary.

85 This initiative has numerous sponsors and supporting organizations in different medical specialty domains and geographical regions. In North America the primary sponsors are the Healthcare Information and Management Systems Society (HIMSS) and the Radiological Society of North America (RSNA). IHE Canada has also been formed. IHE Europe (IHE-EUR) is supported by a large coalition of organizations including the European Association of Radiology (EAR) and European Congress of Radiologists (ECR), the Coordination Committee of the Radiological and Electromedical Industries (COCIR), Deutsche Röntgengesellschaft (DRG), the EuroPACS Association, Groupement pour la Modernisation du Système d'Information Hospitalier (GMSIH), Société Française de Radiologie (SFR), Società Italiana di Radiologia Medica (SIRM), the European Institute for health Records (EuroRec), and the European Society of Cardiology (ESC). In Japan IHE-J is sponsored by the Ministry of Economy, Trade, and Industry (METI); the Ministry of Health, Labor, and Welfare; and MEDIS-DC; cooperating organizations include the Japan Industries Association of Radiological Systems (JIRA), the Japan Association of Healthcare Information Systems Industry (JAHIS), Japan Radiological Society (JRS), Japan Society of Radiological Technology (JSRT), and the Japan Association of Medical Informatics (JAMI). Other organizations representing healthcare professionals are invited to join in the expansion of the IHE process across disciplinary and geographic boundaries.

95 100 The IHE Technical Frameworks for the various domains (IT Infrastructure, Cardiology, Laboratory, Radiology, etc.) defines specific implementations of established standards to achieve integration goals that promote appropriate sharing of medical information to support optimal patient care. It is expanded annually, after a period of public review, and maintained regularly through the identification and correction of errata. The current version for these Technical Frameworks may be found at www.ihe.net/Technical_Framework.

The IHE Technical Framework identifies a subset of the functional components of the healthcare enterprise, called IHE Actors, and specifies their interactions in terms of a set of coordinated, standards-based transactions. It describes this body of transactions in progressively greater

110 depth. The volume I provides a high-level view of IHE functionality, showing the transactions
organized into functional units called Integration Profiles that highlight their capacity to address
specific clinical needs. The subsequent volumes provide detailed technical descriptions of each
IHE transaction.

115 This IHE IT Infrastructure Technical Framework Supplement is issued for Trial Implementation
through April 2010.

Comments and change proposals arising from Trial Implementation may be
submitted to <http://forums.rsna.org> under the forum:

“Integrating the Healthcare Enterprise”

Select the sub-forum:

120 ***“IHE IT Infrastructure 2009-2010 Supplement for Trial Implementation”***

The IHE IT Infrastructure Technical Committee will address these comments resulting from
implementation, Connectathon testing, and demonstrations such as HIMSS 2010.

Introduction

125 The Cross-Community Access profile supports the means to query and retrieve patient relevant
130 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 clinical information via an established mechanism. Facilities/enterprises may
host any type of healthcare application such as EHR, PHR, etc. A community is identifiable by a
globally unique id called the homeCommunityId. Membership of a facility/enterprise in one
community does not preclude it from being a member in another community. Such communities
may be XDS Affinity Domains which define document sharing using the XDS profile or any
other communities, no matter what their internal sharing structure.

135 This profile is compatible with the XDS.b supplement released in the same year. It is not
compatible and will not be retrofitted to the XDS.a transactions where they are different from
XDS.b. The significant effect of this is that this profile does not support the XDS.a style retrieve
(HTTP GET) but only the XDS.b retrieve which relies on MTOM. Please refer to the XDS.b
supplement for more information.

140 In 2006, a White Paper was developed by the ITI Technical Committee proposing a set of
profiles that should be developed to allow cross-community patient data access. This profile is
the Cross-Community Access profile described in the White Paper. For more details please
refer to the Cross-Community White Paper which can be accessed at
http://www.ihe.net/Technical_Framework/index.cfm#IT.

1.1 Open Issues and Questions

145 **XCA002:** Support significant delay in response - The current XDS Stored Query does not allow
the requester to specify a timeout value for a time frame where a subset of data is returned. The
requestor has the choice of aborting an existing request, thus getting nothing, or waits for as long
as it takes to get everything. For example, a requestor may want to get as many results as
possible in one minute. Current support allows for canceling the request at one minute - hence
getting nothing - or waiting for as long as it takes to get everything. In a multiple Affinity
150 Domain environment it is perceived to be more important that the requestor can specify a time
frame to receive partial results. It has been suggested that this is a problem that does not need to
be solved. The VA has collected statistics regarding its multi-domain healthcare system which
states that the average delay is 6-7 seconds as measured at the initiating gateway.

155 It has been suggested that performance improvements result if the gateways involved in the
transport are forwarding data as it is received, rather than collecting it locally and forwarding
once all is received. The underlying transport (i.e. HTTP or equivalent) should support the
ability for the gateway to send blocks of data as it is received, even though the higher level
transport (SOAP) sees this as a single synchronous response.

160 Supporting an asynchronous mode for the transactions is another solution to consider. In this
case the requestor would not have to wait for the response, but would be notified later once the
complete response was collected. This has some performance benefits but does not solve the

user's problem of having to wait for all the data to arrive. The delay is still experienced by the end user (or application).

165 **XCA015:** Specifying homeCommunityId on query: The Registry Stored Query syntax is dependent on ebXRS query support, which defines a schema where parameters are specified in slots. Our desire is to define a way for a set of pairs, where each uniqueID/entryUUID is grouped with a homeCommunityId. Several techniques for this were considered but none stood out as a clear direction. There is also Change Proposal work expected next year that may show a direction for this type of problem. For all these reasons, we have decided that for this season
170 there can only be one homeCommunityId per query. Thus Document Consumers must break up queries to multiple homeCommunityId values into multiple query instances. We assess this restriction as a minor one and expect that as the query syntax is modified to support more complex queries this problem will also be solved.

1.2 Closed Issues

175 **XCA001:** Support large volume data - The current XDS Stored Query assumes all data is returned in one synchronous response. It is expected that queries spanning multiple Affinity Domains will result in larger sets of data and it is a requirement that the requestor be able to request that results be chunked in the response. The ebRS Stored Query "Query Iteration" function was considered to accommodate this requirement. While this functionality solves part
180 of the requirement there were many issues that the standard did not resolve. After extensive discussion it was agreed that chunking was already supported by the Stored Query Transaction in two ways:

- A find documents query can request only object references and then retrieve objects separately. This allows for a paging ability where the first request gets all references and
185 subsequent requests get a "page" at a time.
- A find documents query can be refined to select a smaller group of documents, either a smaller time range or restriction on document type or other class of documents.

If a request is received which is too big the gateway processing the request will return an error value which will indicate that the request returned too many records. This will be returned to the
190 requestor who can then refine the query so fewer records are returned. Because chunking algorithms are complicated it is agreed that it does not make sense to design a solution until a clear, demonstrated use case experienced in a real implementation is defined.

195 **XCA003:** Ordering of query response data - The XDS Stored Query does not specify any ordering to the query results. Ordering of results is seen as very important but technically difficult in a cross XDS Affinity Domain environment. To support a sorted query result the gateway must get all results from all XDS Affinity Domains and perform the sort against all results before anything is returned. This will result in a potentially long delay in receiving results. Agreed that given that chunking will not be supported it is reasonable to require the consumer to do any sorting that is required.

200 **XCA004:** Error handling - Neither the ebXML specification or XDS deals specifically with a situation when results plus errors are both returned. In a cross XDS Affinity Domain environment this situation is much more prevalent, coming up whenever the gateway is able to

reach some of the other XDS Affinity Domains and not others. In this case the gateway should return both the results received as well as a message explaining that some XDS Affinity
205 Domains could not be reached. Agreed to include details regarding error messages. Will follow the description in CP 28 which includes the new status return value of partial success.

XCA005: Unique Identification of Patient - Ensuring unique patient identification involves a set of issues to be addressed next year. To integrate disparate regional domains, there's a need to minimize redundancy and provide acceptable performance accessibility. The process of
210 determining which communities to query must be fully addressed as well. For this year we can require that the gateway must ensure that the patient has been uniquely identified prior to the gateway-to-gateway query and leave out of scope how exactly the gateway does that.

XCA006: Interaction with XDS – The interaction between gateways and Registry/Repository has been detailed in a process flow, effectively the gateway acts as a Document Consumer when interacting with the Registry and Repository. See XCA014 for interactions with the XDS
215 Document Consumer.

XCA010: How to handle vocabulary differences across communities. Agreed that scoping for this year will assume all sharing communities are using the same coding vocabulary for metadata elements.

220 **XCA007:** Managing metadata – at issue is the technique used by the gateway on resolving references provided in document entry metadata to the originating gateway. This issue comes up in two situations:

- **EntryUUID&UniqueID** - EntryUUID and UniqueID are values in the ExtrinsicObject which can be used in subsequent queries. When the gateway receives a query which only
225 references one of these values it needs to know which gateway to route the request to. The resolution is that the gateway adds to each ExtrinsicObject and ObjectRef the “home” attribute supported by ebXML which references the gateway the object was received from. This home attribute would then be returned as part of the query parameters for the gateway to resolve.
- **Document reference** - The XCA profile will only support the new Web Services based Retrieve, called Retrieve Document Set, which specifies a document uniqueId and repository id. The gateway will need to translate these elements into the gateway which holds the document being retrieved. This profile requires the consumer to specify the “home” element (described above) in the retrieve transaction.

235 Issue resolved by requiring “home” to be specified in the return from the query in all appropriate elements and requiring subsequent queries by ID to include “home”. Also require retrieve to include home in the request.

XCA008: Need Risk Analysis Section to be completed. DONE

240 **XCA009:** Need description of audit messages. Audit information added which refers to base transaction audit requirements and does not extend.

XCA011: How to define the mapping from the home attribute to the gateway to be contacted about that home? Resolved the following:

- Static association cached in the gateway: the gateway is required to route subsequent requests including the home attribute to the same “place” that it was received from. This requires the gateway to remember what that place was, and know how to route both subsequent queries and retrieves to that place. The gateway would need to cache this association, probably forever.

XCA013: Should the transactions defined (Gateway Query, Cross Gateway Query, Gateway Retrieve, Cross Gateway Retrieve) be new transactions, or re-use of existing transactions with extra requirements? Agreed that the Stored Query and Retrieve Document Set transactions will be re-used for consumer/gateway interaction, but the transactions between gateways will remain as new transactions.

XCA014: Request that the Document Consumer defined in the XCA profile be identical (or nearly identical) to the Document Consumer defined in the XDS.b profile. To accomplish the Registry Stored Query and the Retrieve Document Set transactions have been updated by this supplement to require the Document Consumer to propagate the homeCommunityId attribute, if present, from a Registry Stored Query response into a subsequent query or retrieve. This is a requirement of the Document Consumer whether it is implementing the XCA or XDS.b profiles. The implication of this change is that compliance with the XDS.b Document Consumer implies compliance with the XCA Document Consumer. The effects of this on the Retrieve Document Set transaction are described in the XDS.b supplement.

XCA012: Asynchronous transactions: Should the query and retrieve transactions have an asynchronous mode? The following use cases related to this have been considered:

1. Support large volume data – see closed issue XCA001
2. Support significant delay in response – see open issue XCA002
3. Support messaging systems which prefer to operate only in an asynchronous mode

The last use case (others addressed under other issue items) has been addressed by applying the 2008 Supplement on Asynchronous Web Services Exchange to XCA. The rationale for this requirement is that if asynchronous messaging was supported this would allow a class of systems to make use of the transactions defined in this profile. Support for a single request with a single response pattern is well described in several places. What requires greater specification would be to support a single request followed by a series of responses. A detailed description of the technical steps of a standards based approach for doing this has not agreed to nor identified in detail. To support requirements #1 and #2 support for multiple responses is required. If the only required use case is #3 then support for a request followed by a single response asynchronous message pattern would satisfy the requirements. Further analysis of the requirements is needed to ensure that the solution satisfies. Given the problems to be addressed and in order to gain more understanding of the use of this profile it is proposed that defining an asynchronous transport for the transactions be deferred for future year work.

280 **2 Profile Abstract**

Add the following to Section 3 Profile Abstract:

285 The Cross-Community Access 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 clinical information via an established mechanism. Facilities/enterprises may
290 host any type of healthcare application such as EHR, PHR, etc. A community is identifiable by a
globally unique id called the homeCommunityId. Membership of a facility/enterprise in one
community does not preclude it from being a member in another community. Such communities
may be XDS Affinity Domains which define document sharing using the XDS profile or any
other communities, no matter what their internal sharing structure.

3 Glossary

Add the following to Section 4 Glossary:

295 **Community:** 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 clinical information via
an established mechanism. Facilities/enterprises may host any type of healthcare application
such as EHR, PHR, etc. A community is identifiable by a globally unique id called the
homeCommunityId. Membership of a facility/enterprise in one community does not preclude it
300 from being a member in another community. Such communities may be XDS Affinity Domains
which define document sharing using the XDS profile or any other communities, no matter what
their internal sharing structure.

homeCommunityId: A globally unique identifier for a community. It is used in XCA to obtain
the Web Services endpoint of services that provide access to data in that community.

Volume I – Integration Profiles

305 *This section describes the changes required in Volume I of the Technical Framework that result from including this Integration Profile.*

History of Annual Changes

<Brief description of what to add to Volume I, section 1.7 which gives a brief overview of “what’s new” in the given year of the Technical Framework.>

Add the following bullet to the end of the bullet list in Section 1.7

- 310
- Added the XCA Profile which defines transactions for query and retrieve of documents outside of a local community.

Add the following section to Table 2-1 Integration Profiles Dependencies in Section 2.1

Cross-Community Access (XCA)	Audit Trail and Node Authentication	Each XCA Actor shall be grouped with Secure Node Actor or Secure Application	Required to manage audit trail of exported PHI, node authentication and transport encryption.
Cross-Community Access (XCA)	Consistent Time	Each XCA Actor shall be grouped with the Time Client Actor.	To ensure consistency among document and submission set dates.

315 *Add the following Section to section 2.2*

2.2.18 XCA Integration Profile

320 The Cross-Community Access 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 clinical information via an established mechanism. Facilities/enterprises may host any type of healthcare application such as EHR, PHR, etc. A community is identifiable by a globally unique id called the homeCommunityId. Membership of a facility/enterprise in one community does not preclude it from being a member in another community. Such communities may be XDS Affinity Domains which define document sharing using the XDS profile or any other communities, no matter what their internal sharing structure.

325

The section shall be added to Vol 1

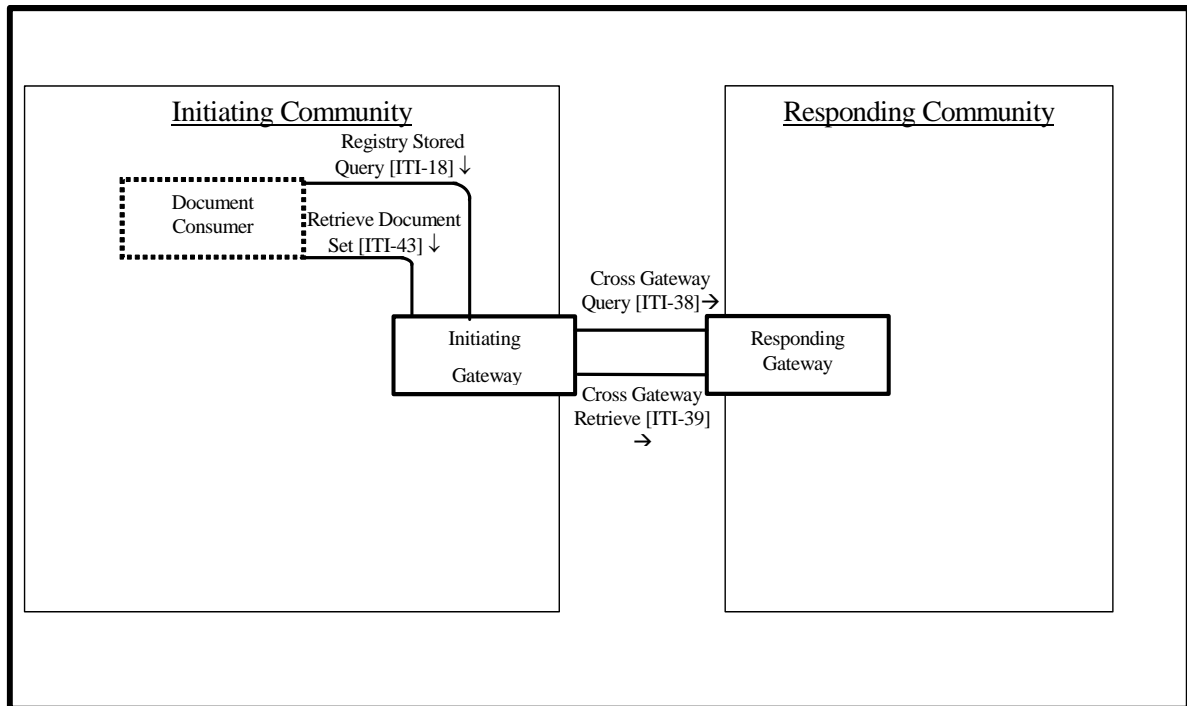
18 XCA Integration Profile

330 The Cross-Community Access 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 clinical information via an established mechanism. Facilities/enterprises may
 host any type of healthcare application such as EHR, PHR, etc. A community is identifiable by a
 globally unique id called the homeCommunityId. Membership of a facility/enterprise in one
 335 community does not preclude it from being a member in another community. Such communities
 may be XDS Affinity Domains which define document sharing using the XDS profile or any
 other communities, no matter what their internal sharing structure.

18.1 Actors/ Transactions

340 Figure 18.1-1 shows the actors directly involved in the XCA Integration Profile and the relevant
 transactions between them.

Note: The Document Consumer Actor is shown in Figure 18.1-1 to clarify the responsibility of
 the XDS Affinity Domain Option discussed in Section 18.2.



345 **Figure 18.1-1. XCA Actor Diagram**

Table 18.1-1 lists the transactions for each actor directly involved in the XCA Profile. In order to claim support of this Integration Profile, an implementation must perform the required transactions (labeled “R”). Transactions labeled “O” are optional. A complete list of options

350 defined by this Integration Profile and that implementations may choose to support is listed in Section 18.2.

Table 18.1-1. XCA Integration Profile - Actors and Transactions

Actors	Transactions	Optionality	Section
Initiating Gateway	Cross Gateway Query [ITI-38]	R	ITI TF-2b: 3.38
	Cross Gateway Retrieve [ITI-39]	R	ITI TF-2b: 3.39
	Registry Stored Query [ITI-18]	O	ITI TF-2a: 3.18
	Retrieve Document Set [ITI-43]	O	ITI TF-2b: 3.43
Responding Gateway	Cross Gateway Query [ITI-38]	R	ITI TF-2b: 3.38
	Cross Gateway Retrieve [ITI-39]	R	ITI TF-2b: 3.39

Note: When an Initiating or Responding Gateway is grouped with a Document Consumer, there are additional requirements. See Section 18.2.3 for a description of grouping.

355

18.2 XCA Integration Profile Options

Options that may be selected for this Integration Profile are listed in the Table 18.2-1 along with the Actors to which they apply. Dependencies between options when applicable are specified in notes.

360

Table 18.2-1 XCA Integration Profile - Actors and Options

Actor	Options	Vol & Section
Initiating Gateway	<i>XDS Affinity Domain Option</i>	ITI TF-1: 18.2.1
	<i>Asynchronous Web Services Exchange</i>	ITI TF-1: 18.2.2
Responding Gateway	<i>No options defined</i>	--

18.2.1 XDS Affinity Domain Option

Initiating Gateways which support the XDS Affinity Domain Option interact with Document Consumers within the XDS Affinity Domain served by the Initiating Gateway.

Initiating Gateway actors which support this option:

- 365
- shall **receive** Registry Stored Query [ITI-18] transactions from a local Document Consumer actor and act on those requests on behalf of the Document Consumer. When receiving a Registry Stored Query from a local Document Consumer, shall require the homeCommunityId as an input parameter on relevant queries, and shall specify the homeCommunityId attribute within its Registry Stored Query responses. See Section 18.3.2
- 370
- shall **receive** Retrieve Document Set [ITI-43] transactions from a local Document Consumer actor and act on those requests on behalf of the Document Consumer. When receiving a Retrieve Document Set from a local Document Consumer, shall require the homeCommunityId as an input parameter.

375 When an Initiating Gateway does not support the XDS Affinity Domain option it is expected to be using non-IHE specified interactions to communicate remote community data to systems within its local community. These proprietary interactions are not further described within any IHE profile.

See the relevant transactions for further details regarding the homeCommunityId attribute.

380 **18.2.2 Asynchronous Web Services Exchange Option**

Initiating Gateways which support Asynchronous Web Services Exchange shall support Asynchronous Web Services Exchange on the Cross Gateway Query [ITI-38] and Cross Gateway Retrieve [ITI-39] transactions. If the Initiating Gateway supports both the XDS Affinity Domain Option and the Asynchronous Web Services Option it shall support
385 Asynchronous Web Services Exchange on the Registry Stored Query [ITI-18] and Retrieve Document Set [ITI-43] transactions.

18.2.3 Grouping Rules

Grouping with a Document Consumer Actor is used in situations where an Initiating Gateway and/or Responding Gateway are supporting an XDS Affinity Domain

390 When an Initiating Gateway is supporting an XDS Affinity Domain, it can choose to query and retrieve from local actors in addition to remote communities. This is accomplished by grouping the Initiating Gateway Actor with a Document Consumer Actor. This grouping allows Document Consumers such as EHR/PHR/etc systems to query the Initiating Gateway to retrieve document information and content from both the local XDS Affinity Domain as well as remote
395 communities. For details see Section 18.2.3.1. An Initiating Gateway Actor that is not grouped with a Document Consumer Actor is only able to return results from remote communities, so local EHR/PHR/etc systems (Document Consumer Actors) must direct separate query and document retrieve transactions internally and externally.

400 When a Responding Gateway is supporting an XDS Affinity Domain, it may resolve Cross Gateway Query and Cross Gateway Retrieve Transactions by grouping with a Document Consumer Actor and using the Registry Stored Query and Retrieve Document Set transactions. For details see 18.2.3.2

18.2.3.1 Initiating Gateway grouped with Document Consumer

Initiating Gateways that are grouped with a Document Consumer:

- 405 • shall support the XDS Affinity Domain option
- shall **initiate** Registry Stored Query [ITI-18] transactions to a local Document Registry to query local information in response to a received Registry Stored Query [ITI-18] from a local Document Consumer.
- 410 • shall **initiate** Retrieve Document Set [ITI-43] transactions to a local Document Repository in response to a received Retrieve Document Set from a local Document Consumer which contains a homeCommunityID indicating the local community.

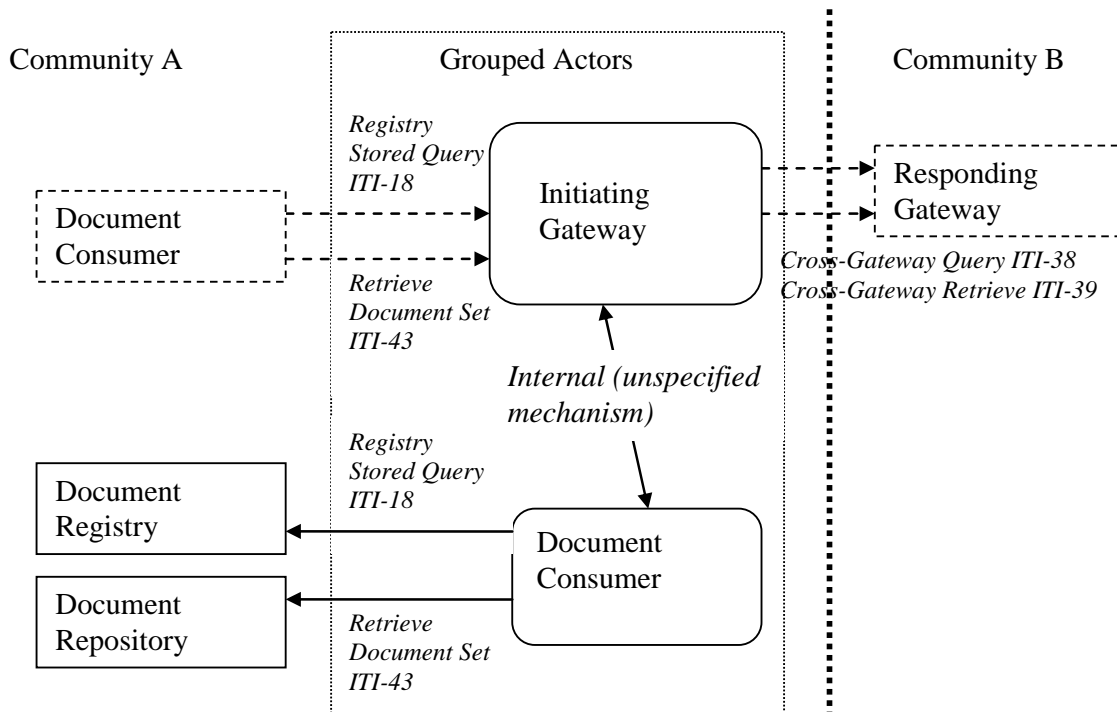


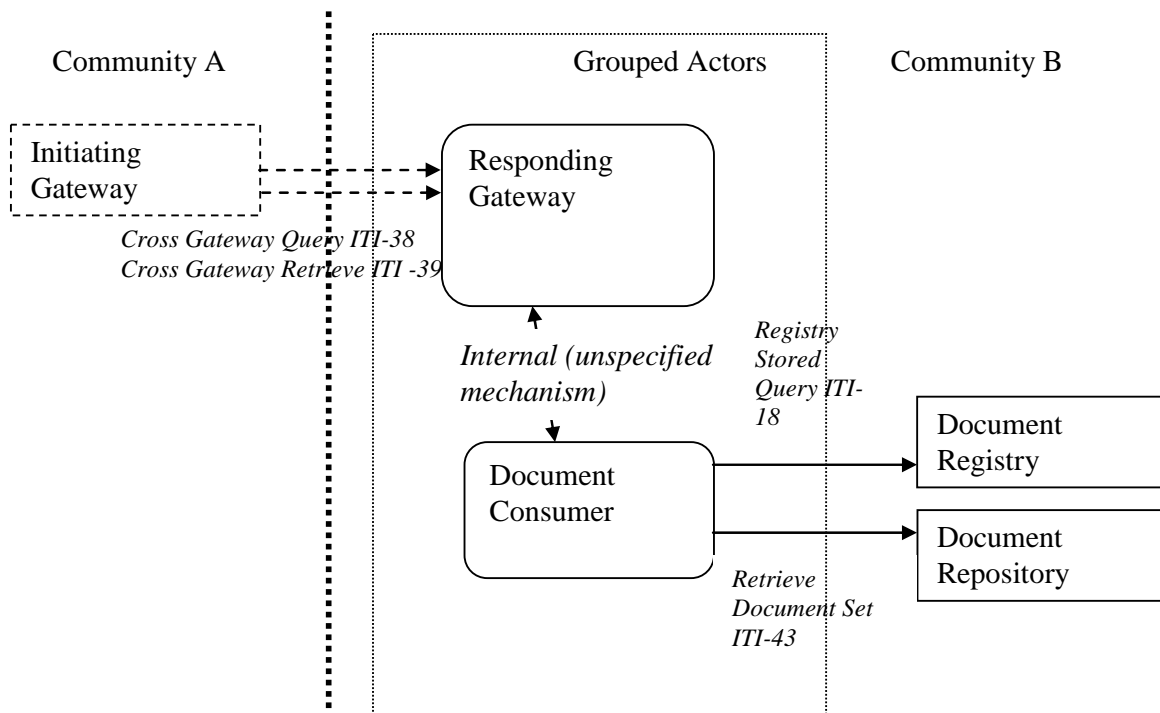
Figure 18.2-1. Initiating Gateway grouped with Document Consumer

415 **18.2.3.1 Responding Gateway grouped with Document Consumer**

Responding Gateways that are grouped with a Document Consumer:

- shall **initiate** a Registry Stored Query [ITI-18] transaction to a local Document Registry to query local information in response to a received Cross Gateway Query [ITI-38]. The Document Registry response must be augmented with the homeCommunityId of the Responding Gateway's community prior to returning in the response to the Cross Gateway Query.
- shall **initiate** a Retrieve Document Set [ITI-43] transaction to a local Document Repository to retrieve local information in response to a Cross Gateway Retrieve [ITI-39].

425 When a Responding Gateway is not grouped with a Document Consumer actor it is expected to be using non-IHE specified interactions to collect local information in response to a Cross Gateway Query or Cross Gateway Retrieve. These proprietary interactions are not further described within any IHE profile.



430

Figure 18.2-2. Responding Gateway grouped with Document Consumer

18.3 XCA Process Flow

18.3.1 Use Cases

435 Assume within a given domain, such as the State of California, we have several healthcare communities (or XDS Affinity Domains or RHIOs). One in Los Angeles is based on IHE-XDS. One in Sacramento is based on another form of healthcare sharing infrastructure. One in San Francisco is also based on IHE-XDS. A patient X, who travels frequently, has received healthcare in each of these communities. Patient X is admitted to a hospital in LA. The attending physician uses his hospital information system to query across multiple domains for healthcare information about this patient. Once found, references to patient data outside the local domain are cached locally for easy future reference.

440

18.3.2 homeCommunityId defined

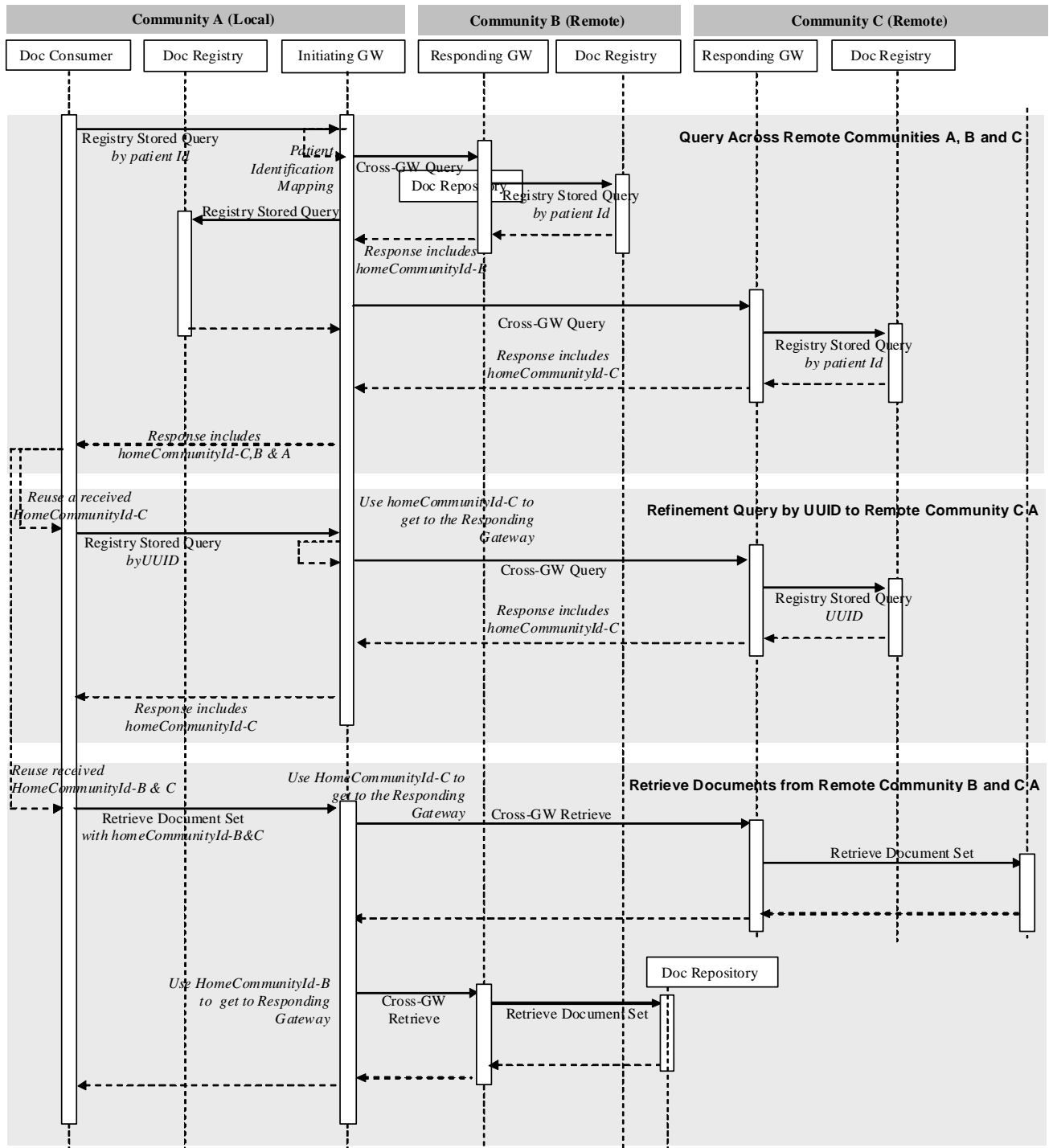
445 This profile makes use of a homeCommunityId value which is a globally unique identifier for a community and is used to obtain the Web Services endpoint of services that provide access to data in that community. Specifically:

- It is returned within the response to Cross Gateway Query and Registry Stored Query transactions to indicate the association of a response element with a community. Document Consumers process the value in the response as an opaque unique identifier.

- 450
- It is an optional parameter to Registry Stored Query requests, not requiring a patient id parameter, and Retrieve Document Set requests to indicate which community to direct the request.
 - It is used by Initiating Gateways to direct requests to the community where the initial data originated.

18.3.3 Detailed Interactions

455 The following diagram presents a high level view of the interactions between actors when both initiating and responding communities are XDS Affinity Domains i.e. use of the XDS Affinity Domain option and the Initiating Gateway and Responding Gateway are each grouped with a Document Consumer. Details on each interaction follow the diagram.



460

Figure 18.3.3: XCA Detailed Interactions

- **Document Consumer** initiates a *Registry Stored Query* request by patient id – the Document Consumer initiates the initial transaction by formatting a Registry Stored Query request by patient identifier. The consumer uses PDQ, PIX or some other means to identify the XDS Affinity Domain patient id, formats that information plus any other query

- 465 parameters into a Registry Stored Query request and sends this request to an Initiating Gateway.
- 470 • **Initiating Gateway processes Registry Stored Query by patient id request** – The Initiating Gateway receives a Registry Stored Query by patient id and must determine a) which Responding Gateways this request should be sent to b) what patient id to use in the Cross Gateway Queries. Detailed specification of these steps is not in the intended scope of this profile. Combination of this profile with other existing profiles (e.g. PIX/PDQ), future profiles or configuration mechanisms is possible. Please refer to ITI TF-2x: E.7 *XCA and Patient Identification Management* for possible use of existing profiles PIX and PDQ. For each Responding Gateway identified, the Initiating Gateway shall update the query with the correct patient identifier corresponding to the Responding Gateway’s community and initiates a Cross Gateway Query transaction to the Responding Gateway. If the Initiating Gateway is grouped with a Document Consumer it shall also initiate a Registry Stored Query to the local Document Registry.
 - 480 • **Responding Gateway processes Cross Gateway Query by patient id** – The Responding Gateway within an XDS Affinity Domain processes the Cross Gateway Query by using grouping as a Document Consumer and initiates a Registry Stored Query to the local Document Registry. The Responding Gateway shall update the response from the Document Registry to ensure that the homeCommunityId is specified on every applicable element. This updated response is sent as the response to the Cross Gateway Query.
 - 485 • **Initiating Gateway processes Cross Gateway Query by patient id responses** – The Initiating Gateway collects the responses from all Responding Gateways it contacted. For each response it shall verify homeCommunityId is present in each appropriate element. If the Initiating Gateway initiated a Registry Stored Query to the local Document Registry it shall update the response to that transaction to contain the homeCommunityId value associated with the local community. Once all responses are received the Initiating Gateway consolidates all updated response data into one response to the Document Consumer. The Initiating Gateway shall return to the Document Consumer the same homeCommunityId attribute values that it received from Responding Gateways.
 - 490 • **Document Consumer receives Registry Stored Query by patient id response** – The Document Consumer receives the results of the query from the Initiating Gateway and must account for two unique aspects of the response; namely that a) the homeCommunityId attribute will be specified and b) the Document Consumer may not be able to map the repository id value directly to the Document Repository. There shall be a common coding/vocabulary scheme used across all communities. For example, all communities shall have common privacy consent vocabularies. The Document Consumer shall retain the values of the homeCommunityId attribute for future interaction with the Initiating Gateway.
 - 500 • **Document Consumer initiates a Registry Stored Query by UUID** – Many Registry Stored Queries do not include patient id as a parameter, but instead require one of the entryUUID or uniqueID parameters, generically referred to as UUID. Both of these values are returned as part of the metadata from a query by patient id. The Document Consumer may do a patient id query to the Initiating Gateway prior to a query by UUID or shall have access to the correct homeCommunityId through some other means. In either case the consumer has the homeCommunityId attribute and shall specify it as a parameter of the query. The Document
 - 505

- 510 Consumer puts the homeCommunityId and UUID values plus any other query parameters into a Registry Stored Query request and sends this request to an Initiating Gateway.
- 515 • **Initiating Gateway processes Registry Stored Query by UUID request** – The Initiating Gateway receives a Registry Stored Query by UUID and determines which Responding Gateway to contact by using the homeCommunityId to obtain the Web Services endpoint of the Responding Gateway. The process of obtaining the Web Services endpoint is not further specified in this profile. If the homeCommunityId represents the local community the Initiating Gateway will initiate a Registry Stored Query to the local Document Registry. The Initiating Gateway shall specify the homeCommunityId in the Cross Gateway Query by UUID which is associated with the Responding Gateway.
 - 520 • **Responding Gateway processes Cross Gateway Query by UUID** – The Responding Gateway within an XDS Affinity Domain processes the Cross Gateway Query by grouping as a Document Consumer and initiating a Registry Stored Query to the local Document Registry. The response to the Cross Gateway query shall contain the homeCommunityId of the responding community. This processing is identical to processing of the Cross Gateway Query by patient id.
 - 525 • **Initiating Gateway receives Cross Gateway Query by UUID response** – The processing of a Cross Gateway Query by UUID response is identical to the processing of a Cross Gateway Query by patient id response, except there is only one response, so consolidation of responses is not needed.
 - 530 • **Document Consumer receives Registry Stored Query by UUID response** – The processing of a Registry Stored Query by UUID response is identical to the processing of a Registry Stored Query by patient id response.
 - 535 • **Document Consumer initiates a Retrieve Document Set** – Prior to issuing a Retrieve Document Set the Document Consumer may issue a Registry Stored Query by patient id to the Initiating Gateway. The response to the Registry Stored Query by patient id or subsequent Registry Stored Query by UUID includes a) the document unique ID b) the repository unique ID c) the homeCommunityId attribute. If the Document Consumer did not issue a Registry Stored Query which returned this information then it shall have acquired the information through some other means. The Document Consumer shall specify these three parameters in its Retrieve Document Set transaction to the Initiating Gateway.
 - 540 • **Initiating Gateway processes Retrieve Document Set** – The Initiating Gateway determines which Responding Gateways to contact by using the homeCommunityId to obtain the Web Services endpoint of the Responding Gateway. If the homeCommunityId represents the local community the Initiating Gateway will initiate a Retrieve Document Set to a local Document Repository. The Retrieve Document Set may contain more than one unique
545 homeCommunityId so the Initiating Gateway shall be capable of initiating requests to more than one Responding Gateway and consolidating the results. The Initiating Gateway shall specify the homeCommunityId in the Cross Gateway Retrieve which identifies the community associated with the Responding Gateway.
 - 550 • **Responding Gateway processes Cross Gateway Retrieve** – The Responding Gateway within an XDS Affinity Domain processes the Cross Gateway Retrieve by grouping as a Document Consumer and initiating a Retrieve Document Set transaction to the Document Repository

identified by the repository unique ID within the request. If the Cross Gateway Retrieve requests multiple documents with different repository unique IDs, the Responding Gateway shall contact multiple Document Repositories and consolidate the responses.

555 **18.4 XCA Security Considerations**

18.4.1 XCA Risk Assessment

The risk analysis for XCA enumerates assets, threats, and mitigations. The complete risk data is stored and maintained in a central location. The complete risk data is stored and available from IHE¹.

560 The purpose of this risk assessment is to notify vendors of some of the risks that they are advised to consider in implementing XCA actors. For general IHE risks and threats please see ITI TF-1: Appendix L. The vendor is also advised that many risks can not be mitigated by the IHE profile and instead the responsibility for mitigation is transferred to the vendor, and occasionally to the XDS Affinity Domain and enterprises. In these instances, IHE fulfills its responsibility to notify
565 affected parties through the following section.

18.4.2 Requirements/Recommendations

The following mitigations shall be implemented by all XCA actors. These mitigations moderate all high impact risks.

- 570 • M1: All actors in XCA shall be grouped with an ATNA Secure Node actor and a CT Time Client actor.
- M2: Document metadata shall include a SHA1 hash of the document content. Applications shall have the ability to verify the SHA1 hash of the document with the SHA1 hash in the metadata, if corruption detection is requested.
- 575 • M3: Document Consumer implementations shall handle overloading through excessive volume of response data by discontinuing the read on the socket and closing it. The Initiating and Responding Gateways shall respond to disconnection by discontinuing processing of responses.
- M4: Document Consumer implementations shall not issue a Registry Stored Query that is not patient specific, i.e. it shall either supply a patient identifier or a unique document entry
580 identifier.
- **M6**: Queries of unknown patient identifiers shall return zero documents with no further information. This applies to patient identifiers that are properly formatted or improperly formatted. By not defining an error code indicating that the identifier is ill-formatted, you are reducing the ability of applications to fish for data. This applies to Document Registries
585 and Responding Gateways, if appropriate.

¹ The risk analysis data may be found at: ftp://ftp.ihe.net/IT_Infrastructure/iheityr5-2007-2008/Technical_Cmte/Profile_Work/XC/XCARiskAnalysis.xls

The following mitigations address the risk of a document being maliciously changed. This mitigation is optional.

- **M5:** Documents may be digitally signed using the DSG profile

590 The following mitigations are transferred to the vendors, XDS Affinity Domains, and enterprises.

- **T1:** Backup systems for registry metadata, repository documents, and gateway configuration are recommended.
- **T2:** All implementations are recommended to ensure that all received data is propagated appropriately (i.e. without corruption and complete results) or an error is presented.
- 595 • **T3:** Network protection services are recommended to be sufficient to guard against denial of service attacks on all service interfaces.
- **T4:** A process that reviews audit records and acts on inappropriate actions is recommended.
- **T5:** It is recommended that service interfaces be implemented with a good design to guard
- 600 against corruption and denial of service attacks

18.4.3 Policy Choices

Policy choices will not be addressed by this profile. Each community may have different policies. The profile has been designed with this fact in mind and an understanding of enough

605 variety of policies so that any reasonable policy can be implemented without violating the profile.

<p><i>Update the NAV Supplement (if it still exists) to change the “Profile Abstract” section (line 110) as follows. If NAV has been integrated as Final Text this update is no longer necessary.</i></p>

610

Profile Abstract

The capability for automation of critical workflows used in healthcare has been greatly advanced by the introduction of the Cross-Enterprise Document Sharing Integration Profile. However, without point-to-point notification of document availability, these workflows still require manual

615 interactions between parties using document sharing.

The Notification of Document Availability Integration Profile (NAV) introduces a mechanism allowing notifications to be sent point-to-point to systems and users within an affinity domain **or** **between different affinity domains**, eliminating the need for manual steps or polling mechanisms. This basic mechanism is only intended to facilitate the common part of a large

620 range of workflows related to notifying a remote party (user or system) that one or more documents have been registered in an XDS Registry and may be retrieved if the notified party wishes.

625 **Volume I – Integration Profiles**

Update the following bullet Section 1.7 History of Annual Changes line 135

Added the Notification of Document Availability Profile that supports point-to-point notifications within an XDS affinity domain **or between different affinity domains.**

630

Update the NAV Profile Section 2.5.5 line 140 as follows.

2.5.5 Notification of Document Availability (NAV)

635 The NAV Profile defines a mechanism for point-to-point notifications between systems or users within an XDS Affinity Domain **or between different XDS Affinity Domains.**

Update the NAV Profile Section 12 line 147 as follows.

64012 Notification of Document Availability (NAV) Integration Profile

The NAV Profile defines a mechanism for point-to-point notifications between systems or users within an XDS Affinity Domain **or between different XDS Affinity Domains**. These notifications can be used to trigger various activities within applications that implement both XDS and NAV. The Notification of Document Availability Profile specifies the use of SMTP and related standards for sending notifications, and the XML Digital Signature Core for creating a manifest of documents which are the subject of the notification.

~~Within a single XDS Affinity Domain, t~~This profile may be used to support:

1. Responses to requests for records between providers.
2. Referrals between providers.
- 650 3. Guiding Patients in accessing specific parts of their health records.

The Notification of Document Availability Profile (NAV) defines the format, content, encoding and transmission of notification messages and acknowledgements between NAV Actors and a known recipient (either a person or system) that participate in the same XDS Affinity Domain **or between different XDS Affinity Domains**. These notifications are used to indicate that meta-data for one or more new or existing documents are available in the XDS Registry.

The manner in which a Notification Receiver is associated with and XDS Document Consumer is not defined in this profile to allow a broad range of implementation approaches.

Scope

This profile defines the format and content of e-mail messages exchanged ~~primarily~~ between Actors within an XDS Affinity domain **or between different XDS Affinity Domains**. While the message may be intermediated by a traditional e-mail agent operated by the patient, the final destination of the message is intended to be an Actor that is grouped with an XDS Consumer. Using the content of the notification message, the XDS Consumer can initiate automated processing based upon the content of these documents or their meta-data.

665 Although the format for the content of the notification uses XML digital signature in anticipation of future use cases, verification of the signature is outside the scope of this profile.

The profile has been designed to minimize the patient identifying or private information content by using opaque identifiers in the notification. These identifiers can only be linked to protected health information by querying an XDS Registry **or XCA Initiating Gateway**.

670

Update the NAV Profile Section 12 line 190 as follows.

Note to reviewers: The deleted text references Section 3.25.5.1 which does not seem to exist.

675 **Multiple XDS Affinity Domains**

While XDS does not profile transfers of information across XDS Affinity Domains (federation), it does not prohibit an XDS Actor from participating in more than one XDS Affinity Domain. For example, a facility may participate in two non federated XDS Affinity Domains. One might be intended for community use, and another could be part of a regional network. The same XDS
680 Actor might in fact participate in both affinity domains simultaneously. Therefore, any notification mechanism must acknowledge that a single actor may be the sender or recipient of messages that are stored within any number of XDS Affinity domains.

This profile has been designed to support actors that participate in more than one non federated XDS Affinity Domain. However, it is not intended to be a substitute for federation of XDS
685 Affinity Domains, as that activity has yet to be profiled by IHE. However, the intent is that the profile may, with very little change, be used to support XDS federation, once that capability has been profiled.

Because an NAV actor could send or receive notifications about documents that appear in more than one registry, they must be able to identify the registry that indexes the documents which are
690 the subject of the notification message. A mechanism has been established and is described in more detail in Volume II, Section 3.25.5.1.

To support multiple XDS Affinity Domains the NAV profile supports the XCA environment by allowing the homeCommunityId parameter to be specified if available for cross XDS Affinity Domain notifications. If the Notification Sender has a value for homeCommunityId it shall include the homeCommunityId of the local Community in the notification message to allow the Initiating Gateway in the remote Community to know which Responding Gateway to address the Cross Gateway Query and Retrieve transactions to.
695

700 **<Appendix A> Actor Summary Definitions**

Update the definition of Document Consumer as shown:

Document Consumer - The Document Consumer Actor **is able to query document metadata and retrieve documents.** queries a Document Registry Actor for documents meeting certain criteria, and retrieves selected documents from one or more Document Repository
705 actors.

Initiating Gateway - supports all outgoing inter-community communications.

Responding Gateway – supports all incoming inter-community communications.

<Appendix B> Transaction Summary Definitions

Cross Gateway Query – send a query from one community to another in order to identify where
710 healthcare information satisfying specific restraints is located.

Cross Gateway Retrieve – request the retrieval of a specific set of healthcare information (a document or documents) from a remote location.

<Appendix E> Cross Profile Considerations

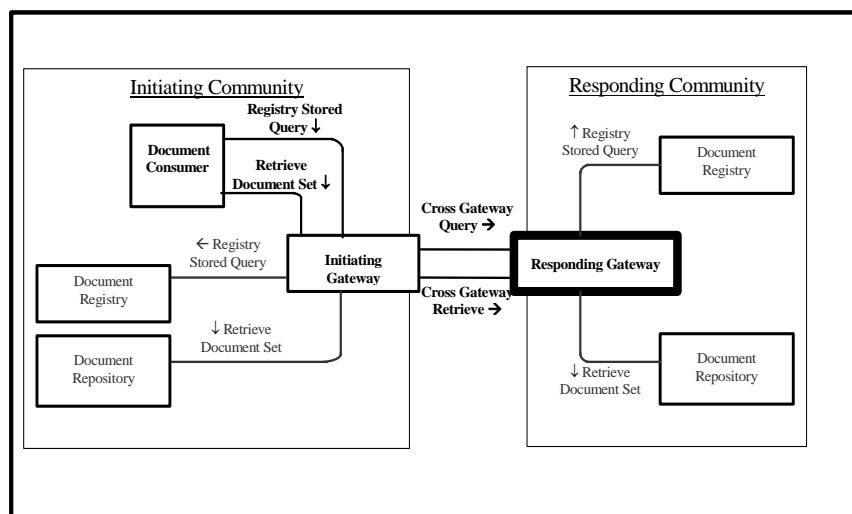
E.6 XCA Integration with XDS and non-XDS communities

715 This section is informative and suggests some potential configurations that may be used by a community. The following types of community are described:

- An XDS Affinity Domain
 - A non-XDS Affinity Domain
 - A collection of XDS Affinity Domains
- 720
- A collection of non-XDS Affinity Domains
 - An XDS Affinity Domain with a “transparent” Gateway

E.6.1 An XDS Affinity Domain

In the example below, the responding community is an XDS Affinity Domain which is served by a Responding Gateway.



725

Figure E.6.1: XDS Affinity Domain

E.6.2 A Non-XDS Affinity Domain

In the example below, the responding community is served by a Responding Gateway.

730 However, within this community, there is no XDS Document Registry or Repositories. A proprietary mechanism is used by the Responding Gateway to gather data for the response to the Cross Gateway Query and Cross Gateway Retrieve transactions.

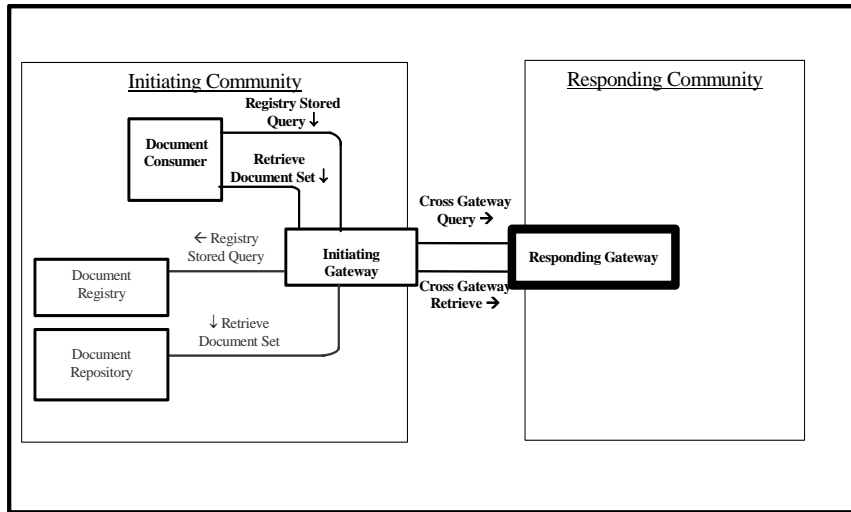


Figure E.6.2: Non-XDS Affinity Domain

735

E.6.3 A Collection of XDS Affinity Domains (informative)

In the example below, one Responding Gateway is serving two communities. Each one of these communities is an XDS Affinity Domain served by its own Responding Gateway; these two Responding Gateways are hidden from the initiating community.

740

This example is informative only. This profile does not specifically support this configuration and does not address all the considerations of such a configuration.

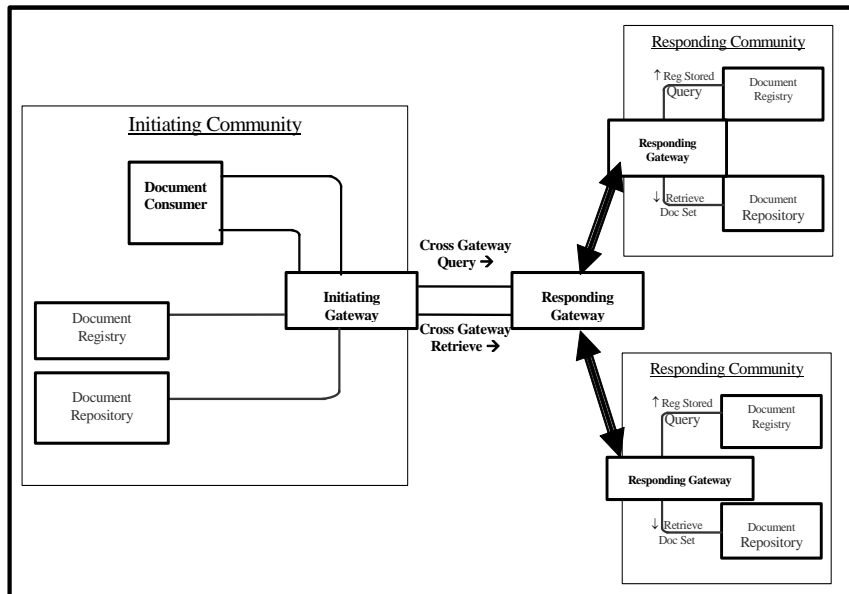


Figure E.6.3: Collection of XDS Affinity Domains

745 **E.6.4 A Collection of Non-XDS Affinity Domains (informative)**

In the example below, one Responding Gateway is serving two communities. Each one of these communities is a non-XDS Affinity Domain served by its own Responding Gateway; these two Responding Gateways are hidden from the initiating Community.

750 **This example is informative only.** This profile does not specifically support this configuration and does not address all the considerations of such a configuration.

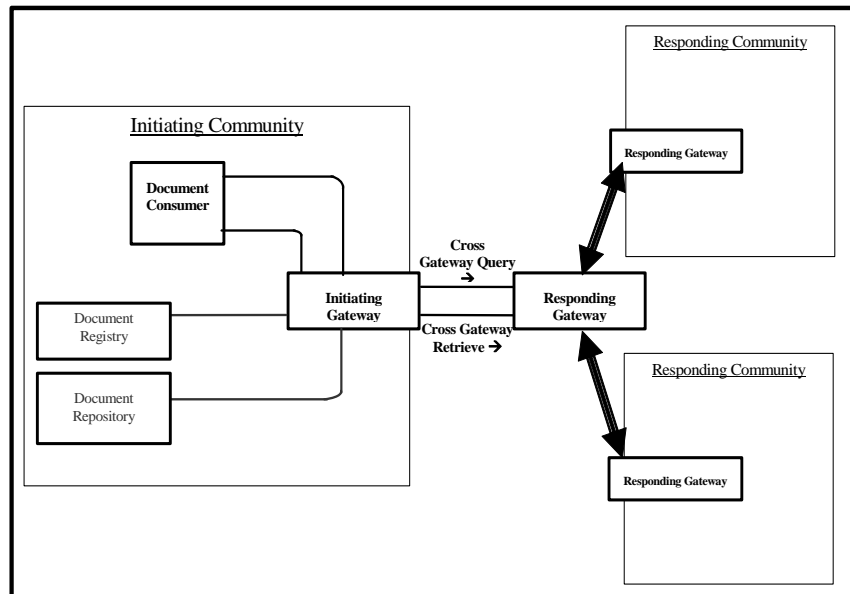


Figure E.6.4: Collection of Non-XDS Affinity Domains

E.6.5 An XDS Affinity Domain with a “Transparent” XCA Gateway (informative)

755 In the example below, the initiating community is an XDS Affinity Domain where the Initiating Gateway is grouped with the XDS Affinity Domain Document Registry. Thus the Document Consumer interacts with one system to retrieve both local and non-local data. This is called “transparent Gateway” as the Document Consumers do not see the cross-domain communication explicitly, but it is hidden by the Domain Registry and a Proxy Repository. Configuration would
760 be needed to instruct the Document Consumer to interact with the Initiating Gateway when a non-local repository identifier was found in the metadata. In this way the Document Consumer interacts with the Initiating Gateway as a Proxy repository.

This diagram also shows a Responding Gateway grouped with a Document Registry.

765 **This example is informative only.** This profile does not specifically support this configuration and does not address all the considerations of such a configuration

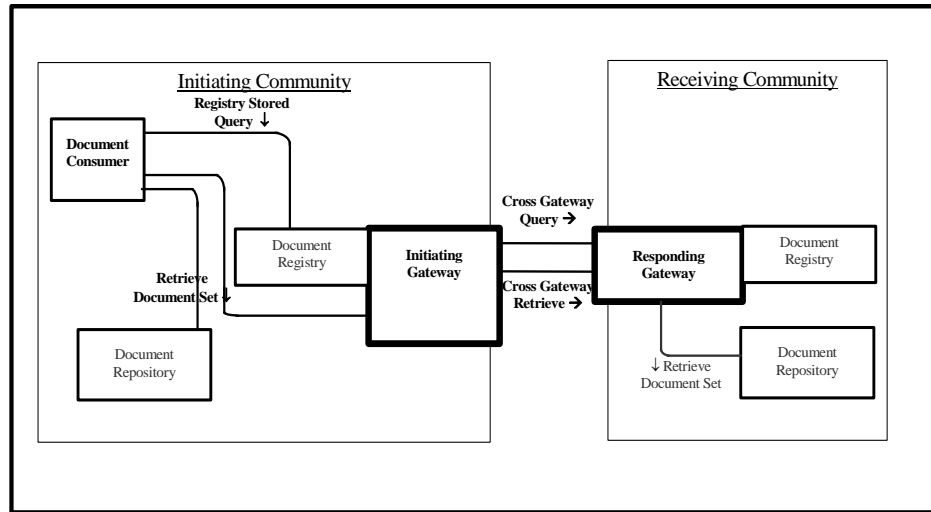


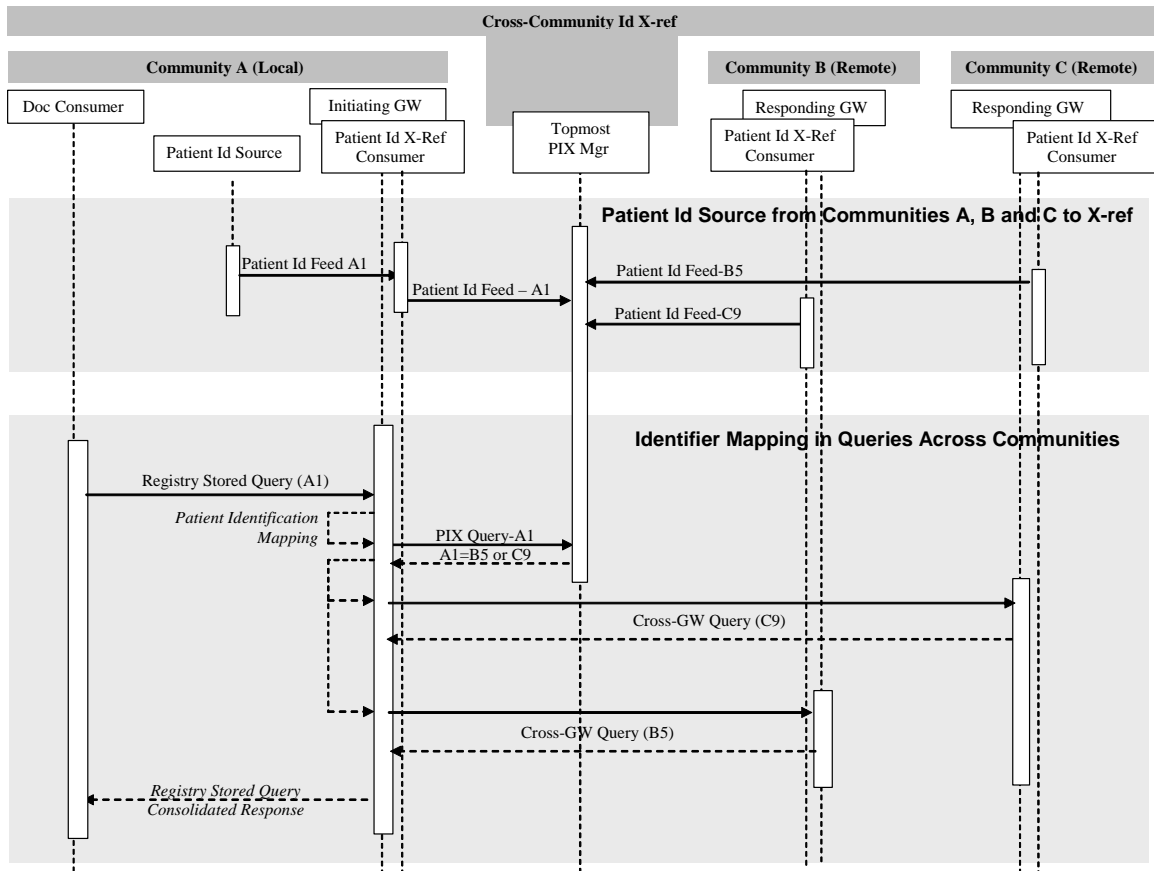
Figure E.6.5: An XDS Affinity Domain with a “Transparent” XCA Gateway

E.7 XCA and Patient Identification Management

770 This section describes two models for resolving the patient identity in a cross-community
 exchange environment. As the XCA profile is not intended to address patient identification
 management, it is therefore necessary to combine XCA with appropriate identification
 management Integration Profiles. This section is informative and describes only two possible
 ways to resolve patient identification relying on the existing two IHE Integration Profiles in this
 775 domain, Patient Identifier Cross-Referencing (PIX) and Patient Demographics Query (PDQ).
 The description in this section is only at a high level and more details (not covered here) are
 necessary for implementation of these models. Other models for patient identification exist and
 will not be described in this section. Future work by the IHE IT Infrastructure Technical
 committee may support more sophisticated approaches.

780 E.7.1 Patient Identification using PIX

The following diagram describes a mechanism for managing patient identities where there is
 topmost PIX which cross references between communities A, B and C. This diagram assumes
 that a Responding or Initiating Gateway for each community interacts in order to drive a patient
 identity feed to the topmost PIX. The diagram does not include processing on the remote
 785 communities (B and C) to respond to the query request. The topmost PIX is not defined in this
 example, but can be assumed to be a PIX Manager, or equivalent, which is accessible to all
 communities.



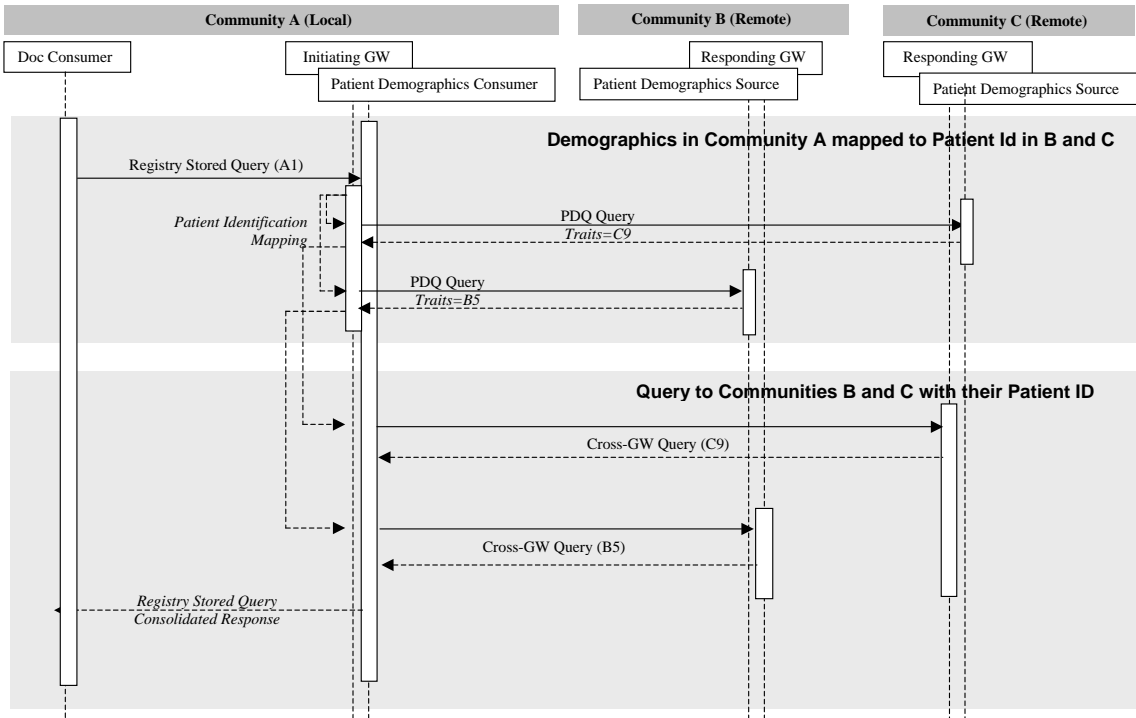
790

Figure E.7.1: Patient Identification using PIX

E.7.2 Patient Identification using PDQ

The following diagram describes one approach to patient identification in a cross-community exchange where there is no entity which can cross reference between local and remote identifiers. Note that interactions among entities in remote communities (B & C) are not detailed in this diagram.

795



800

Figure E.7.2: Patient Identification using PDQ

This diagram present a basic approach relying on the existing IHE Patient Demographics Query (PDQ) Integration Profile by the Initiating and Responding Gateways, where the Responding Gateway respond to queries with patient demographics traits for potential patients in the community it serves, thus allowing Initiating Gateways to obtain the patient Id to use in the Cross Gateway Query. The result of this transaction would be a) zero, indicating the patient does not have records at that community b) one, indicating the gateway was able to uniquely identify the patient c) multiple, indicating the Responding Gateway was not able to uniquely identify the patient. In the case of a) or b) the transaction is complete and does not require human intervention. If multiple results are returned this requires human intervention to resolve.

810 This approach requires a significant number of policy decisions to be in place, coordinated with privacy consent in cross-community environment that are well beyond the scope of the combined use of PDQ and XCA presented in Figure E.7.2. In addition, the integration of a large number of communities with a large number of non overlapping patient populations is likely to require addressing significant scaling issues in allowing Responding Gateways to process the requests for identity resolution.

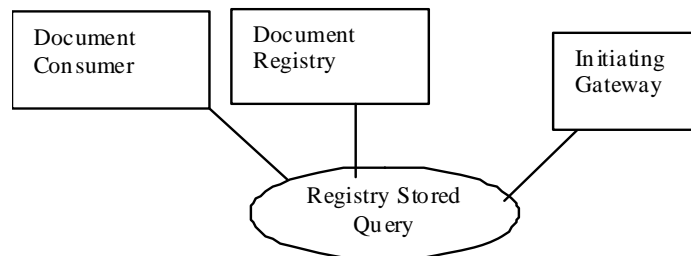
815 Future IHE work in this area may offer more sophisticated integration profiles that could be combined with XCA.

Volumes 2a and 2b - Transactions

820 3.18 Registry Stored Query

Update TF Volume 2a Section 3.18.2 to add Initiating Gateway as an actor on the transaction.

3.18.2 Use Case Roles



825 **Actor:** Initiating Gateway

Role: Services the stored query by initiating transactions with a selected set of Responding Gateways, Document Registries or other appropriate systems.

Update TF Volume 2a Section 3.18.4.1.2.3.8 as follows

830 3.18.4.1.2.3.8 Use of homeCommunityId

The Registry Stored Query makes use of the homeCommunityId which is a globally unique identifier for a community and is used to obtain the Web Services endpoint of services that provide access to data in that community. homeCommunityId is structured as an OID limited to 64 characters and specified in URI syntax, for example the homeCommunityId of 1.2.3 would be formatted as urn:oid:1.2.3.

835

Its use is as follows:

- It is returned within the response to Registry Stored Query **and Cross Gateway Query** transactions 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 as an opaque unique identifier.
- It is an optional parameter to Registry Stored Query requests, not requiring a patient id parameter, and Retrieve Document Set requests to indicate which community to direct the request.

840

For stored queries which do not require the patient id as a parameter, meaning query by EntryUUID or UniqueID:

845

- **If the Registry Stored Query is being addressed to an Initiating Gateway then the Document Consumer may have previously sent a Registry Stored Query to the**

Initiating Gateway which included a patient id and saved the homeCommunityId which was returned on the element containing the EntryUUID or uniqueID. If this is not the case the Document Consumer shall have access to the correct homeCommunityId through some other means.

850

- If the Document Consumer received the EntryUUID or uniqueID in a previous Registry Stored Query response which contained a homeCommunityId, then the Document Consumer shall specify the homeCommunityId parameter.

855

- The homeCommunityId value is specified as the home attribute on the AdhocQuery element of the query request, as in:

```
<AdhocQuery id="..." home="urn:oid:1.2.3" ... >
```

860

- Each query request can have at most one homeCommunityId value. If the Document Consumer specifies multiple entryUUID or uniqueID values they must all be associated with the same homeCommunityId value. Multiple individual query requests can be used to retrieve data associated with different homeCommunityIds. This restriction is expected to be temporary as query syntax is extended to handle multiple homeCommunityIds in a single query request.

865

Update TF Volume 2a Section 3.18.4.1.3 Expected Actions to describe the processing of the homeCommunityId attribute.

3.18.4.1.3 Expected Actions

The responder to the Registry Stored Query shall

870

1. Accept a parameterized query in an AdhocQueryRequest message
2. Verify the required parameters are included in the request. Additionally, special rules documented in the above section ‘Parameters for Required Queries’ shall be verified.
3. Errors shall be returned for the following conditions:
 - Unknown query ID
 - Required parameter missing

875

4. Process the query as appropriate:

880

- **For Document Registry Actors:** Retrieve the internal implementation template of the query based on the Query ID supplied in the query request, substitute appropriate parameters as indicated in ITI TF-2a:3.18.4.1.2.3.7 Parameters for Required Queries and execute the query. The Document Registry shall accept the homeCommunityId value if it is specified in a Registry Stored Query request.

- **For Initiating Gateway Actors:**
 - **Initiating Gateway receives a Registry Stored Query by patient id: It shall determine a) which Responding Gateways this request should be sent to and b) what patient id to use in the Cross Gateway Query. Detailed specification of these steps is not in the intended scope of this profile. Combination of this profile with other existing profiles (e.g. PIX/PDQ), future profiles or configuration mechanisms is possible. Please refer to ITI TF-1: E.7 XCA and Patient Identification Management for possible use of existing profiles PIX and PDQ. For each Responding Gateway identified, the Initiating Gateway shall update the query with the correct patient identifier corresponding to the Responding Gateway’s community and initiates a Cross Gateway Query transaction to the Responding Gateway. If the Initiating Gateway is grouped with a Document Consumer it will also initiate a Registry Stored Query to the local Document Registry.**
 - **Initiating Gateway receives a Registry Stored Query by entryUUID or uniqueID: Verify homeCommunityId has been specified. If missing return Failure status with XDSMissingHomeCommunityId error code. If homeCommunityId not recognized return a Failure or PartialSuccess status with XDSUnknownCommunity error code. Determine which Responding Gateway to contact by using the homeCommunityId to obtain the Web Services endpoint of the Responding Gateway. The process of obtaining the Web Services endpoint is not further specified in this profile. If the homeCommunityId represents the local community the Initiating Gateway shall initiate a Registry Stored Query to the local Document Registry. The Initiating Gateway shall specify the homeCommunityId in the Cross Gateway Query by entryUUID or uniqueID which identifies the community associated with the Responding Gateway. For details regarding the homeCommunityId see ITI TF-2a: 3.18.4.1.2.3.8 and ITI TF-2b: 3.38.4.1.2.1.**
- 5. Return XML formatted metadata in an AdhocQueryResponse message. The syntax of the metadata returned by this query shall be in ebRIM and ebRS version 3.0.
 - The Document Registry may specify the homeCommunityID attribute on any appropriate elements.
 - **The Initiating Gateway shall specify the homeCommunityID attribute on all appropriate elements. If the Initiating Gateway contacted a Document Registry, the Document Registry response might not contain the homeCommunityId. In this case the Initiating Gateway shall add the homeCommunityId of its local community to the Document Registry response prior to including it in the consolidated response to the Document Consumer. The homeCommunityId attribute corresponds to the ‘home’ attribute specified in the ebRIM standard. For more information on homeCommunityId see ITI TF-2a: 3.18.4.1.2.3.8 and ITI TF-2b: 3.38.4.1.2.1. The elements that shall include the home attribute are:**

- 925 • **If returnType="LeafClass" the ExtrinsicObject and RegistryPackage elements shall contain the home attribute.**
- **If returnType="ObjectRef" the ObjectRef element shall contain the home attribute**
- 930 • **If the Initiating Gateway is unable to get an appropriate response from a selected Responding Gateway it shall include in its response to the Document Consumer an XDSUnavailableCommunity error code where the context identifies the unavailable Responding Gateway. In this case, and any other error from a Responding Gateway, the Initiating Gateway shall return to the Document Consumer either a Failure status (if no part was successful) or a PartialSuccess status.**
- 935 6. **When the Document Consumer receives the query response from the Initiating Gateway it must account for two aspects of the response; namely that a) the homeCommunityId attribute will be specified b) the Document Consumer may not be able to map the repository id value directly to the Document Repository. XCA assumes a common coding/vocabulary scheme is used across all communities. For**
- 940 **example, all communities shall have common privacy consent vocabularies. The Document Consumer shall retain the values of the homeCommunityId attribute for future interaction with the Initiating Gateway.**

945 *Update the Retrieve Document Set transaction, Vol. 2b Section 3.43 to add Initiating Gateway as an actor on the transaction.*

3.43 Retrieve Document Set

This section corresponds to Transaction ITI-43 of the IHE Technical Framework. The Document Consumer, Document Repository **and Initiating Gateway** actors use transaction ITI-43.

Integration Profiles using this Transaction
Cross-Enterprise Document Sharing-b (XDS.b)
<u>Cross-Community Access (XCA)</u>

950 3.43.1 Scope

This transaction is used by the Document Consumer to retrieve a set of documents from the Document Repository **or Initiating Gateway**. The Document Consumer has already obtained the XDSDocumentEntry uniqueId and the Document Repository repositoryUniqueId from the Document Registry/**Initiating Gateway** by means of the Registry Stored Query transaction.

955

The following diagram is updated to add the reference to Initiating Gateway.

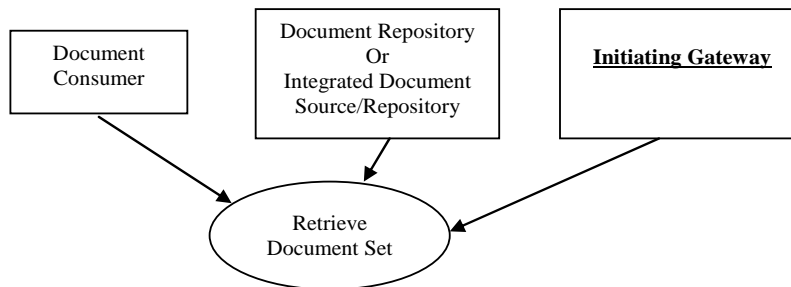


Figure 3.43.2: Use Case Roles

960 **XDS Actors:**

Actor: Document Consumer

Role: Obtains document.

Actor: Document Repository or Integrated Document Source/Repository

Role: Provides documents.

965 **XCA Actors:**

Actor: Initiating Gateway

Role: An Initiating Gateway which implements the XDS Affinity Domain option retrieves a set of documents by using the Cross Gateway Retrieve transaction and/or a Retrieve Document Set transaction.

970 Note: Within this transaction, the Document Repository and Integrated Document Source/Repository actors can be used interchangeably.

Update the Retrieve Document Set transaction, Vol. 2b Section 3.43.4.1.3 as follows.

975 **3.43.4.1.3 Expected Actions**

When receiving a Retrieve Document Set Request, a Document Repository **or an Initiating Gateway** shall generate a Retrieve Document Set Response containing the requested documents or error codes if the documents could not be retrieved.

980 **An XCA Initiating Gateway receiving the Retrieve Document Set Request shall use the homeCommunityId to obtain the Web Services endpoint of the Responding Gateways or, in the case where homeCommunityId identifies the local community, use the repositoryUniqueId to obtain the Web Services endpoint of the Document Repositories. The process of obtaining the Web Services endpoint is not further specified in this profile. The Initiating Gateway shall send Cross Gateway Retrieves/Retrieve Document Set transactions to each appropriate Responding Gateway/Document Repository, consolidate the results, and return them to the Document Consumer.**

985

Add to TF Volume 2b Sections 3.38, 3.39

3.38 Cross Gateway Query

990 This section corresponds to Transaction 38 of the IHE Technical Framework. Transaction 38 is used by cooperating Initiating Gateway and Responding Gateway actors.

3.38.1 Scope

The scope of the Cross Gateway Query transaction is based on the Registry Stored Query transaction [ITI-18]. The same set of stored queries is required to be supported and the options controlling what kind of data is returned are the same. Differences from the Registry Stored Query transactions are:

- The Cross Gateway Query is between an Initiating Gateway and Responding Gateway.
- Initiating Gateway shall specify the homeCommunityId attribute in all Cross-Community Queries which do not contain a patient identifier.
- The homeCommunityID attribute shall be returned within all appropriate elements.
- Responding Gateways shall support the Asynchronous Web Services Exchange Option on the Cross Gateway Query. Support for this function is required in order to enable use of Asynchronous Web Services Exchange in any cross-community interaction. Without this support an Initiating Gateway would require unique configuration, per Responding Gateway, to know if Asynchronous Web Services Exchange was supported. It is expected that Asynchronous Web Services Exchange will be desired by the majority of communities.
- Asynchronous Web Services Exchange is an option on the Initiating Gateway, see ITI TF-1: 18.2.2.
- For stored queries that rely on concepts that a community may not support, namely associations, folders and submission sets, a Responding Gateway is allowed to respond with zero entries.

1015 There shall be an agreed upon common coding/vocabulary scheme used for the Cross Gateway Query. For example, a common set of privacy consent vocabularies shall be used.

3.38.2 Use Case Roles

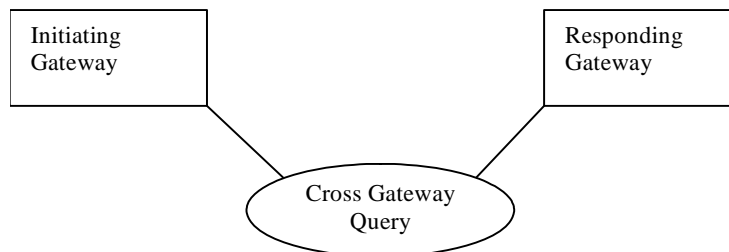


Figure 3.38.2: Use Case Roles

1020 **Actor:** Initiating Gateway

Role: To formulate a Cross Gateway Query on behalf of a user.

Actor: Responding Gateway

Role: To respond to a Cross Gateway Query based on the internal configuration of the community.

1025 **3.38.3 Referenced Standard**

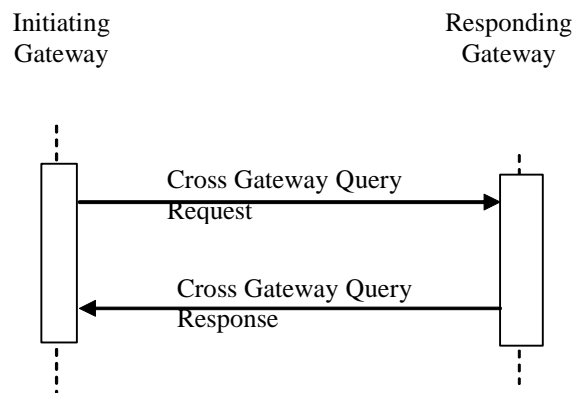
Implementers of this transaction shall comply with all requirements described in ITI TF-2x: Appendix V Web Services for IHE Transactions.

ebRIM OASIS/ebXML Registry Information Model v3.0

ebRS OASIS/ebXML Registry Services Specifications v3.0

1030 Appendix V ITI TF-2x: Appendix V: Web Services for IHE Transactions
 Contains references to all Web Services standards and requirements of use

3.38.4 Interaction Diagram



1035 **3.38.4.1 Cross Gateway Query**

This is a query request between an Initiating Gateway and a Responding Gateway. The query request contains:

- A reference to a pre-defined query defined by the Registry Stored Query transaction [ITI-18].
 - Parameters to the query. The query parameters are defined by the Registry Stored Query transaction. The homeCommunityId attribute is required for every Registry Stored Query which does not specify a patient identity.
- 1040

3.38.4.1.1 Trigger Events

1045 This message is initiated when the Initiating Gateway has determined that it must interact with the Responding Gateway to satisfy a Registry Stored Query request received from an XDS.b Document Consumer or a query request from other internal non-IHE actor.

3.38.4.1.2 Message Semantics

1050 The message semantics are based on the Registry Stored Query. See ITI TF-2a: 3.18.4.1.2. Of special note are the use of homeCommunityId, specifying the patient identifier and special handling of some stored queries. These are explained below.

3.38.4.1.2.1 homeCommunityId

1055 The homeCommunityId attribute is required on the Cross Gateway Query. The homeCommunityId is a globally unique identifier for a community and is used to obtain the Web Services endpoint of services that provide access to data in that community. homeCommunityId is structured as an OID limited to 64 characters and specified in URI syntax, for example the homeCommunityId of 1.2.3 would be formatted as urn:oid:1.2.3.

Its use is as follows:

- 1060 • It is returned within the response to Cross Gateway Query and Registry Stored Query transactions 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 as an opaque unique identifier.
- It is an optional parameter to Registry Stored Query requests, not requiring a patient id parameter, and Retrieve Document Set requests to indicate which community to direct the request.

1065 The Initiating Gateway shall specify the homeCommunityId parameter within all queries which do not include a patient identifier parameter. These would be queries which specify an entryUUID or uniqueID. The homeCommunityId shall contain the value that identifies the community associated with the Responding Gateway. The homeCommunityId value is specified as the home attribute on the AdhocQuery element of the query request, as in:

1070 `<AdhocQuery id="..." home="urn:oid:1.2.3" ... >`

1075 Each Cross Gateway Query request can have at most one homeCommunityId value. If multiple entryUUID or uniqueID values are specified they must all be associated with the same homeCommunityId value. Multiple individual query requests can be used to retrieve data associated with different homeCommunityIds. This restriction is expected to be temporary as query syntax is extended to handle multiple homeCommunityIds in a single query request.

3.38.4.1.2.2 Specifying patient identifier

1080 The Initiating Gateway shall specify in relevant queries a patient identifier known to the Responding Gateway. The mechanism used by the Initiating Gateway to determine the correct patient identifier to use is outside the intended scope of this profile. The Responding Gateway

can expect to be able to resolve the patient identifier. If the patient identifier is unknown by the Responding Gateway’s community, the Responding Gateway shall return a successful response with no elements.

3.38.4.1.2.3 Special handling of some stored queries

1085 Some stored queries rely on the support of concepts which may not be used within a community. It is also possible that a Responding Gateway community may have policies which restrict the sharing of information related to those concepts. The concepts of concern are submission sets, folders and associations. In either case a Responding Gateway shall respond to the appropriate stored queries by returning zero results. Table 3.38.4-1 lists all the stored queries and which rely on specialized concepts.

1090

Query Name	Concepts	Requirement
FindDocuments	None	Required by all
FindSubmissionSets	Submission Set	Zero elements when no submission set concept in community
FindFolders	Folder	Zero elements when no folder concept in community
GetAll	Submission Set, Folder, Association	Return all appropriate document entries and other entries depending on which of the other concepts the community supports
GetDocuments	None	Required by all
GetFolders	Folder	Zero elements when no folder concept in community
GetAssociations	Association	Zero elements when no association concept in community
GetDocumentsAndAssociations	Association	Return only document entries if no association concept
GetSubmissionSets	Submission Set	Zero elements when no submission set concept in community
GetSubmissionSetAndContents	Submission Set	Zero elements when no submission set concept in community
GetFolderAndContents	Folder	Zero elements when no folder concept in community
GetFoldersForDocument	Folder	Zero elements when no folder concept in community
GetRelatedDocuments	Association	Zero elements when no association concept in community

Table 3.38.4-1

3.38.4.1.3 Expected Actions

1095 Actors supporting this transaction shall support the Expected Actions described in ITI TF-2a: 3.18.4.1.3. In addition:

The Responding Gateway actor shall:

- Verify the homeCommunityId is specified on relevant queries and return an XDSMissingHomeCommunityId error code if missing. Return an XDSUnknownCommunity error code if the value is not known by the Responding Gateway.
 - Route the query to the local XDS Document Registry or perform equivalent action to form a query response.
- 1100

- 1105 • Ensure that the response contains the value identifying the Responding Gateway’s community for the homeCommunityId attribute in every appropriate element. The elements that shall include the ebRIM home attribute are:
 - If returnType=”LeafClass” the ExtrinsicObject and RegistryPackage elements shall contain the home attribute.
 - If returnType=”ObjectRef” the ObjectRef element shall contain the home attribute.
 - 1110 • Ensure that every RegistryError element returned in the response shall have the location attribute set to the homeCommunityId of the Responding Gateway.

The Initiating Gateway actor shall:

- 1115 • On receiving the response from the Responding Gateway, verify the homeCommunityId is present where appropriate. If homeCommunityId is not present in any of the ExtrinsicObject, RegistryPackage or ObjectRef elements the Initiating Gateway shall reflect an XDSMissingHomeCommunityId to the initiator of the transaction – either the Document Consumer or the internal actor. All XDSMissingHomeCommunityId errors generated by the Initiating Gateway shall include, in the context of the message, identification of the RespondingGateway that returned the invalid response and the element or elements that were in error.
- 1120 • If the XDS Affinity Domain Option is supported and if needed, consolidate results from multiple Responding Gateways. This includes reflecting in the consolidated results returned in response to the originating Registry Stored Query [ITI-18] all successes and failures received from Responding Gateways. If both successes and failures are received from Responding Gateways, the Initiating Gateway shall return both RegistryObjectList and RegistryErrorList in one response and specify PartialSuccess status.
- 1125

3.38.4.1.4 Security Considerations

Both the Initiating Gateway and Responding Gateway shall audit the Cross Gateway Query. The audit entries shall be equivalent to the entries required for the Registry Stored Query.

The Initiating Gateway:

- 1130 • If receiving a Registry Stored Query transaction from a Document Consumer, shall audit as if it were a Document Registry. See ITI TF-2a: 3.18.4.2.5.
- In addition, shall audit the Cross Gateway Query as if it were a Document Consumer except that for EventTypeCode the Initiating Gateway shall specify EV(“ITI-38”, “IHE Transactions”, and “Cross Gateway Query”). See ITI TF-2a: 3.18.4.2.4.
- 1135 • In addition, if interacting with a local Document Registry, shall audit as if it were a Document Consumer. See ITI TF-2a: 3.18.4.2.5.

The Responding Gateway:

- 1140 • Shall audit the Cross Gateway Query as if it were a Document Registry except that for EventTypeCode the Responding Gateway shall specify EV(“ITI-38”, “IHE Transactions”, “Cross Gateway Query”). See ITI TF-2a: 3.18.4.2.4.
- In addition, if interacting with a local Document Registry, shall audit as if it were a Document Consumer. See ITI TF-2a: 3.18.4.2.5.

3.38.5 Protocol Requirements

1145 The Cross Gateway Query request and response will be transmitted using Synchronous or Asynchronous Web Services Exchange, according to the requirements specified in ITI TF-2x: Appendix V. The protocol requirements are identical to the Registry Stored Query except as noted below.

Table 3.38.5-1 WSDL Namespace Definitions

soap	http://schemas.xmlsoap.org/wsdl/soap/
soap12	http://schemas.xmlsoap.org/wsdl/soap12/
wsaw	http://www.w3.org/2006/05/addressing/wsdl/
xsd	http://www.w3.org/2001/XMLSchema
ihe	urn:ihe:iti:xds-b:2007
rs	urn:oasis:names:tc:ebxml-regrep:xsd:rs:3.0
lcm	urn:oasis:names:tc:ebxml-regrep:xsd:lcm:3.0
query	urn:oasis:names:tc:ebxml-regrep:xsd:query:3.0

1150

Initiating Gateway: These are the requirements for the Cross Gateway Query transaction presented in the order in which they would appear in the Initiating Gateway WSDL definition:

- The following types shall be imported (xsd:import) in the /definitions/types section:
 - namespace=" urn:oasis:names:tc:ebxml-regrep:xsd:query:3.0",
 - schemaLocation="query.xsd"
 - The /definitions/message/part/@element attribute of the Cross Gateway Query Response message shall be defined as “query:AdhocQueryResponse”
 - Refer to Table 3.38.5-2 below for additional attribute requirements
- 1155

1160

Table 3.38.5-2 Additional Attribute Requirements

Attribute	Synchronous Web Services Exchange	Asynchronous Web Services Exchange
/definitions/portType/operation@name	Not applicable	InitiatingGateway_CrossGatewayQueryRetrieveAsyncResponse
/definitions/portType/operation/input/@wsaw:Action	Not applicable	urn:ihe:iti:2007:CrossGatewayQueryAsyncResponse
/definitions/binding/operation/soap12:operation/@soapAction	Not applicable	urn:ihe:iti:2007:CrossGatewayQueryAsyncResponse

For informative WSDL for the Initiating Gateway actor see ITI TF-2x: Appendix W.

Responding Gateway: These are the requirements for the Cross Gateway Query transaction presented in the order in which they would appear in the Responding Gateway WSDL definition:

1165

- The following types shall be imported (xsd:import) in the /definitions/types section:
 - namespace="urn:oasis:names:tc:ebxml-regrep:xsd:query:3.0", schemaLocation="query.xsd"

1170

- The /definitions/message/part/@element attribute of the Cross Gateway Query Request message shall be defined as “query:AdhocQueryRequest”
- The /definitions/message/part/@element attribute of the Cross Gateway Query Response message shall be defined as “query:AdhocQueryResponse”
- Refer to Table 3.38.5-3 below for additional attribute requirements

Table 3.38.5-3 Additional Attribute Requirements

Attribute	Synchronous Web Services Exchange	Asynchronous Web Services Exchange
/definitions/portType/operation@name	RespondingGateway_CrossGatewayQuery	RespondingGateway_CrossGatewayQueryAsync
/definitions/portType/operation/input/@wsaw:Action	urn:ihe:iti:2007:CrossGatewayQuery	urn:ihe:iti:2007:CrossGatewayQueryAsync
/definitions/portType/operation/output/@wsaw:Action	urn:ihe:iti:2007:CrossGatewayQueryResponse	Not applicable
/definitions/binding/operation/soap12:operation/@soapAction	urn:ihe:iti:2007:CrossGatewayQuery	urn:ihe:iti:2007:CrossGatewayQueryAsync

1175

These are the requirements that affect the wire format of the SOAP message. The other WSDL properties are only used within the WSDL definition and do not affect interoperability. Full sample request and response messages are in ITI TF-2b: 3.38.5.1 Sample SOAP Messages.

For informative WSDL for the Responding Gateway actor see ITI TF-2x: Appendix W.

3.38.5.1 Sample SOAP Messages

- 1180 The samples in the following two sections show a typical SOAP request and its relative SOAP response. The sample messages also show the WS-Addressing headers <Action/>, <MessageID/>, <ReplyTo/>...; these WS-Addressing headers are populated according to the W3C WS-Addressing standard. The body of the SOAP message is omitted for brevity; in a real scenario the empty element will be populated with the appropriate metadata.
- 1185 Samples presented in this section are also available online on the IHE FTP site, see ITI TF-2x: Appendix W.

3.38.5.1.1 Sample Cross Gateway Query SOAP Request

3.38.5.1.1.1 Synchronous Web Services Exchange

- 1190 `<s:Envelope xmlns:s="http://www.w3.org/2003/05/soap-envelope"
xmlns:a="http://www.w3.org/2005/08/addressing">`
- 1195 `<s:Header>
<a:Action s:mustUnderstand="1">urn:ihe:iti:2007:CrossGatewayQuery</a:Action>
<a:MessageID>urn:uuid:def119ad-dc13-49c1-a3c7-e3742531f9b3</a:MessageID>
<a:ReplyTo>
<a:Address>http://www.w3.org/2005/08/addressing/anonymous</a:Address>
</a:ReplyTo>
<a:To s:mustUnderstand="1">http://localhost/service/IHXCAREspondingGateway.svc</a:To>
</s:Header>
<s:Body>
1200 <query:AdhocQueryRequest xmlns:query="urn:oasis:names:tc:ebxml-regrep:xsd:query:3.0"/>
</s:Body>
</s:Envelope>`

3.38.5.1.1.2 Asynchronous Web Services Exchange

- 1205 `<s:Envelope xmlns:s="http://www.w3.org/2003/05/soap-envelope"
xmlns:a="http://www.w3.org/2005/08/addressing">`
- 1210 `<s:Header>
<a:Action s:mustUnderstand="1">urn:ihe:iti:2007:CrossGatewayQueryAsync</a:Action>
<a:MessageID>urn:uuid:def119ad-dc13-49c1-a3c7-e3742531f9b3</a:MessageID>
<a:ReplyTo>
<a:Address>http://192.168.2.4:9080/XcaService/InitiatingGatewayReceiver.svc</a:Address>
</a:ReplyTo>
<a:To s:mustUnderstand="1">http://localhost/XcaService/RespondingGatewayReceiver.svc</a:To>
</s:Header>
<s:Body>
1215 <query:AdhocQueryRequest xmlns:query="urn:oasis:names:tc:ebxml-regrep:xsd:query:3.0"/>
</s:Body>
</s:Envelope>`

3.38.5.1.2 Sample Cross Gateway Query SOAP Response

3.38.5.1.2.1 Synchronous Web Services Exchange

- 1220 `<s:Envelope xmlns:s="http://www.w3.org/2003/05/soap-envelope"
xmlns:a="http://www.w3.org/2005/08/addressing">`
- 1225 `<s:Header>
<a:Action s:mustUnderstand="1">urn:ihe:iti:2007:CrossGatewayQueryResponse</a:Action>
<a:RelatesTo>urn:uuid:def119ad-dc13-49c1-a3c7-e3742531f9b3</a:RelatesTo>
</s:Header>
<s:Body>
<query:AdhocQueryResponse xmlns:query="urn:oasis:names:tc:ebxml-regrep:xsd:query:3.0"/>
</s:Body>
</s:Envelope>`

1230 **3.38.5.1.2.2 Asynchronous Web Services Exchange**

```

1235 <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:CrossGatewayQueryAsyncResponse</a:Action>
    <a:MessageID>urn:uuid:D6C21225-8E7B-454E-9750-821622C099DB</a:MessageID>
    <a:RelatesTo>urn:uuid:def119ad-dc13-49c1-a3c7-e3742531f9b3</a:RelatesTo>
    <a:To s:mustUnderstand="1">http://localhost:2647/XcaService/InitiatingGatewayReceiver.svc
    </a:To>
1240 </s:Header>
    <s:Body>
    <query:AdhocQueryResponse xmlns:query="urn:oasis:names:tc:ebxml-regrep:xsd:query:3.0"/>
    </s:Body>
    </s:Envelope>
    
```

3.39 Cross Gateway Retrieve

1245 This section corresponds to Transaction 39 of the IHE Technical Framework. Transaction 39 is used by the Initiating Gateway and Responding Gateway actors.

3.39.1 Scope

1250 The scope of the Cross Gateway Retrieve transaction is semantically the same as the Retrieve Document Set transaction [ITI-43]. Differences from the Retrieve Document Set transactions are:

- The Cross Gateway Retrieve is between an Initiating Gateway and a Responding Gateway.
- The ‘homeCommunityId’ parameter is required. This means that the homeCommunityId parameter which is optional on the Retrieve Document Set transaction is required by this transaction.
- 1255 • Responding Gateways shall support the Asynchronous Web Services Exchange Option on the Cross Gateway Retrieve. Support for this function is required in order to enable use of Asynchronous Web Services Exchange in any cross-community interaction. Without this support an Initiating Gateway would require unique configuration, per Responding Gateway, to know if Asynchronous Web Services Exchange was supported. It is expected that
- 1260 • Asynchronous Web Services Exchange will be desired by the majority of communities.
- Asynchronous Web Services Exchange is an option on the Initiating Gateway, see ITI TF-1: 18.2.2.

3.39.2 Use Case Roles

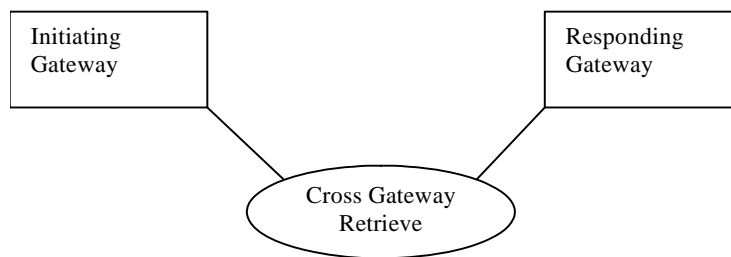


Figure 3.39.2: Use Case Roles

1265

Actor: Initiating Gateway

Role: To formulate a Cross Gateway Retrieve in response to Retrieve Document Set transactions or other internal interaction.

1270 **Actor:** Responding Gateway

Role: To return the documents requested.

3.39.3 Referenced Standard

Implementors of this transaction shall comply with all requirements described in ITI TF-2x: Appendix V Web Services for IHE Transactions.

1275 ebRIM OASIS/ebXML Registry Information Model v3.0

ebRS OASIS/ebXML Registry Services Specifications v3.0

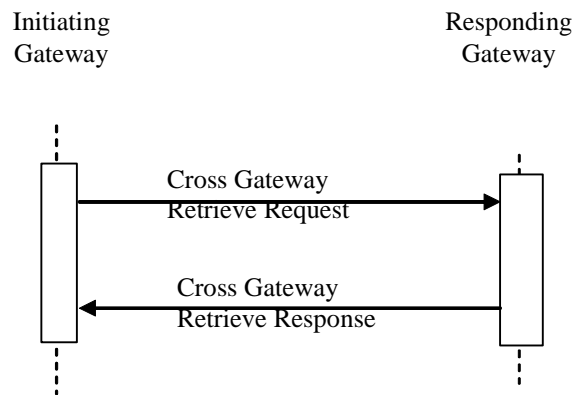
Appendix V ITI TF-2x: Appendix V: Web Services for IHE Transactions

Contains references to all Web Services standards and requirements of use

MTOM SOAP Message Transmission Optimization Mechanism

1280 <http://www.w3.org/TR/soap12-mtom/>

3.39.4 Interaction Diagram



3.39.4.1 Cross Gateway Retrieve

1285 The Cross Gateway Retrieve uses the same syntax and standards as the Retrieve Document Set transaction specified in XDS.b. See ITI TF-2b: 3.43.

3.39.4.1.1 Trigger Events

1290 This message is initiated by the Initiating Gateway to retrieve a set of documents from another community represented by a Responding Gateway. The Initiating Gateway may be responding to a Retrieve Document Set transaction or may use a proprietary mechanism for triggering the Cross Gateway Retrieve.

3.39.4.1.2 Message Semantics

1295 The message semantics for Cross Gateway Retrieve are the same as Retrieve Document Set. See ITI TF-2b: 3.43.4.1.2. The Initiating Gateway shall specify the homeCommunityId parameter within the Retrieve Document Set. The homeCommunityId shall contain the value that identifies the community associated with the Responding Gateway.

3.39.4.1.3 Expected Actions

Actors supporting this transaction shall support the Expected Actions described in the ITI TF-2b: 3.43.4.1.3.

1300 The Responding Gateway shall determine the local system or systems which hold the documents requested and interact with those systems. The Responding Gateway may use a Retrieve Document Set transaction or other internally defined interaction, to retrieve the document or documents. If more than one system is contacted the Responding Gateway shall consolidate the results from the multiple systems into one response to the Initiating Gateway. If both successes and failures are received the Responding Gateway may choose to use PartialSuccess status to reflect both failure and success. The Responding Gateway may alternatively choose to suppress the failures and report only successes.

Every RegistryError element returned in the response shall have the location attribute set to the homeCommunityId of the Responding Gateway.

1310 If the XDS Affinity Domain Option is supported, the Initiating Gateway actor shall, if needed, consolidate results from multiple Responding Gateways. This includes reflecting in the consolidated results returned to the originating Retrieve Document Set [ITI-43] all successes and failures received from Responding Gateways. If both successes and failures are received from Responding Gateways, the Initiating Gateway shall return both DocumentResponse and RegistryErrorList elements in one response and specify PartialSuccess status.

1315 3.39.4.1.4 Security Considerations

Both the Initiating Gateway and Responding Gateway shall audit the Cross Gateway Retrieve. The audit entries shall be equivalent to the entries required for the Retrieve Document Set.

The Initiating Gateway:

- 1320 • If receiving a Retrieve Document Set transaction from a Document Consumer, shall audit as if it were a Document Repository. See ITI TF-2b: 3.43.6.
- In addition, shall audit the Cross Gateway Retrieve as if it were a Document Consumer except that for EventTypeCode the Initiating Gateway shall specify EV(“ITI-39”, “IHE Transactions”, and “Cross Gateway Retrieve”). See ITI TF-2b: 3.43.6.
- 1325 • In addition, if interacting with a local Document Repository, shall audit as if it were a Document Consumer. See ITI TF-2b: 3.43.6. One audit record shall be created for each Document Repository contacted.

The Responding Gateway:

- 1330 • Shall audit the Cross Gateway Retrieve as if it were a Document Repository except that for EventTypeCode the Responding Gateway shall specify EV(“ITI-39”, “IHE Transactions”, “Cross Gateway Retrieve”). See ITI TF-2b: 3.43.6.
- In addition, if interacting with a local Document Repository, shall audit as if it were a Document Consumer. See ITI TF-2b: 3.43.6. One audit record shall be created for each Document Repository contacted.

3.39.5 Protocol Requirements

1335 The Cross Gateway Retrieve request and response will be transmitted using Synchronous or Asynchronous Web Services Exchange, according to the requirements specified in ITI TF-2x: Appendix V. The protocol requirements are identical to the Retrieve Document Set except as noted below.

Table 3.39.5-1 WSDL Namespace Definitions

soap	http://schemas.xmlsoap.org/wsdl/soap/
soap12	http://schemas.xmlsoap.org/wsdl/soap12/
wsaw	http://www.w3.org/2006/05/addressing/wsdl/
xsd	http://www.w3.org/2001/XMLSchema
ihe	urn:ihe:iti:xds-b:2007
rs	urn:oasis:names:tc:ebxml-regrep:xsd:rs:3.0
lcm	urn:oasis:names:tc:ebxml-regrep:xsd:lcm:3.0
query	urn:oasis:names:tc:ebxml-regrep:xsd:query:3.0

1340 **Initiating Gateway:** These are the requirements for the Cross Gateway Retrieve transaction presented in the order in which they would appear in the Initiating Gateway WSDL definition:

- The following types shall be imported (xsd:import) in the /definitions/types section:
 - namespace="urn:ihe:iti:xds-b:2007", schema="IHEXDS.xsd"
- 1345 • The /definitions/message/part/@element attribute of the Cross Gateway Retrieve Request message shall be defined as “ihe:RetrieveDocumentSetRequest”
- The /definitions/message/part/@element attribute of the Cross Gateway Retrieve Response message shall be defined as “ihe:RetrieveDocumentSetResponse”
- Refer to Table 3.39.5-2 below for additional attribute requirements

1350

Table 3.39.5-2 Requirements for portType and Binding attributes

Attribute	Synchronous Web Services Exchange	Asynchronous Web Services Exchange
/definitions/portType/operation@name	Not applicable	InitiatingGateway_CrossGatewayRetrieveAsyncResponse
definitions/portType/operation/input/@wsaw:Action	Not applicable	urn:ihe:iti:2007:CrossGatewayRetrieveAsyncResponse
/definitions/binding/operation/soap12:operation/@soapAction	Not applicable	urn:ihe:iti:2007:CrossGatewayRetrieveAsyncResponse

For informative WSDL for the Initiating Gateway actor see ITI TF-2x: Appendix W.

Responding Gateway: These are the requirements for the Cross Gateway Retrieve transaction presented in the order in which they would appear in the Responding Gateway WSDL definition:

1355

- The following types shall be imported (xsd:import) in the /definitions/types section:
 - namespace="urn:ihe:iti:xds-b:2007", schema="IHEXDS.xsd"
- The /definitions/message/part/@element attribute of the Cross Gateway Retrieve Request message shall be defined as “ihe:RetrieveDocumentSetRequest”
- The /definitions/message/part/@element attribute of the Cross Gateway Retrieve Response message shall be defined as “ihe:RetrieveDocumentSetResponse”
- Refer to Table 3.39.5-3 below for additional attribute requirements

1360

3.39.5-3 Requirements for portType and Binding attributes

Attribute	Synchronous Web Services Exchange	Asynchronous Web Services Exchange
/definitions/portType/operation@name	RespondingGateway_CrossGatewayRetrieve	RespondingGateway_CrossGatewayRetrieveAsync
/definitions/portType/operation/input/@wsaw:Action	urn:ihe:iti:2007:CrossGatewayRetrieve	urn:ihe:iti:2007:CrossGatewayRetrieveAsync
/definitions/portType/operation/output/@wsaw:Action	urn:ihe:iti:2007:CrossGatewayRetrieveResponse	Not applicable
/definitions/binding/operation/soap12:operation/@soapAction	urn:ihe:iti:2007:CrossGatewayRetrieve	urn:ihe:iti:2007:CrossGatewayRetrieveAsync

1365

These are the requirements that affect the wire format of the SOAP message. The other WSDL properties are only used within the WSDL definition and do not affect interoperability. Full sample request and response messages are in ITI TF-2b: 3.39.5.1 Sample SOAP Messages.

For informative WSDL for the Responding Gateway actor see ITI TF-2x: Appendix W.

The <ihe:RetrieveDocumentSetRequest/> element is defined in ITI TF-2b: 3.43.5. When used within the Cross Gateway Retrieve the <ihe:HomeCommunityId/> element is required.

The <ihe:RetrieveDocumentSetResponse/> element is defined in ITI TF-2b: 3.43.5.

1370 **3.39.5.1 Sample SOAP Messages**

The samples in the following two sections show a typical SOAP request and its relative SOAP response. The sample messages also show the WS-Addressing headers <Action/>, <MessageID/>, <ReplyTo/>...; these WS-Addressing headers are populated according to the W3C WS-Addressing standard. The body of the SOAP message is omitted for brevity; in a real scenario the empty element will be populated with the appropriate metadata.

Samples presented in this section are also available online on the IHE FTP site, see ITI TF-2x: Appendix W.

3.39.5.1.1 Sample Cross Gateway Retrieve SOAP Request**3.39.5.1.1.1 Synchronous Web Services Exchange**

1380

```

<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:ReplyTo>
      <a:Address>http://www.w3.org/2005/08/addressing/anonymous</a:Address>
    </a:ReplyTo>
    <a:To
s:mustUnderstand="1">http://localhost:2647/XcaService/IHEXCAGateway.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:1.2.3.5</homeCommunityId>
        <repositoryUniqueId>1.3.6.1.4...2000</repositoryUniqueId>
        <documentUniqueId>1.3.6.1.4...2301</documentUniqueId>
      </DocumentRequest>
    </RetrieveDocumentSetRequest>
  </s:Body>
</s:Envelope>

```

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3.39.5.1.1.2 Asynchronous Web Services Exchange

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```

<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:CrossGatewayRetrieveAsync</a:Action>
    <a:MessageID>urn:uuid:0fbfdced-6c01-4d09-a110-2201afedaa02</a:MessageID>
    <a:ReplyTo>
      <a:Address>http://192.168.2.4:9080/XcaService/InitiatingGatewayReceiver.svc
      </a:Address>
    </a:ReplyTo>
    <a:To
s:mustUnderstand="1">http://localhost:2647/XcaService/RespondingGatewayReceiver.svc</a:To>
  </s:Header>
  <s:Body>
    <RetrieveDocumentSetRequest xmlns="urn:ihe:iti:xds-b:2007">
      <DocumentRequest>

```

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```

1430         <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:1.2.3.5</homeCommunityId>
           <repositoryUniqueId>1.3.6.1.4...2000</repositoryUniqueId>
1435         <documentUniqueId>1.3.6.1.4...2301</documentUniqueId>
           </DocumentRequest>
         </RetrieveDocumentSetRequest>
       </s:Body>
</s:Envelope>

```

3.39.5.1.2 Sample Cross Gateway Retrieve SOAP Response

1440 3.39.5.1.2.1 Synchronous Web Services Exchange

```

<s:Envelope xmlns:s="http://www.w3.org/2003/05/soap-envelope"
xmlns:a="http://www.w3.org/2005/08/addressing">
  <s:Header>
1445     <a:Action
s:mustUnderstand="1">urn:ihe:iti:2007:CrossGatewayRetrieveResponse</a:Action>
     <a:RelatesTo>urn:uuid:0fbfdced-6c01-4d09-a110-2201afedaa02</a:RelatesTo>
  </s:Header>
  <s:Body>
1450     <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:rims="urn:oasis:names:tc:ebxml-regrep:xsd:rims:3.0"
           xmlns:rs="urn:oasis:names:tc:ebxml-regrep:xsd:rs:3.0">
1455       <rs:RegistryResponse status="urn:oasis:names:tc:ebxml-
regrep:ResponseStatusType:Success" />
       <DocumentResponse>
1460         <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>
1465       <Document>UjBsR09EbGhjZ0dTQUxNQUFBUNBRU1tQ1p0dU1GUXhEUzhi</Document>
       </DocumentResponse>
       <DocumentResponse>
         <homeCommunityId>urn:oid:1.2.3.5</homeCommunityId>
         <repositoryUniqueId>1.3.6.1.4...2000</repositoryUniqueId>
1470       <documentUniqueId>1.3.6.1.4...2301</documentUniqueId>
         <mimeType>text/xml</mimeType>
       </Document>
       </DocumentResponse>
     </RetrieveDocumentSetResponse>
  </s:Body>
</s:Envelope>

```

3.39.5.1.2.2 Asynchronous Web Services Exchange

```

<s:Envelope xmlns:s="http://www.w3.org/2003/05/soap-envelope"
xmlns:a="http://www.w3.org/2005/08/addressing">
  <s:Header>
1480     <a:Action
s:mustUnderstand="1">urn:ihe:iti:2007:CrossGatewayRetrieveAsyncResponse</a:Action>
     <a:MessageID>urn:uuid:D6C21225-8E7B-454E-9750-821622C099DB</a:MessageID>
     <a:RelatesTo>urn:uuid:0fbfdced-6c01-4d09-a110-2201afedaa02</a:RelatesTo>
1485     <a:To
s:mustUnderstand="1">http://localhost:2647/XcaService/InitiatingGatewayReceiver.svc</a:To>
  </s:Header>
  <s:Body>
     <RetrieveDocumentSetResponse

```

```

1490         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:rims="urn:oasis:names:tc:ebxml-regrep:xsd:rims:3.0"
           xmlns:rs="urn:oasis:names:tc:ebxml-regrep:xsd:rs:3.0">
1495     <rs:RegistryResponse status="urn:oasis:names:tc:ebxml-
regrep:ResponseStatusType:Success" />
           <DocumentResponse>
1500             <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>
1505     <DocumentResponse>
           <homeCommunityId>urn:oid:1.2.3.5</homeCommunityId>
           <repositoryUniqueId>1.3.6.1.4...2000</repositoryUniqueId>
           <documentUniqueId>1.3.6.1.4...2301</documentUniqueId>
           <mimeType>text/xml</mimeType>

1510     <Document>UjBsR09EbGhjz0dTQUxNQUFBUUNBRU1tQ1p0dU1GUXhEUzhi</Document>
           </DocumentResponse>
           </RetrieveDocumentSetResponse>
1515 </s:Body>
</s:Envelope>

```

Update the NAV Profile Section 3.25.4.1.2.1 line 481 follows.

15203.25.4.1.2.1 XDS Notification Document Structure

The XDS Notification Document is a W3C digital signature that is compliant with the W3C XML Digital Signature specification [xmldsig-core]. Both the IHE ITI Digital Signature Profile and this profile extend the `SignatureProperties` element to include a `recommendedRegistry` property, which identifies the unique ID of the Document Registry (see ITI TF-2a: 3.25.4.1.2.2). **This profile also extends the `SignatureProperties` element to include a `homeCommunityId` property, which identifies the `homeCommunityId` of the Community where the document is available (see ITI TF-2a: 3.25.4.1.2.3).** This profile furthermore defines the `sendAcknowledgementTo` property which shall be used when an acknowledgement is requested. This property provides the e-mail address where acknowledgements shall be sent.

An example is provided in Figure 3.25-2 below.

```

1535 <Signature Id="signatureID" xmlns="http://www.w3.org/2000/09/xmldsig#">
  <SignedInfo>
    <CanonicalizationMethod Algorithm="http://www.w3.org/TR/2001/REC-xml-c14n-20010315#WithComments" />
    <SignatureMethod Algorithm="urn:ihe:iti:dsg:nosig" />
    <Reference URI="#IHEManifest" Type="http://www.w3.org/2000/09/xmldsig#Manifest">
      <DigestMethod Algorithm="http://www.w3.org/2000/09/xmldsig#sha1" />
      <DigestValue>00</DigestValue>
1540    </Reference>
  </SignedInfo>
  <SignatureValue>base64SignatureValue</SignatureValue>
  <Object>

```

```

1545     <SignatureProperties>
S         <SignatureProperty Id="recommendedRegistry"
            target="signatureID">urn:oid:1.3.983249923.1234.3</SignatureProperty>
            <SignatureProperty Id="homeCommunityId"
1550             target="signatureID">urn:oid:1.3.983249923.123456.7</SignatureProperty>
            <SignatureProperty Id="sendAcknowledgementTo"
                target="signatureID">pseudouser@bogus.site</SignatureProperty>
        </SignatureProperties>
        <Manifest Id="IHEManifest">
            <Reference URI="urn:oid:1.3.345245354.435345">
1555                 <DigestMethod Algorithm="http://www.w3.org/2000/09/xmldsig#sha1"/>
                 <DigestValue>base64DigestValue</DigestValue>
                <!--this is document A, read it first-->
            </Reference>
            <Reference URI="urn:oid:1.2.123412341.1234143">
1560                 <DigestMethod Algorithm="http://www.w3.org/2000/09/xmldsig#sha1"/>
                 <DigestValue>base64DigestValue</DigestValue>
                <!--this is document B-->
            </Reference>
            <Reference URI="urn:oid:1.2.1324123.123413241.5">
1565                 <DigestMethod Algorithm="http://www.w3.org/2000/09/xmldsig#sha1"/>
                 <DigestValue>base64DigestValue</DigestValue>
                <!--this is document C-->
            </Reference>
        </Manifest>
    </Object>
1570 </Signature>

```

Figure 3.25-2 NAV Notification Sample

The XDS Registry where the meta-data resides for the documents that are the subject of the notification shall be stored in the recommendedRegistry signature property of the signature. **If available, the unique identifier of the Community holding the documents shall be stored in the homeCommunityId signature property of the signature.**

Add to the NAV Profile the new Section 3.25.4.1.2.3 as follows.

3.25.4.1.2.3 Community Identification

1580 The notification message shall specify the unique ID of the community in the signatureProperty element with id=homeCommunityId, if the unique ID is available. The unique ID for the Community is configured in the Initiating Gateway of the receiver of the notification to allow for identification and connection to the right remote Community.

1585

Update ITI TF-3:4 Table 4.1-4 to add Initiating Gateway to the Cx Code description

Table 4.1-4 Codes for Source/Query Column

Code	Meaning
R	Required
R2	Required if Known
O	Optional
P	Registry is not required to support query of this attribute.
Cp	Computed/Assigned by Repository, required in register transaction.
Cg	Computed/Assigned by Registry
Cx	Optionally Computed/Assigned by a Document Registry <u>or Initiating Gateway</u>

1590

Update ITI TF-3:4 Table 4.1-5 to update the homeCommunityId entry to reference section 3.38.4.1.2.1

Table 4.1-5 Document Metadata Attribute Definition

XDS Document Attribute	Definition	Source/Query	Constraints
homeCommunityId	A globally unique identifier for a community.	Cx/O	64 character OID in URI syntax See ITI TF-2a: 3.18.4.1.2.3.8 ITI TF-2b: 3.38.4.1.2.1

1595

Update ITI TF-3:4 Table 4.1-6 to update the homeCommunityId entry to reference section 3.38.4.1.2.1

1600

Table 4.1-6 Submission Set Metadata Attribute Definitions

XDS Submission Set Attribute	Definition	Source/Query	Constraints
homeCommunityId	A globally unique identifier for a community.	Cx/O	64 character OID in URI syntax

XDSSubmission Set Attribute	Definition	Source/Query	Constrains
			See ITI TF-2a: 3.18.4.1.2.3.8 ITI TF-2b: 3.38.4.1.2.1

Update ITI TF-3:4 Table 4.1-7 to update the homeCommunityId entry to reference section 3.38.4.1.2.1

1605

Table 4.1-7 Folder Metadata Attribute Definitions

XDSSFolder Attribute	Definition	Source/Query	Constrains
homeCommunity Id	A globally unique identifier for a community.	Cx/O	64 character OID in URI syntax See ITI TF-2a: 3.18.4.1.2.3.8 ITI TF-2b: 3.38.4.1.2.1

Update TF-3: 4.1.13 Error Reporting which updates the description of the location attribute of a RegistryError element.

1610

The following attributes on the RegistryError element are optional:

- **location** supplies the **original** location of the error: **homeCommunityId**, module name and line number or stack trace if appropriate.
- **highestSeverity** – supplies the severity of the most severe error (this attribute is not available in ebRS 2.1)

1615

1620 *Update Error Reporting section of the ITI TF-3 (4.1.2.13) to add two new error codes to Table 4.1-11. NOTE: this section assumes the updates to this table specified in the XDS.b Supplement are applied first. Because the list of transactions has grown lengthy they are moved outside the table heading for this update.*

Table 4.1-11 – Error Codes

Error Code	Discussion	Transaction (See Note 1)
<u>XDSUnknownCommunity</u>	<u>A value for the homeCommunityId is not recognized</u>	<u>SQ, XGQ, RS, XGR</u>
<u>XDSMissingHomeCommunityId</u>	<u>A value for the homeCommunityId is required and has not been specified</u>	<u>SQ, XGQ, RS, XGR</u>
<u>XDSUnavailableCommunity</u>	<u>A community which would have been contacted was not available . See Note 2.</u>	<u>SQ, RS</u>

Note 1:

- 1625 **P** = Provide and Register, Provide and Register-b
R = Register, Register-b
Q = Query
SQ = Stored Query
RS = Retrieve Document Set

- 1630 **XGQ** = Cross Gateway Query
XGR = Cross Gateway Retrieve

Note 2:

Two examples of the use of error code XDSUnavailableCommunity are:

- 1635 1. A Cross Gateway Query or Cross Gateway Retrieve fail because the community identified by a homeCommunityId could not be contacted.
2. A Cross Gateway Query based on Patient ID could not contact some known communities to relay the query.

1640 The error would be generated by the Initiating Gateway and returned in the Registry Stored Query or Retrieve Document Set. This would only apply when XDS Affinity Domain Option was used.

Update TF-3:4.1 Table 4.1-15 table heading to add the Cross Gateway Query

Table 4.1-15 – Stored Query and Cross Gateway Query Responses

Update TF-3:4.1 Table 4.1-16 table heading to add the Cross Gateway Retrieve

1645 **Table 4.1-16 – Retrieve Document Set and Cross Gateway Retrieve Responses**