Integrating the Healthcare Enterprise

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IHE IT Infrastructure
Technical Framework Supplement

10

Asynchronous AS4 Option

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Revision 1.2 – Trial Implementation

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Foreword

This is a supplement to the IHE IT Infrastructure Technical Framework V16. Each supplement
30   undergoes a process of public comment and trial implementation before being incorporated into
the volumes of the Technical Frameworks.

This supplement is published on July 12, 2019 for trial implementation and may be available for
testing at subsequent IHE Connectathons. The supplement may be amended based on the results
of testing. Following successful testing it will be incorporated into the IT Infrastructure
35   Technical Framework. Comments are invited and can be submitted at
http://www.ihe.net/ITI_Public_Comments.

This supplement describes changes to the existing technical framework documents.

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

40   *Amend Section X.X by the following:*

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

45

General information about IHE can be found at www.ihe.net.

Information about the IHE IT Infrastructure domain can be found at ihe.net/IHE_Domains.

Information about the organization of IHE Technical Frameworks and Supplements and the
process used to create them can be found at http://ihe.net/IHE_Process and http://ihe.net/Profiles.

50   The current version of the IHE IT Infrastructure Technical Framework can be found at
http://ihe.net/Technical_Frameworks.

CONTENTS

55

Introduction to this Supplement

195   This supplement introduces a new Asynchronous Web Services (WS) Exchange stack based on the OASIS Applicability Statement 4 (AS4).

The current WS-Addressing Asynchronous WS Exchange stack is an IHE specialization of the asynchronous capabilities of the WS stack. It is based on WS-Addressing and MTOM/XOP and is left unchanged by this Supplement.

200   The AS4 Specification provides a more robust Asynchronous WS Exchange Option which is attractive for upcoming cross-border ehealth information exchange, such as the European eHealth Digital Service Infrastructure that deploys the XCA, XCPD, and XCDR Profiles and for countries where the adoption of the OASIS AS4 reliable and secure messaging is common when cross-sector (beyond the health sector) applicability is needed.

205   This new Asynchronous Web Services Exchange stack:

Relies on the OASIS AS4 WS Stack that has been natively designed to support Asynchronous WS Exchange and offers:

   a. Message packaging governed by ebMS 3.0 and message security governed by WS-Security

210   b. Support for both *push* and *pull* message exchange choreographies

   c. Payload compression

   d. Non-Repudiation of Origin and Receipt (NRO/NRR)

   e. Reception Awareness – simple and effective reliable messaging with no known interoperability issues

215   Is introduced as:

   a. An option to the profiles where the current WS-Addressing based Asynchronous WS Exchange is currently available,

   b. A new option to the XDR and XCDR Profiles, where the [ITI-41] is specified to support Asynchronous WS, but the option is not exposed.

220

Open Issues and Questions

None

Closed Issues

225 ***AS4-1: Which is the best approach to convey the document content in the case of IHE transactions[ITI-39], [ITI-41], [ITI-43] and [ITI-80] that involves the inclusion of document metadata along with document content?***

Several packaging alternatives can be considered:

1. *Place all document content inline as content of xds:Document elements in base64*
230 *encoded form in the XML document in the SOAP Body (and not in a MIME Attachment)*

2. *Place all document content inline as content of xds:Document elements in base64 encoded form in the XML document in a MIME Attachment*

3. *Place each individual document content inline in native format as separate MIME*
235 *parts that are <u>directly</u> cross-referenced from rim:ExtrinsicObject metadata using the Volume 3, 4.2.3.2.27 DocumentEntry.URI mechanism*

4. *Place all documents inline in native format as separate MIME parts that are <u>indirectly</u> cross-referenced from rim:ExtrinsicObject by placing the value of that object's "id" attribute as a Part Property in the AS4 PartInfo. As that same PartInfo*
240 *element links to the MIME part content identifier using its "href" attribute, metadata and payload content are unambiguously linked.*

Agreed Solution: *Alternative 4 was chosen*

Alternative 1 is suboptimal as the payloads have to be base64-encoded and base64-decoded and the overall message size increases due to the AS4 compression feature not being applicable to
245 *SOAP Body content.*

Alternative 2 is also suboptimal as the payloads also have to be base64-encoded and base64-decoded. An advantage over Alternative 1 is that the message size will be optimized as the AS4 compression feature can be applied to MIME parts.

In Alternative 3 and 4 there is no base64-encoding or decoding and compression is available (if
250 *the native format is not already natively compressed). However, in Alternative 3, the RIM XML has to be aware of AS4 message MIME content identifiers, a task normally left to the AS4 engine.*

Therefore, the TI version uses Alternative 4, as it has the advantages of Alternative 3, and provides a higher degree of indirection. When available, it concatenates the HomeCommunityID
255 *with the documentId to strengthen uniqueness in case the same documentID is used for different documents in different communities.*

___

AS4-3: *Appendix V identifies 4 different types of MEP in the PMode possibilities. Should all be supported in Appendix V, when only one may be typically used (e.g., Push and Push?*

Resolution: The following is proposed to ensure an interoperable base line (Push and Push,
260   without excluding that other MEP be used by specific deployments):

PMode.MEPBinding	AS4 defines the following values:
	http://docs.oasis-open.org/ebxml-msg/ebms/v3.0/ns/core/200704/push
	http://docs.oasis-open.org/ebxml-msg/ebms/v3.0/ns/core/200704/pushAndPush
	http://docs.oasis-open.org/ebxml-msg/ebms/v3.0/ns/core/200704/pushAndPull
	http://docs.oasis-open.org/ebxml-msg/ebms/v3.0/ns/core/200704/pullAndPush
	Support is required for pushAndPush. Others are optional.

AS4-2: *AS4 supports both a Push-and-Push mode and a Push and Pull mode. They are both covered by Appendix V.4. The two modes are described in the figures below.*
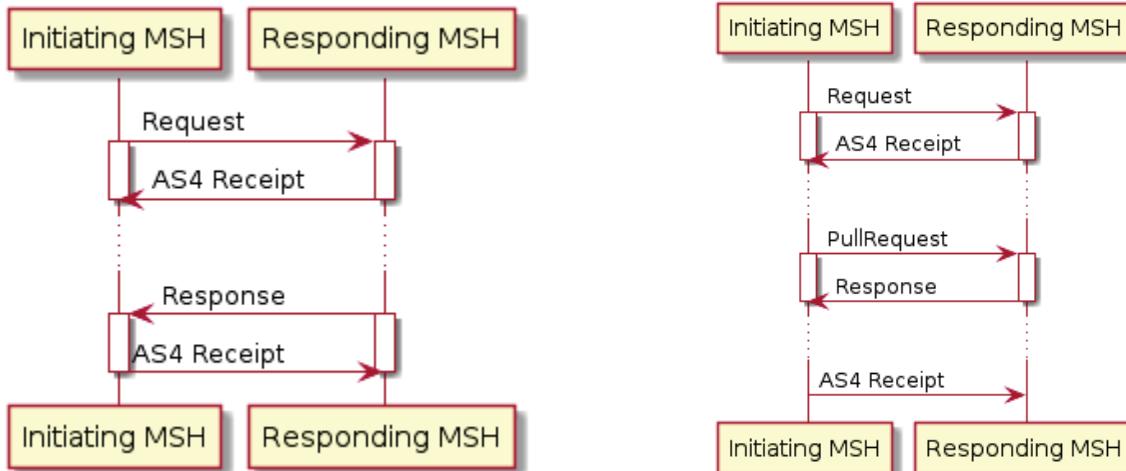
265   ***Should we:***

1.   *Require the support of the Asynchronous-Push-Push Option and allow the optional support of other MEP (e.g., an Asynchronous-Push-Pull Option) in Appendix V.4 and not specify a choice in the IHE transactions. By allowing implementations to support a baseline interoperability is guaranteed. With the ability to use the other MEP, this leaves*
270   *the deployment more flexible. AS4 engines typically support all MEPs*

___

2.   *Select in the transactions covered by this Supplement either the Push-and-Push mode or the Push-and-Pull depending on the transaction. However, end-to-end considerations may influence this choice, thus requiring the flexibility of Alternative 1.*

275   3.   *Require the Responding MSH to support both the Asynchronous-Push-Push Message Exchange Pattern and the Asynchronous-Push-Pull Message Exchange Pattern, and allow the initiating MSH to choose which one they want they want to use.*

Agreed Solution: *Alternative 1 was chosen*

AS4-4: *How to deal with AS4 examples?*

280   **Agreed Resolution**: *Examples of AS4 differ minimally based on the transaction conveyed (Service, Action, To/From Roles reversed, etc.). A number of typical examples have been included in Appendix V Section 4 with notes explaining the few "attributes" that are being changed depending of the transactions. This avoids fragmenting the examples and/or spread them around the various transactions.*

285

AS4-5: *The Deferred Option seems to be an Asynchronous type exchange in XCPD*. *Is it still needed with the AS4 Asynchronous Option? Should it be a push and push AS4 Asynchronous P-Mode MEP?*

Agreed response: *It is proposed to keep the Deferred Option as currently specified as it is an*
290   *application (versus transport-level) mode of operation, longer term delays (hours and days) compared to the AS4 Asynchronous push and push typical delays (minutes).*

AS4-6: *Support of AS4 Asynchronous Web Service Exchange Option on [ITI-18] Query Stored Registry and [ITI-43] Retrieve Document Set-b.*

295   *XCA Profile supports the XDS Affinity Domain Option that requires [ITI-18] and [ITI-43] transactions from the XDS Profile, triggered by a Document Consumer to an Initiating Gateway. These transactions support the current WS-Addressing Asynchronous Web Services Option. This Supplement introduces the AS4 Asynchronous Web Services Option to align both Asynchronous Options.*

300   **Should we:**

1.   *Support in the Supplement the AS4 Asynchronous Web Services Option on these two XDS transactions when the Document Consumer interacts with the Initiating Gateway of the XCA Profile.*

2.   *Extend the support of the AS4 Asynchronous Web Services Option to all actors*
305   *and transactions of the XDS Profile where the Asynchronous Web Services Option already exists.*

3.   *Remove the support of the AS4 Asynchronous Web Services Option on the [ITI-18] and [ITI-43] transactions.*

Resolution: It is proposed to proceed with Alternative 1. To clarify this support, the Document
310   Consumer has been explicitly introduced in the XCA Profile (in current XCA the [ITI-18] and
[ITI-43] transactions are required with the XDS Affinity Domain Option, but the XDS Document
Consumer was not explicitly introduced).

AS4-7: **With the support of two Asynchronous options:**

315   • **the AS4 Asynchronous Web Service Exchange Option and**

• **the Asynchronous** **(WS-Addressing based)** **Web Service Exchange Option,**

in order to distinguish between the two similar options, there is a need to qualify the current
"Asynchronous Web Service Exchange Option" with "WS-Addressing based" such as
Asynchronous Web Service Exchange Option (WS-Addressing based). This is what has been
320   *done by this Supplement with XCA, XCPD, XDR and XCDR. Resolution: It has been decided*
to not change the name of the current option to avoid updating several profiles such as XDS,
MPQ and XCF that reference the current **Asynchronous Web Service Exchange Option**. It is
proposed to create a distinct Change Proposals (CPs) to simply update the references in
Appendix V to the more precise section (V.3 for Synchronous and WS-Addressing based
325   Asynchronous) and V.4 for AS4 (Asynchronous) and to simply qualify the current option in this
supplement by (WS-Addressing based) so that it is better contrasted with the AS4 Asynchronous
Web Service one.

AS4-8: **With the introduction of the AS4 Asynchronous Web Service Exchange Option and the**
330   **making of the WS-Addressing based Asynchronous Web Service Exchange Option no longer**
required on Responding Gateways (lowering requirements in the current XCA and XCPD
Profile), this may introduce a gap in the way integration statements may be interpreted.

Design Assumption: *When making the current WS-Addressing based Asynch support as an*
explicit Option on the XCA Responding Gateway, one provides the flexibility to product
335   *designers and deployment to select the Asynchronous Option they prefer, either WS-Addressing*
or AS4 or both. It also seems important to maintain Synchronous as a required baseline to
ensure interoperability among all XCA/XCPD Initiating or Responding GW that support
XCA/XCPD.

Resolution:

340   The Responding Gateways of XCA and XCPD will be offered the choice to support either one or
both of the asynchronous Option (WS-Addressing or AS4 based).

With this design assumption a product claiming support of the XCA/XCPD Profile as a
Responding Gateway may not support WS-Addressing based Asynchronous Web Service

Exchange but the AS4 Option. This fact will be clear in the Product Integration Statement, because the AS4 Option will be mentioned.

If an older product does not claim any option, it may support WS-Addressing based Web Services Exchanges. If it is a new product, it will explicitly list the AsynchronousWebservices Exchanges (WS-Addressing based).

It was felt acceptable that older products may have to add the option to make their support of the WS-Addressing based Asynchronous Webservices Exchanges explicit.

AS4-9: *The various "urn" referenced in this Supplement need to be checked to ensure that they are registered in the IHE terminology Wiki.*

Agreed Solution: This will be done during the publication process of the TI version of the Supplement.

AS4-10: *Should this work item engage in redocumenting the XD* transaction that have not yet been redocumented (e.g., [ITI-43] Retrieve Document Set)?*

 Resolution: *No systematic redocumentation effort has been made for two reasons:*

  o *It was felt critical to avoid mixing of editorial redocumentation with actual technical changes introducing the AS4 Asynchronous Option. Such mixing is prone to accidental changes that would impact the current specification of synchronous web services.*

  o *This is a rather extensive effort that would have distracted resources for the primary focus of the Supplement.*

  o *As a result, it has been decided to update the various transactions, keeping their respective documentation styles (consistency within the transaction has been preferred).*

AS4-11: *Timing issue: Is pre-work needed in 2018 Final Text publication to issue a CP-1122 to clear up editorial structure "baggage" to make the AS4 supplement simpler and easier to apply when eventually approved?*

 Resolution: *It is a possibility that has been applied to Appendix V. There are three types of changes needed for Appendix V:*

  1. *Improve the structure and remove some of the somewhat obsolete discussion material. Creating a new structure that will be capable to perform more simply the extensions to add the definition of the AS4 asynchronous Web Services is proposed to be addressed by a redocumentation CP-1122.*

2. *Correct references to an ongoing effort by HL7®[1] on web services that never*
380 *resulted in a published standard and update the references to current OASIS*
webservices standards. This will not be addressed by this supplement, but by a
distinct CP-1123.

3. *Introduce the AS4 based asynchronous web services exchange options, which is*
the focus of this supplement. There this supplement will build upon the
385 *redocument CP identified in point 1.*

AS4-12: The use of the SOAP specific attributes for both the Synchronous and the AS4
Asynchronous Web Services stacks will not be moved to Appendix V. *This would reduce the*
documentation details in the various transactions referencing Appendix V. However, there are
390 *sufficient differences for each transaction to document and it was not the way it was done so far.*

Resolution: *The style proposed in the Public Comment version is to leave this*
documentation in the Transaction and use in the case of AS4 Asynchronous the same
approach as the one used for Synchronous.

395 **AS4-21: Section 3.55.6 Protocol Requirements may need a review to consider**
redocumentation in order to better split the payload (HL7 V3 Transaction) from the various
SOAP transport mappings.

Agreed: *Subsections have been created in the TI version of the Supplement.*

400 **AS4-22: Section V.4.4.6 Message Layer Security places some requirements for channel**
encryption that may be perceived to interact with ATNA requirements through statements
such as:

Signing and encryption are configured using P-Modes. The use of message layer signing
is configured using the PMode[].Security. X509.Signature parameter set. The use of
405 *message layer encryption is configured using the PMode[].Security. X509.Encryption*
parameter set.

Resolution: As current ATNA only requires WS-I-Basic Security Profile1.0 and AS4 is based on
the same, there are no incompatibilities nor any need to change ATNA as specified.

410 **AS4-23: In Synchronous and WS-Addressing based Asynchronous (see 3.55.4.1.2 and**
3.55.4.2.2) for [ITI-55] Cross Gateway Patient Discovery, there is a capability to set a duration
time suggestion for caching correlations resulting from the interaction. For example: *The*
Initiating Gateway may specify a duration value in the SOAP Header element of the request.

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[1] HL7 is the registered trademark of Health Level Seven International.

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415   *This value suggests to the Responding Gateway a length of time that the Initiating Gateway recommends caching any correlation resulting from the interaction. For the Synchronous and WS-Addressing Option of Web Services Exchange, the duration value is specified in the SOAP Header using the CorrelationTimeToLive element and contains a value conformant with the xs:duration type defined in* http://www.w3.org/TR/xmlschema-2/#duration*.*

420   **Resolution:** This capability will be included in the AS4 Asynchronous WebService Exchange for the request and the response in a manner acceptable to ebMS and AS4. It will use the "message property" attributes

General Introduction and Shared Appendices

425   The IHE Technical Framework General Introduction and Shared Appendices are components shared by all of the IHE domain technical frameworks. Each technical framework volume contains links to these documents where appropriate.

430   *Update the following appendices to the General Introduction as indicated below. Note that these are **not** appendices to Volume 1.*

Appendix D – Glossary

*Add the following **new** glossary terms to the IHE Technical Frameworks General Introduction Appendix D.*

435

Glossary Term	Definition
ebMS3.0	ebXML Messaging Services. A family of standards from OASIS.
AS4	Applicability Statement 4: A profile of ebMS3.0

Volume 1 – Profiles

440

XDR Profile
Update Vol 1 Section 15.2 as follows:

15.2 XDR Integration Profile Options

Options that may be selected for this Integration Profile are listed in Table 15.2-1 along with the actors to which they apply. Dependencies between options when applicable are specified in

445 notes.

Table 15.2-1: XDR - Actors and Options

Actor	Options	Vol. & Section
Document Source	Basic Patient Privacy Enforcement	ITI TF-1: 15.2.2
	AS4 Asynchronous Web Services Exchange	**ITI TF-1: 15.2.4**
Metadata-Limited Document Source	Basic Patient Privacy Enforcement	ITI TF-1: 1 5.2.2
	AS4 Asynchronous Web Services Exchange	**ITI TF-1: 15.2.4**
Document Recipient	Basic Patient Privacy Enforcement	ITI TF-1: 15.2.2
	Accepts Limited Metadata	ITI TF-1: 15.2.3
	AS4 Asynchronous Web Services Exchange	**ITI TF-1: 15.2.4**

15.2.1 Intentionally Left Blank

…

450

Add a new Vol 1 Section 15.2.4 as follows:

15.2.4 AS4 Asynchronous Web Services Exchange Option

Asynchronous processing is necessary to support scaling to large numbers of sources and recipients because Asynchronous Web Services Exchange allows for more efficient handling of

455 latency and scale. This AS4 Asynchronous Web Services Exchange stack relies on the OASIS

AS4 WS Stack that has been natively designed to support Asynchronous WS Exchange and offers (see also ITI TF-2x: Appendix V.5):

a. Message packaging governed by ebMS 3.0 and message security governed by WS-Security

460

b. Support for both *push* and *pull* message exchange choreographies

c. Payload compression

d. Non-Repudiation of Origin and Receipt (NRO/NRR)

e. Reception Awareness – simple and effective reliable messaging with no known interoperability issues

465 Document Sources which support the AS4 Asynchronous Web Services Exchange Option shall support AS4 Asynchronous Web Services Exchange on the Provide and Register Document Set-b [ITI-41] transaction.

Metadata-Limited Document Sources which support the AS4 Asynchronous Web Services Exchange Option shall support AS4 Asynchronous Web Services Exchange on the Provide and 470 Register Document Set-b [ITI-41] transaction.

Document Recipients which support the AS4 Asynchronous Web Services Exchange Option shall support AS4 Asynchronous Web Services Exchange on the Provide and Register Document Set-b [ITI-41] transaction.

475

> **_XCA Profile_**
>
> _Update Vol 1 Section 18.1 and 18.2 as follows._
>
> **_NOTE:_** _Replace Figure 18.1-1 with the figure below._

480 ## 18.1 Actors/ Transactions

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

~~Note: The Document Consumer is shown in Figure 18.1-1 to clarify the responsibility of the XDS Affinity Domain Option discussed in Section 18.2.~~
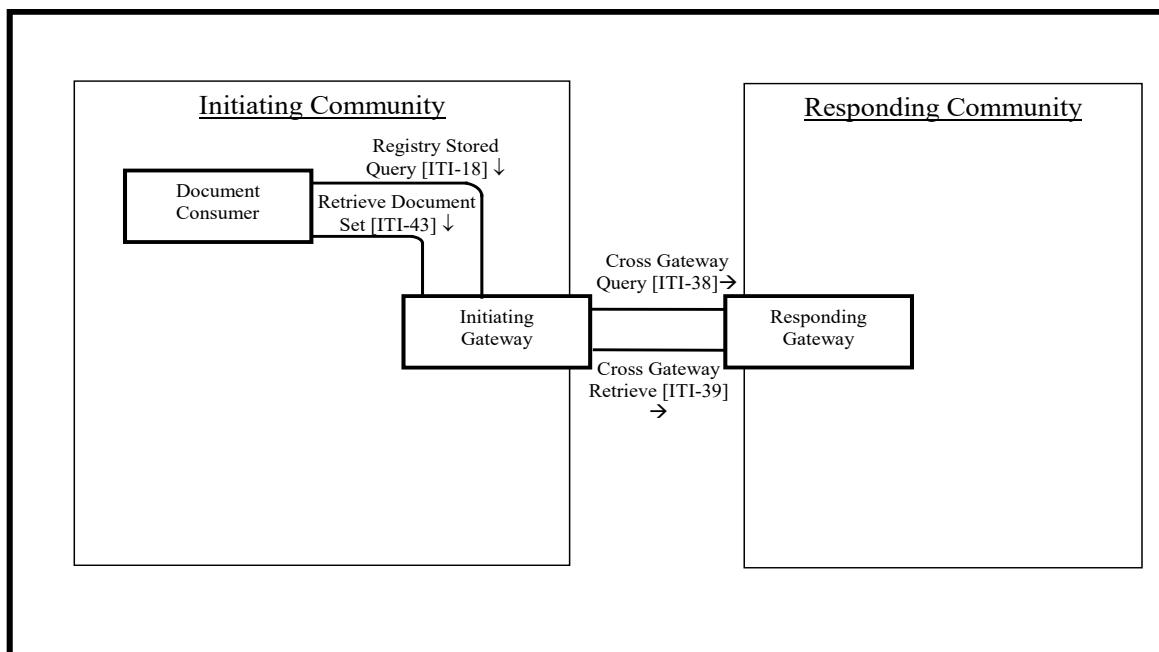
485

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

490 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
Document Consumer	**Registry Stored Query [ITI-18]**	**R**	**ITI TF-2a: 3.18**
	Retrieve Document Set [ITI-43]	**R**	**ITI TF-2b: 3.43**

495

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.

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

500 notes.

Table 18.2-1: XCA Integration Profile - Actors and Options

Actor	Options	Vol. & Section
Initiating Gateway	XDS Affinity Domain Option	ITI TF-1: 18.2.1
	Asynchronous Web Services Exchange	ITI TF-1: 18.2.2
	On-Demand Documents	ITI TF-1: 18.2.4
	AS4 Asynchronous Web Services Exchange	**ITI TF-1: 18.2.6**
Responding Gateway	On-Demand Documents	ITI TF-1: 18.2.4
	Persistence of Retrieved Documents	ITI TF-1: 18.2.5
	Asynchronous Web Services Exchange (Note 1)	**ITI TF-1: 18.2.2**
	AS4 Asynchronous Web Services Exchange (Note 1)	**ITI TF-1: 18.2.6**
Document Consumer	**On-Demand Documents (Note 2)**	**ITI TF-1: 10.2.7**
	Basic Patient Privacy Proof (Note 2)	**ITI TF-2a: 3.18.4.1.3.6**
	Basic Patient Privacy Enforcement (Note 2)	**ITI TF-1: 10.2.9**
	Asynchronous Web Services Exchange (Note 1)	**ITI TF-1: 18.2.2**
	AS4 Asynchronous Web Services Exchange (Note 1)	**ITI TF-1: 18.2.6**

Note 1: The Responding Gateway shall implement at least one of these options: Asynchronous (WS-Addressing based) Web Services Exchange or AS4 Asynchronous Web Services Exchange.

Note 2: The Options on the Document Consumer, besides the two Asynchronous ones, are identical to those defined in
505 **the XDS Profile (see ITI TF-1: 10.2).**

Update Vol 1 Section 18.2.2 as follows:

18.2.2 Asynchronous Web Services Exchange Option (WS-Addressing based)

510 **Asynchronous processing is necessary to support scaling to large numbers of sources and recipients because Asynchronous Web Services Exchange allows for more efficient handling of latency and scale. This Asynchronous Web Services Exchange Option relies on the Web Service Addressing Stack (see ITI TF-2x: Appendix V.3).**

Initiating Gateways which support **the** Asynchronous Web Services Exchange **Option** shall
515 support **WS-Addressing based** 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~~ **the Initiating Gateway** shall support **WS-Addressing** based Asynchronous Web Services Exchange on the Registry Stored Query [ITI-18] and Retrieve
520 Document Set [ITI-43] transactions. **These transactions are triggered by a Document Consumer that also supports WS-Addressing based Asynchronous Web Services.**

Responding Gateways which support the Asynchronous Web Services Exchange Option shall support WS-Addressing based Asynchronous Web Services Exchange on the Cross Gateway Query [ITI-38] and Cross Gateway Retrieve [ITI-39] transactions.

525 **Document Consumer that support the Asynchronous Web Services Exchange Option shall support WS-Addressing based Asynchronous Web Services Exchange on the Registry Stored Query [ITI-18] and Retrieve Document Set [ITI-43] transactions.**

530 *Add a new Vol 1 Section 18.2.6 as follows:*

18.2.6 AS4 Asynchronous Web Services Exchange Option

Asynchronous processing is necessary to support scaling to large numbers of communities because Asynchronous Web Services Exchange allows for more efficient handling of latency and scale. This AS4 Asynchronous Web Services Exchange stack relies on the OASIS AS4 WS
535 Stack that has been natively designed to support Asynchronous WS Exchange and offers (see also ITI TF-2x: Appendix V.5):

a. Message packaging governed by ebMS 3.0 and message security governed by WS-Security

b. Support for both *push* and *pull* message exchange choreographies

540 c. Payload compression

d. Non-Repudiation of Origin and Receipt (NRO/NRR)

---

e. Reception Awareness – simple and effective reliable messaging with no known interoperability issues

Initiating Gateways which support the AS4 Asynchronous Web Services Exchange shall support AS4 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 AS4 Asynchronous Web Services Option, the Initiating Gateway shall support AS4 Asynchronous Web Services Exchange on the Registry Stored Query [ITI-18] and Retrieve Document Set [ITI-43] transactions. These transactions are triggered by a Document Consumer that also supports AS4 Asynchronous Web Services.

Responding Gateways which support the AS4 Asynchronous Web Services Exchange shall support AS4 Asynchronous Web Services Exchange on the Cross Gateway Query [ITI-38] and Cross Gateway Retrieve [ITI-39] transactions.

Document Consumer that support the AS4 Web Services Exchange Option shall support AS4 Asynchronous Web Services Exchange on the Registry Stored Query [ITI-18] and Retrieve Document Set [ITI-43] transactions.

560

> **XCPD Profile**
>
> *Update Vol 1 Section 27.1.1 as follows:*

27.1.1 Actors

27.1.1.1 Initiating Gateway

565   The Initiating Gateway supports all outgoing inter-community communications. XCPD uses this actor to initiate the Cross Gateway Patient Discovery [ITI-55]. ~~The Initiating Gateway is required to support synchronous transaction messaging and may declare an option to support Asynchronous Web Services Exchange. Choosing Asynchronous Web Services Exchange will allow the Initiating Gateway to support workflows which scale to large~~

570   ~~numbers of communities because Asynchronous Web Services Exchange allows for more efficient handling of latency and scale.~~

27.1.1.2 Responding Gateway

The Responding Gateway supports all incoming inter-community communications. XCPD uses this actor to receive the Cross Gateway Patient Discovery [ITI-55]. ~~The Responding Gateway is~~

575   ~~required to support either or both the Asynchronous Web Services Exchange all implemented transactions. This allows the Initiating Gateway to choose the better of the two messaging patterns (synchronous or asynchronous) that fit the needs of the workflow. Support for Asynchronous Web Services Exchange allows for workflows which scale to large numbers of communities because it can handle latency and scale more efficiently.~~

580

> *Update Vol 1 Section 27.2 as follows:*
>
> *Note, the changes related to the Patient Location Query [ITI-56] transaction assume that the*
585 > *XCPD HDL Supplement is integrated prior to the changes below. Only two changes are made, adding "and Patient Location Query [ITI-56] transactions" in Section 27.2.1 and 27.2.3.*

27.2 XCPD Integration Profile Options

Options that may be selected for this Integration Profile are listed in Table 27.2-1 along with the actors to which they apply. Dependencies between options when applicable are specified in
590   notes.

Table 27.2-1: XCPD - Actors and Options

Actor	Options	Vol. & Section
Initiating Gateway	Asynchronous Web Services Exchange	ITI TF-1: 27.2.1
	AS4 Asynchronous Web Services Exchange	**ITI TF-1: 27.2.3**
	Deferred Response	ITI TF-1: 27.2.2
Responding Gateway	Deferred Response	ITI TF-1: 27.2.2
	Asynchronous Web Services Exchange (Note 1)	**ITI TF-1: 27.2.1**
	AS4 Asynchronous Web Services Exchange (Note 1)	**ITI TF-1: 27.2.3**

Note 1: The Responding Gateway shall implement at least one of these options: Asynchronous (WS-Addressing based) or AS4 Asynchronous.

595 ### 27.2.1 <u>Asynchronous Web Services Exchange Option (WS-Addressing based)</u>

Asynchronous processing is necessary to support scaling to large numbers of communities because Asynchronous Web Services Exchange allows for more efficient handling of latency and scale (see also ITI TF-2x Appendix V.3).

Initiating Gateways which support **the** Asynchronous Web Services Exchange **Option** shall
600 support **WS-Addressing based** Asynchronous Web Services Exchange on the Cross Gateway Patient Discovery [ITI-55] **transaction. If the Initiating Gateway also supports the Health Data Locator Option, it shall support WS-Addressing based Asynchronous Web Services Exchange on the Patient Location Query [ITI-56] transaction.** ~~Asynchronous processing is necessary to support scaling to large numbers of communities because Asynchronous Web~~
605 ~~Services Exchange allows for more efficient handling of latency and scale.~~

Responding Gateways which support the Asynchronous Web Services Exchange Option shall support WS-Addressing based Asynchronous Web Services Exchange on the Cross Gateway Patient Discovery [ITI-55] transaction. If the Responding Gateway also supports the Health Data Locator Option, it shall support WS-Addressing based Asynchronous Web
610 **Services Exchange on the Patient Location Query [ITI-56] transaction.**

Add a new Vol 1 Section 27.2.3 as follows:

27.2.3 AS4 Asynchronous Web Services Exchange Option

615 Asynchronous processing is necessary to support scaling to large numbers of communities because Asynchronous Web Services Exchange allows for more efficient handling of latency and scale. This Asynchronous Web Services Exchange stack relies on the OASIS AS4 WS Stack that has been natively designed to support Asynchronous WS Exchange and offers (see also ITI TF-2x Appendix V.5):

620   a. Message packaging governed by ebMS 3.0 and message security governed by WS-Security

        b. Support for both push and pull message exchange choreographies

        c. Payload compression

        d. Non-Repudiation of Origin and Receipt (NRO/NRR)

625   e. Reception Awareness – simple and effective reliable messaging with no known interoperability issues

Initiating Gateways which support the AS4 Asynchronous Web Services Exchange Option shall support AS4 Asynchronous Web Services Exchange on the Cross Gateway Patient Discovery [ITI-55] transaction. If the Initiating Gateway also supports the Health Data Locator Option, it
630 shall support AS4 Asynchronous Web Services Exchange on the Patient Location Query [ITI-56] transaction.

Responding Gateways which support AS4 Asynchronous Web Services Exchange Option shall support AS4 Asynchronous Web Services Exchange on the Cross Gateway Patient Discovery [ITI-55] transaction. If the Responding Gateway also supports the Health Data Locator Option, it
635 shall support AS4 Asynchronous Web Services Exchange on the Patient Location Query [ITI-56] transaction.

640
> **XCDR Trial Implementation Supplement:**
>
> *Update Section 40.2 as follows:*

40.2 XCDR Actor Options

Options that may be selected for each actor in this profile, if any, are listed in Table 40.2-1. Dependencies between options when applicable are specified in notes.

645
Table 40.2-1: XCDR - Actors and Options

Actor	Options	Reference
Initiating Gateway	Basic Patient Privacy Enforcement	ITI TF-1: 40.2.1 ITI TF-2c: 3.80.4.1.3.1
	AS4 Asynchronous Web Services Exchange	**ITI TF-1: 40.2.2**
Responding Gateway	Basic Patient Privacy Enforcement	ITI TF-1: 40.2.1 ITI TF-2c: 3.80.4.1.3.1
	AS4 Asynchronous Web Services Exchange	**ITI TF-1: 40.2.2**

> *Add a new Section 40.2.2 as follows:*

40.2.2 AS4 Asynchronous Web Services Exchange

650 Asynchronous processing is necessary to support scaling to large numbers of sources and recipients because Asynchronous Web Services Exchange allows for more efficient handling of latency and scale. This Asynchronous Web Services Exchange stack relies on the OASIS AS4 WS Stack that has been natively designed to support Asynchronous Web S Exchange and offers (see also ITI TF-2x: Appendix V.5):

655
    a. Message packaging governed by ebMS 3.0 and message security governed by WS-Security

    b. Support for both push and pull message exchange choreographies

    c. Payload compression

    d. Non-Repudiation of Origin and Receipt (NRO/NRR)

660
    e. Reception Awareness – simple and effective reliable messaging with no known interoperability issues

Initiating Gateways which support the AS4 Asynchronous Web Services Exchange Option shall support AS4 Asynchronous Web Services Exchange on the Cross Gateway Document Provide [ITI-80] transaction.

665　　Responding Gateways which support the AS4 Asynchronous Web Services Exchange Option shall support AS4 Asynchronous Web Services Exchange on the Cross Gateway Document Provide [ITI-80] transaction.

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670

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*In Vol 2a Section 3.18, **Registry Stored Query [ITI-18]**, update the sub-sections as follows.*

Update Vol 2a Section 3.18.4.1.2.7 as follows.

675 *Text highlighted in green should remain in bold font when integrated to help distinguish requirements for Sync/Async from requirements for AS4.*

3.18.4.1.2 Message Semantics

…

3.18.4.1.2.7 Web Services Transport

This section describes requirements for Web Services transport for:

680
- **Synchronous**

- **WS-Addressing -based Asynchronous**

- **AS4 Asynchronous**

For the support of both Synchronous and Asynchronous (WS-Addressing based) Web Service exchange cases, the requirements are the following:

685 The query request and response will be transmitted using Web Services, according to the requirements specified in ITI TF-2x: Appendix V.**3**. The specific values for the WSDL describing the Stored Query Service are described below.

The Document Registry shall accept a Registry Stored Query Request formatted as a SIMPLE SOAP message and respond with a Registry Stored Query Response formatted as a SIMPLE
690 SOAP message. The Document Consumer shall generate the Registry Stored Query Request formatted as a SIMPLE SOAP message and accept a Registry Stored Query Response formatted as a SIMPLE SOAP message

IHE-WSP201) The attribute /wsdl:definitions/@name shall be "DocumentRegistry".

695 The following WSDL naming conventions shall apply:

```
wsdl:definitions/@name="DocumentRegistry":
query message     -> "RegistryStoredQuery_Message"
query response    -> "RegistryStoredQuery_Response_Message"
portType          -> "DocumentRegistry_PortType"
operation         -> "RegistryStoredQuery"
SOAP 1.2 binding  -> "DocumentRegistry_Binding_Soap12"
```
700

```
SOAP 1.2 port   -> "DocumentRegistry_Port_Soap12"
```

IHE-WSP202) The targetNamespace of the WSDL shall be "urn:ihe:iti:xds-b:2007"

705 Document Registry: These are the requirements for the Registry Stored Query transaction presented in the order in which they would appear in the Document Registry WSDL definition:

- The following types shall be imported (xsd:import) in the /definitions/types section:

  o namespace=" urn:oasis:names:tc:ebxml-regrep:xsd:query:3.0", schemaLocation="query.xsd"

710 - The /definitions/message/part/@element attribute of the Registry Stored Query Request message shall be defined as "query:AdhocQueryRequest"

- The /definitions/message/part/@element attribute of the Registry Stored Query Response message shall be defined as "query:AdhocQueryResponse"

- Refer to Table 3.18.4.1.2.7-1 below for additional attribute requirements

715 To support the ==**Asynchronous Web Services Exchange Option (WS-Addressing based)**== on the Document Consumer, the Document Registry shall support the use of a non-anonymous response EPR in the WS-Addressing replyTo header.

Table 3.18.4.1.2.7-1: Additional Attribute Requirements

Attribute	Value
/definitions/portType/operation@name	DocumentRegistry_RegistryStoredQuery
/definitions/portType/operation/input/ @wsaw:Action	urn:ihe:iti:2007:RegistryStoredQuery
/definitions/portType/operation/output/ @wsaw:Action	urn:ihe:iti:2007:RegistryStoredQuery Response
/definitions/binding/operation/wsoap12 :operation/@soapActionRequired	false

720 The following WSDL fragment shows an example of Registry Stored Query transaction definition:

```
<?xml version="1.0" encoding="utf-8"?>
<definitions ...>
  ...
  <types>
      <xsd:schema elementFormDefault="qualified"
targetNamespace="urn:ihe:iti:xds-b:2007">
          <xsd:import
              namespace="urn:oasis:names:tc:ebxml-regrep:xsd:query:3.0"
              schemaLocation="schema\query.xsd"/>
          ...
      </xsd:schema>
  </types>
  <message name="RegistryStoredQuery_Message">
      <documentation>Registry Stored Query</documentation>
      <part name="body" element="query:AdhocQueryRequest"/>
  </message>
  <message name="RegistryStoredQueryResponse_Message">
      <documentation>Registry Stored Query Response</documentation>
      <part name="body" element="query:AdhocQueryResponse"/>
  </message>
  ...
  <portType name="DocumentRegistry_PortType">
      <operation name="DocumentRegistry_RegistryStoredQuery">
          <input message="ihe:RegistryStoredQuery_Message"
                     wsaw:Action="urn:ihe:iti:2007:RegistryStoredQuery"/>
          <output message="ihe:RegistryStoredQueryResponse_Message"
  wsaw:Action="urn:ihe:iti:2007:RegistryStoredQueryResponse"/>
      </operation>
      ...
  </portType>
  ...
</definitions>
```

A full WSDL for the Document Repository and Document Registry Actors is found in ITI TF-2x: Appendix W.

The requirements for the Registry Stored Query Request using the <mark>AS4 Asynchronous transport</mark> are:

- **The <eb:Service> SOAP element shall be set to the value: ITI-18**

- **The type attribute on the <eb:Service> SOAP element shall be set to the value: urn:ihe:iti:transactions**

- **The <eb:Action> SOAP element shall be set to the value: urn:ihe:iti:2007:Registry StoredQuery**

- **The <eb:From/eb:Role> element shall be set to the value: urn:ihe:iti:2018:Requester**

- **The <eb:To/eb:Role> element shall be set to the value: urn:ihe:iti:2018:Provider**

- **The <soap12:Body> shall contain one <query:AdhocQueryRequest> element**

770
- **The <query:AdhocQueryRequest> element shall contain:**

    o **one <rim:AhocQuery> element representing the Adhoc Query Request (see ITI TF-2a: 18.4.1.2.1 through 18.4.1.2.6 for details of expressing an Adhoc Query Request).**

775 **The requirements for the Registry Stored Query response using AS4 Asynchronous transport are:**

- **The <eb:Service> SOAP element shall be set to the value: ITI-18**

- **The type attribute on the <eb:Service> SOAP element shall be set to the value: urn:ihe:iti:transactions**

780
- **The <eb:Action> SOAP element shall be set to the value: urn:ihe:iti:2007:RegistryStoredQueryResponse**

- **The <eb:From/eb:Role> element shall be set to the value: urn:ihe:iti:2018:Provider**

- **The <eb:To/eb:Role> element shall be set to the value: urn:ihe:iti:2018:Requester**

- **The <soap12:Body> shall contain one <query:AdhocQueryResponse> element**

785
- **The <query:AdhocQueryResponse> element shall contain:**

    o **One <rim:RegistryObjectList> element representing the Adhoc QueryResponse (see ITI TF-2a: 3.18.4.1.2.1 through 3.18.4.1.2.6 for details of expressing an Adhoc QueryResponse)**

Samples for Registry Stored Query request and response can be found in ITI TF-2x:
790 **Appendix V.4.8.**

Update Vol 2a Section 3.18.4.1.2.7.1 as follows.

---

795 **3.18.4.1.2.7.1 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 <a:Action/>, <a:MessageID/>, <a:ReplyTo/>…; these WS-Addressing headers are populated according to ITI TF-2x: Appendix V: Web Services for IHE transactions.~~ The body of the SOAP
800 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.

3.18.4.1.2.7.1.1 Sample Registry Stored Query SOAP Request

805 **3.18.4.1.2.7.1.1.1 Synchronous Web Services Exchange**

The sample messages show the WS-Addressing headers <a:Action/>, <a:MessageID/>, <a:ReplyTo/>…; these WS-Addressing headers are populated according to ITI TF-2x: Appendix V.3: Synchronous and Asynchronous (WS-Addressing based) Web Services.

…

810 **3.18.4.1.2.7.1.1.2 Asynchronous Web Services Exchange**

For the Asynchronous Web Services Exchange Option (WS-Addressing based), the sample messages show the WS-Addressing headers <a:Action/>, <a:MessageID/>, <a:ReplyTo/>…; these WS-Addressing headers are populated according to ITI TF-2x: Appendix V.3: Synchronous and Asynchronous (WS-Addressing based) Web Services.…

815 A sample for the AS4 Asynchronous Web Services Exchange Option is shown in ITI TF-2x: Appendix V.4.8.

3.18.4.1.2.7.1.2 Sample Registry Stored Query SOAP Response

3.18.4.1.2.7.1.2.1 Synchronous Web Services Exchange

820 …

3.18.4.1.2.7.1.2.2 Asynchronous Web Services Exchange

A sample for the Asynchronous Web Services Exchange Option (WS-Addressing based) is shown below. The corresponding sample messages show the WS-Addressing headers <a:Action/>, <a:MessageID/>, <a:RelatesTo/>…; these WS-Addressing headers are 825 populated according to ITI TF-2x: Appendix V.3: Synchronous and Asynchronous (WS-Addressing based) Web Services.

…

A sample for the AS4 Asynchronous Web Services Exchange Option is shown in ITI TF-2x: Appendix V.4.8.

830

---

835   *Update Vol 2a Section 3.18.5.1.1 as follows.*

3.18.5.1.1 Document Consumer audit message:

…

Where:

Source AuditMessage/ ActiveParticipant		M/U	Description
	UserID	M	If **WS-Addressing based** Asynchronous Web Services Exchange is being used, the content of the <wsa:ReplyTo/> element. **If AS4 Asynchronous Web Services Exchange is used, the content of the eb:From/eb:PartyId.** Otherwise, not specialized.
	AlternativeUserID	M	The process ID as used within the local operating system in the local system logs.
	UserName	*U*	*not specialized*
	UserIsRequestor	*U*	*not specialized*
	RoleIDCode	M	EV(110153, DCM, "Source")
	NetworkAccessPointTypeCode	M	"1" for machine (DNS) name, "2" for IP address
	NetworkAccessPointID	M	The machine name or IP address.

…

840   *Update Vol 2a Section 3.18.5.1.2 as follows.*

3.18.5.1.2 Document Registry audit message:

…

Where:

Source AuditMessage/ ActiveParticipant		M/U	Description
	UserID	M	If **WS-Addressing based** Asynchronous Web Services Exchange is being used, the content of the <wsa:ReplyTo/> element. **If AS4 Asynchronous Web Services Exchange is used, the content of the eb:From/eb:PartyId.** Otherwise, not specialized.
	AlternativeUserID	*U*	*not specialized*
	UserName	*U*	*not specialized*
	UserIsRequestor	*U*	*not specialized*
	RoleIDCode	M	EV(110153, DCM, "Source")
	NetworkAccessPointTypeCode	M	"1" for machine (DNS) name, "2" for IP address
	NetworkAccessPointID	M	The machine name or IP address.

…

845

In Vol 2b Section 3.38 ==Cross Gateway Query [ITI-38]==, update the sub-sections as follows.

Update Vol 2b Section 3.38.1 as follows.

850 **3.38.1 Scope**

The scope of the Cross Gateway Query transaction is based on the Registry Stored Query [ITI-18] transaction. 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:

855
- 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.

- **Initiating Gateways and** Responding Gateways ~~shall~~ **may** support the Asynchronous
860 Web Services Exchange Option **(WS-Addressing based)** 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~~
865 ~~Asynchronous Web Services Exchange will be desired by the majority of communities.~~

- **Initiating Gateways and Responding Gateways may support the AS4 Asynchronous Web Services Exchange Option on the Cross Gateway Query. To check if Responding Gateways supports this option, the AS4 Test Service may be used (see**
870 **ITI TF-2x: Appendix V.4.4.3).**

- ~~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
875 with zero entries.

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.

880

> *Update Vol 2b Section 3.38.3 as follows.*

3.38.3 Referenced Standard

885 ~~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~~

~~ITI TF-3:4   Metadata used in Document Sharing profiles~~

890

ebRIM	**OASIS/ebXML Registry Information Model v3.0** **This model defines the types of metadata and content that can be stored in an ebXML Registry, a basis for and subset of Document Sharing metadata.**
ebRS	**OASIS/ebXML Registry Services Specifications v3.0** **This defines the services and protocols for an ebXML Registry, used as the basis for the XDS Document Registry**
See ITI TF-2x: Appendix V for other referenced standards for SOAP encoding. **See ITI TF-3: 4.2 for other referenced standards for metadata element encoding.**	

> *Update Vol 2b Section 3.38.5 as follows.* <mark>Green highlighted text</mark> *shall be in Bold.*

3.38.5 Protocol Requirements

895 **This section describes requirements for Web Services transport for;**

- **Synchronous**
- **WS-Addressing based Asynchronous**
- **AS4 Asynchronous**

For support of Synchronous and Asynchronous (WS-Addressing based) Web Service
900 **exchange, the requirements are the following.**

The Cross Gateway Query request and response **are** ~~will be~~ transmitted using Synchronous or WS-Addressing based Asynchronous Web Services Exchange, according to the requirements specified in ITI TF-2x: Appendix V.3. The protocol requirements are identical to the Registry Stored Query except as noted below.

905 XML namespace prefixes are for informational purposes only and are documented in ITI TF-2x: Appendix V, Table V.2.4-1.

Responding Gateway: These are the requirements for the **Synchronous or Asynchronous (WS-Addressing based)** Cross Gateway Query **Response** ~~transaction~~ presented in the order in which they would appear in the Responding 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 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 **3.38.5-1** ~~3.38.5-2 below~~ for additional attribute requirements

Table 3.38.5-1 ~~3.38.5-2~~: Additional Attribute Requirements

Attribute	Value
/definitions/portType/operation@name	RespondingGateway_CrossGatewayQuery
/definitions/portType/operation/input/@wsaw:Action	urn:ihe:iti:2007:CrossGatewayQuery
/definitions/portType/operation/output/@wsaw:Action	urn:ihe:iti:2007:CrossGatewayQueryResponse
/definitions/binding/operation/wsoap12:operation/@soapAction Required	false

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 Section 3.38.5.1 Sample SOAP Messages.

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

The requirements for the Cross Gateway Query Request using the AS4 Asynchronous transport are described below.

Initiating Gateway: These are the requirements for the Cross Gateway Query AS4 Asynchronous Request:

- **The <eb:Service> SOAP element shall be set to the value: ITI-38**

- **The type attribute on the <eb:Service> SOAP element shall be set to the value: urn:ihe:iti:transactions**

- **The <eb:Action> SOAP element shall be set to the value: urn:ihe:iti:2007:CrossGatewayQuery**

935
- **The <eb:From/eb:Role> element shall be set to the value: urn:ihe:iti:2018:Requester**

- **The <eb:To/eb:Role> element shall be set to the value: urn:ihe:iti:2018:Provider**

- **The <soap12:Body> shall contain one <query:AdhocQueryRequest> element**

- **The <query:AdhocQueryRequest> element shall contain:**

940
  - o **One <rim:AdhocQuery> element representing the Adhoc Query Request (see ITI TF-2b: 3.38.4.1 and the underlying ITI TF-2a: 3.18.4.1.2.1 through 3.18.4.1.2.6 for details of expressing an Adhoc Query Request)**

==Responding Gateway:== **These are the requirements for the Cross Gateway Query AS4 Asynchronous Response:**

945
- **The <eb:Service> SOAP element shall be set to the value: ITI-38**

- **The type attribute on the <eb:Service> SOAP element shall be set to the value: urn:ihe:iti:transactions**

- **The <eb:Action> SOAP element shall be set to the value: urn:ihe:iti:2007:CrossGatewayQueryResponse**

950
- **The <eb:From/eb:Role> element shall be set to the value: urn:ihe:iti:2018:Provider**

- **The <eb:To/eb:Role> element shall be set to the value: urn:ihe:iti:2018:Requester**

- **The <soap12:Body> shall contain one <query:AdhocQueryResponse> element**

955
- **The <query:AdhocQueryResponse> element shall contain:**

  - o **One <rim:RegistryObjectList> element representing the Adhoc Query Response (see ITI TF-2b: 3.38.4.1 and the underlying ITI TF-2a: 3.18.4.1.2.1 through 3.18.4.1.2.6 for details of expressing an Adhoc Query Response)**

Samples for Cross Gateway Query request and response with AS4 Asynchronous can be
960 **found in ITI TF-2x: Appendix V.4.8.**

Update Vol 2b Section 3.38.5.1 as follows.

3.38.5.1 Sample SOAP Messages

965 The samples in the following two sections show a typical SOAP request and its **related**~~relative~~ SOAP response. ~~The sample messages also show the WS-Addressing headers <a:Action/>, <a:MessageID/>, <a:ReplyTo/>…; these WS-Addressing headers are populated according to ITI TF-2x: Appendix V: Web Services for IHE transactions.~~ 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.

3.38.5.1.1 Sample Cross Gateway Query SOAP Request

3.38.5.1.1.1 Synchronous Web Services Exchange

The sample messages show the WS-Addressing headers <a:Action/>, <a:MessageID/>, <a:ReplyTo/>…; these WS-Addressing headers are populated according to ITI TF-2x: Appendix V.3: Synchronous and Asynchronous (WS Addressing based) Web Services.

…

3.38.5.1.1.2 Asynchronous Web Services Exchange

For the Asynchronous Web Services Exchange Option (WS-Addressing based), the sample messages show the WS-Addressing headers <Action/>, <MessageID/>, <ReplyTo/>…; these WS-Addressing headers are populated according to the ITI TF-2x: Appendix V.3: Synchronous and Asynchronous (WS Addressing based) Web Services.

…

For the AS4 Asynchronous Web Services Exchange Option, samples are found in ITI TF-2x: Appendix V.4.8.

3.38.5.1.2. Sample Registry Stored Query SOAP Response

3.38.5.1.2.1 Synchronous Web Services Exchange

….

3.38.5.1.2.2 Asynchronous Web Services Exchange

For the Asynchronous Web Services Exchange Option (WS-Addressing based), the sample messages show the WS-Addressing headers <Action/>, <MessageID/>, <RelatesTo/>…; these WS-Addressing headers are populated according to the ITI TF-2x: Appendix V.3: Synchronous and Asynchronous (WS Addressing based) Web Service.

…

For the AS4 Asynchronous Web Services Exchange Option, samples are found in ITI TF-2x Appendix V.4.8.

---

*In Vol 2b Section 3.39 ==**Cross Gateway Retrieve [ITI-39]**==, update the sub-sections as follows.*

Update Vol 2b Section 3.39.1 as follows.

3.39.1 Scope

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.

- **Initiating Gateways and** Responding Gateways ~~shall~~ **may** support the **Asynchronous Web Services Exchange Option (WS-Addressing based)** 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 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~~

- **Initiating Gateways and Responding Gateways may support the AS4 Asynchronous Web Services Exchange Option on the Cross Gateway Retrieve. To check if Responding Gateways support this option, the AS4 Test Service may be used (see ITI TF-2x: Appendix V.4.4.3).**

Update Vol 2b Section 3.39.3 as follows. MTOM and XOP as referenced standards are specific to the Web Services Stack and are covered in Appendix V. Only the references to standards specific to the "application level" payload of the transaction are kept in this section.

3.39.3 Referenced Standard<u>s</u>

~~Implementors 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~~
~~ITI TF-3:4~~	~~Metadata used in Document Sharing profiles~~
~~MTOM~~	~~SOAP Message Transmission Optimization Mechanism~~

1040   ~~http://www.w3.org/TR/soap12-mtom/~~

ebRIM	**OASIS/ebXML Registry Information Model v3.0** **This model defines the types of metadata and content that can be stored in an ebXML Registry, a basis for and subset of Document Sharing metadata.**
ebRS	**OASIS/ebXML Registry Services Specifications v3.0** **This defines the services and protocols for an ebXML Registry, used as the basis for the XDS Document Registry**
See ITI TF-2x: Appendix V for other referenced standards for SOAP encoding. **See ITI TF-3: 4.2 for other referenced standards for metadata element encoding.**	

Update Vol 2b Section 3.39.5 as follows. Green highlighted text shall be in Bold.

1045   **3.39.5 Protocol Requirements**

This section describes requirements for Web Services transport for;

- **Synchronous**

- **WS-Addressing based Asynchronous**

- **AS4 Asynchronous**

1050   **For the support of both Synchronous and WS-Addressing based Asynchronous Web Service exchange cases the requirements are the following:**

The Cross Gateway Retrieve request and response **are** ~~will be~~ transmitted using Synchronous or WS-Addressing based Asynchronous Web Services Exchange, according to the requirements specified in ITI TF-2x: Appendix V.3. The protocol requirements are identical to the Retrieve
1055   Document Set except as noted below.

XML namespace prefixes are for informational purposes only and are documented in ITI TF-2x: Appendix V, Table V.2.4-1.

Responding Gateway: These are the requirements for the Synchronous or WS-Addressing
1060   based Asynchronous Cross Gateway Retrieve **Response** ~~transaction~~ presented in the order in which they would appear in the Responding Gateway WSDL definition:

- The following types shall be imported (xsd:import) in the /definitions/types section:

- o 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 "xds:RetrieveDocumentSetRequest"
- The /definitions/message/part/@element attribute of the Cross Gateway Retrieve Response message shall be defined as "xds:RetrieveDocumentSetResponse"
- Refer to Table **3.39.5-1** ~~3.39.5-2 below~~ for additional attribute requirements

Table 3.39.5-1 ~~3.39.5-2~~: Requirements for portType and Binding attributes

Attribute	Value
/definitions/portType/operation@name	RespondingGateway_CrossGatewayRetrieve
/definitions/portType/operation/input/@wsaw:Action	urn:ihe:iti:2007:CrossGatewayRetrieve
/definitions/portType/operation/output/@wsaw:Action	urn:ihe:iti:2007:CrossGatewayRetrieveResponse
/definitions/binding/operation/wsoap12:operation/@soapActionRequired	false

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 Section 3.43.5.1 Sample SOAP Messages.

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

Initiating Gateway: The <ihe:RetrieveDocumentSetRequest/> element is defined in Section 3.43.5. When used within the Cross Gateway Retrieve the <ihe:HomeCommunityId/> element is required.

The <ihe:RetrieveDocumentSetResponse/> element is defined in Section 3.43.5.

The requirements for the Cross Gateway Retrieve using the AS4 Asynchronous transport are described below.

Initiating Gateway: These are the requirements for the Cross Gateway Retrieve AS4 Asynchronous Request:

- **The <eb:Service> SOAP element shall be set to the value: ITI-39**
- **The type attribute on the <eb:Service> SOAP element shall be set to the value: urn:ihe:iti:transactions**
- **The <eb:Action> SOAP element shall be set to the value: urn:ihe:iti:2007:CrossGatewayRetrieve**

- **The <eb:From/eb:Role> element shall be set to the value: urn:ihe:iti:2018:Requester**

1090

- **The <eb:To/eb:Role> element shall be set to the value: urn:ihe:iti:2018:Provider**

- **The <soap12:Body> shall contain one <xds:RetrieveDocumentSetRequest> element**

- **The <xds:RetrieveDocumentSetRequest> element shall contain:**

1095

  - **one or more <xds:DocumentRequest> element representing the Cross Gateway Retrieve Request (see ITI TF-2b: 3.43.4.1.2 for details of expressing a Cross Gateway Retrieve Request).**

Responding Gateway: These are the requirements for the Cross Gateway Retrieve AS4

1100 **Asynchronous Response:**

- **The <eb:Service> SOAP element shall be set to the value: ITI-39**

- **The type attribute on the <eb:Service> SOAP element shall be set to the value: urn:ihe:iti:transactions**

- **The <eb:Action> SOAP element shall be set to the value:**

1105 **urn:ihe:iti:2007:CrossGatewayRetrieveResponse**

- **The <eb:From/eb:Role> element shall be set to the value: urn:ihe:iti:2018:Provider**

- **The <eb:To/eb:Role> element shall be set to the value: urn:ihe:iti:2018:Requester**

1110

- **The <soap12:Body> shall contain one <xds:RetrieveDocumentSetResponse> element**

- **The <xds:RetrieveDocumentSetResponse> element shall contain:**

  - **One <rs:RegistryResponse> element containing the status attribute**

  - **Zero or more <xds:DocumentResponse> elements representing the Cross Gateway Retrieve Response (see ITI TF-2b: 3.43.4.2.2 for details of**

1115 **expressing a Retrieve Document Set Response).**

  - **The document element (if present):**

    - **For each document in the <xds:DocumentResponse> element, an id attribute shall be set to allow correlation to the corresponding**

1120 **MIME part as explained in ITI TF-2x: Appendix V.4.6.2.**

Update Vol 2b Section 3.39.5.1 as follows.

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

**The sample messages show the WS-Addressing headers <a:Action/>, <a:MessageID/>,
<a:ReplyTo/>…; these WS-Addressing headers are populated according to ITI TF-2x:
Appendix V: Web Services for IHE transactions.**

…

3.39.5.1.1.2 Asynchronous Web Services Exchange

**For the Asynchronous Web Services Exchange Option (WS-Addressing based), the sample
messages show the WS-Addressing headers <Action/>, <MessageID/>, <ReplyTo/>…; these
WS-Addressing headers are populated according to the ITI TF-2x: Appendix V.3:
Synchronous and Asynchronous (WS Addressing based) Web Services.**

…

**For the AS4 Asynchronous Web Service Exchange Option, samples are found in ITI TF: 2x
Appendix V.4.8.**

3.39.5.1.2 Sample Cross Gateway Retrieve SOAP Response

…

3.39.5.1.2.1 Synchronous Web Services Exchange

…

3.39.5.1.2.2 Asynchronous Web Services Exchange

**The sample message shows the WS-Addressing headers <a:Action/>, <a:MessageID/>,
<a:RelatesTo/>…; these WS-Addressing headers are populated according to ITI TF-2x:
Appendix V.3: Synchronous and Asynchronous (WS-Addressing based) Web Services.**

…

1155 **For the AS4 Asynchronous Web Service Exchange Option, samples are found in ITI TF: 2x Appendix V.4.8.**

> *In Vol 2b Section 3.41 **Provide and Register Document Set-b [ITI-41]**, update the sub-sections as follows.*

1160

> *Update Vol 2b Section 3.41.3 as follows. MTOM and XOP as referenced standards are specific to the Web Services Stack and are covered in Appendix V. Only the references to standards specific to the "application level" payload of the transaction are kept in this section.*

1165 ## 3.41.3 Referenced Standards

ebRIM	OASIS/ebXML Registry Information Model v3.0 This model defines the types of metadata and content that can be stored in an ebXML Registry, a basis for and subset of Document Sharing metadata.
ebRS	OASIS/ebXML Registry Services Specifications v3.0 This defines the services and protocols for an ebXML Registry, used as the basis for the XDS Document Registry
~~MTOM~~	~~SOAP Message Transmission Optimization Mechanism http://www.w3.org/TR/soap12-mtom/~~ ~~This is a method for optimizing the transmission and/or wire format of SOAP messages.~~
~~XOP~~	~~XML-binary Optimized Packaging http://www.w3.org/TR/2005/REC-xop10-20050125/~~ ~~This is a means of more efficiently of converting an XML Infoset with certain types of content into a stream of bytes for transmission.~~
See ITI TF-2x: Appendix V for other referenced standards for SOAP encoding. See ITI TF-3: 4.2 for other referenced standards for metadata element encoding.	

> *Update Vol 2b Section 3.41.4.1.2 as follows:*

3.41.4.1.2 Message Semantics

1170 **~~The Provide and Register Document Set-b Request message shall use SOAP 1.2 and MTOM with XOP encoding (labeled MTOM/XOP in this specification). Implementers of this transaction shall comply with all requirements described in: ITI TF-2x: Appendix V: Web Services for IHE Transactions.~~**

The Provide and Register Document Set-b Request message:

1175   A. **Shall comply with the Synchronous Web Services Exchange protocol stack with all requirements specified in ITI TF-2x: V.3: Synchronous Web Services. This stack is based on SOAP 1.2 and MTOM with XOP encoding (labeled MTOM/XOP in this specification).**

    For the Synchronous Web Services Exchange protocol stack, ~~T~~the use of
1180   MTOM/XOP is governed by the following rules:

     o The Content Sender shall generate the Provide and Register Document Set-b Request message in MTOM/XOP format.

     o The Content Receiver shall accept documents in a Provide and Register Document Set-b Request message in MTOM/XOP format.

1185   **B. May comply with the WS-Addressing based Asynchronous Web Services Exchange protocol stack. When the Asynchronous Web Services Exchange Option is selected, the Content Sender shall meet the requirements specified in ITI TF-2x: Appendix V.3: Synchronous and Asynchronous (WS-Addressing based) Web Services. This stack is based on SOAP 1.2 and MTOM with XOP encoding.**

1190   **For the WS-Addressing based Asynchronous Web Services Exchange protocol stack, the use of MTOM/XOP is governed by the following rules:**

     o **The Content Sender shall generate the Provide and Register Document Set-b Request message in WS-Addressing based Asynchronous Web Services SOAP message format.**

1195   o **The Content Receiver shall accept documents in a Provide and Register Document Set-b Request message in WS-Addressing based Asynchronous Web Services SOAP message format.**

     C. May comply with the AS4 Asynchronous Web Services Exchange protocol stack. When the AS4 Asynchronous Web Services Exchange Option is selected, the
1200   **Content Sender shall meet all requirements specified in ITI TF-2x: V.4: AS4 Asynchronous Web Services. This stack is based on the AS4 profile of ebMS3.0 and use SOAP 1.2 with Attachments.**

     For the AS4 Asynchronous Web Services Exchange protocol stack, the use of AS4 is governed by the following rules:

1205   o **The Content Sender shall generate the Provide and Register Document Set-b Request message in AS4 format as a SOAP-With-Attachments message containing a MIME Multipart/related envelope and with additional constraints described in ITI TF-2x: Appendix V.4.**

     o **The Content Receiver shall accept documents in a Provide and Register**
1210   **Document Set-b Request message in AS4 format as a SOAP-With-Attachments message containing a MIME Multipart/related envelope and with additional constraints described in ITI TF-2x: Appendix V.4.**

1215   The Provide and Register Document Set-b request message shall contain a Submission Request, as defined in ITI TF-3: 4.1.4, and may contain documents. See ITI TF-3: 4.2.1.4 for a description of the ebRS/ebRIM representation of a Submission Request. The metadata requirements for this Submission Request are defined in ITI TF-3: 4.3.1. The Submission Request shall contain exactly one DocumentEntry object for each Document contained in the request message, and vice versa.

1220 If the associationType is RPLC, XFRM_RPLC, or IsSnapshotOf, the targetObject of the Relationship Association in the Submission Request shall be a DocumentEntry already in the Document Registry. All DocumentEntry objects in this Submission Request shall be Stable DocumentEntry objects and, therefore, will not be On-Demand DocumentEntry objects. Associations included in the Submission Request may reference On-Demand DocumentEntry
1225 objects that have been registered previously.

The sections in ITI TF-3: 4.1 specify the mapping of XDS concepts to ebRS and ebRIM semantics and document metadata. A full example of document metadata submission can be found in ITI TF-2x: Appendix W.

XML namespace prefixes used in text and examples below are for informational purposes only
1230 and are documented in ITI TF-2x: Appendix V, Table V.2.4-1.

A full XML Schema Document for the XDS schema types is available online on the IHE FTP site: see ITI TF-2x: Appendix W.

The requirements for the **Provide and Register Document Set-b** request message **with the Synchronous and the Asynchronous (WS-Addressing based) Web Services stack** are:

1235
- the <wsa:Action> SOAP element shall ~~contain~~ **be set to** the value urn:ihe:iti:2007:ProvideAndRegisterDocumentSet-b

- the <soap12:Body> shall contain one <xds:ProvideAndRegisterDocumentSetRequest> element

- the <xds:ProvideAndRegisterDocumentSetRequest> element shall contain:

1240
  - one <lcm:SubmitObjectsRequest> element representing the Submission Request (see ITI TF-3: 4.2.1.4 for details of expressing a Submission Request).

  - one <xds:Document> element for each <rim:ExtrinsicObject> contained in the <lcm:SubmitObjectsRequest>

- the <xds:Document> element shall:

1245
  - have an @id attribute whose value matches the value of the corresponding rim:ExtrinsicObject/@id

  - contain the document using the xsi:base64Binary data type (Note: This is the logical representation of the document in the XML. The wire format may be different; see ITI TF-2x: ~~Appendix~~ **V.3.6).**

1250 Below is an example of the SOAP Body for a Provide and Register Document Set-b Request message **with the Synchronous Web Services stack**.

```
        <soap12:Body>
          <xds:ProvideAndRegisterDocumentSetRequest>
1255        <lcm:SubmitObjectsRequest>
              <!-- Submission Request contents - See ITI TF-3: 4.2.1.4 -->
              <rim:RegistryObjectList>

1260           <!-- Registry Metadata goes here -->

              </rim:RegistryObjectList>
            </lcm:SubmitObjectsRequest>
            <xds:Document id="Document01">SGVyZSBpcyBteSBkb2N1bWVudA==</xds:Document>
          </xds:ProvideAndRegisterDocumentSetRequest>
1265    </soap12:Body>
```

The requirements for the Provide and Register Document Set-b Request message with the AS4 Asynchronous Web Services stack are:

- **The <eb:Service> SOAP element shall be set to the value: ITI-41**

1270
- **The type attribute on the <eb:Service> SOAP element shall be set to the value: urn:ihe:iti:transactions**

- **The <eb:Action> SOAP element shall be set to the value: urn:ihe:iti:2007:ProvideAndRegisterDocumentSet-b**

- **The <eb:From/eb:Role> element shall be set to the value: urn:ihe:iti:2018:Requester**
1275

- **The <eb:To/eb:Role> element shall be set to the value: urn:ihe:iti:2018:Provider**

- **The <soap12:Body> shall contain one <xds:ProvideAndRegisterDocumentSetRequest> element**

- **The <xds:ProvideAndRegisterDocumentSetRequest> element shall contain:**

1280
  - **One <lcm:SubmitObjectsRequest> element representing the Submission Request (see ITI TF-3: 4.2.1.4 for details of expressing a Submission Request).**

  - **For each <rim:ExtrinsicObject> contained in the <lcm:SubmitObjectsRequest> element, an @id attribute shall be set in order to allow correlation to the corresponding MIME part as explain in**
1285 **ITI TF-2x: Appendix V.4.6.2.**

ITI TF-2x: Appendix V.4.8 includes an example of the SOAP Body for a Provide and Register Document Set-b Request message applicable to the AS4 Asynchronous Web Services stack.

1290

Update Vol 2b Section 3.41.4.1.3.1 as follows:

1295 **3.41.4.1.3.1 Document Recipient Expected Actions**

A Document Recipient that supports the AS4 Asynchronous Web Services Exchange Option shall be able to process the AS4 Asynchronous Web Services request as defined in ITI TF-2x: Appendix V.4 and return an AS4 Asynchronous Web Services response as defined in ITI TF-2x: Appendix V.4.

1300 In addition to the Expected Actions of all Content Receivers (described in the beginning of Section 3.41.4.1.3), a Document Recipient shall meet the following requirements.

- A Document Recipient shall be able to interpret a submission without any context, such as knowledge of a prior submission.

…

1305

Update Vol 2b Section 3.41.4.2.2 by the following updated section (R change)

3.41.4.2.2 Message Semantics

~~The Provide and Register Document Set-b Response message shall use SOAP 1.2 and MTOM with XOP encoding (labeled MTOM/XOP in this specification). Implementors of~~ 1310 ~~this transaction shall comply with all requirements described in: ITI TF-2x: Appendix V: Web Services for IHE Transactions.~~

The Provide and Register Document Set-b Response message:

- A. **Shall comply with the Synchronous Web Services Exchange protocol stack with all requirements specified in ITI TF-2x: Appendix V.3: Synchronous and** 1315 **Asynchronous (WS-Addressing based) Web Services. These are based on SOAP 1.2 and MTOM with XOP encoding (labeled MTOM/XOP in this specification).**

  For the Synchronous Web Services Exchange protocol stack, ~~Tt~~the use of MTOM/XOP is governed by the following rules:

  - o The Content Sender shall generate the Provide and Register Document Set-b 1320 Response message in MTOM/XOP format.

  - o The Content Receiver shall accept documents in a Provide and Register Document Set-b Response message in MTOM/XOP format.

- B. **May comply with the WS-Addressing based Asynchronous Web Services Exchange protocol stack. When the Asynchronous Web Services Exchange Option is selected,** 1325 **the Content Sender shall meet all requirements specified in ITI TF-2x: Appendix V.3: Synchronous and Asynchronous Web Services.**

For the WS-Addressing Asynchronous Web Services Exchange protocol stack, the use of WS-Addressing is governed by the following rules:

- o **The Content Sender shall generate the Provide and Register Document Set-b Request message in Asynchronous Web Services SOAP message format.**

- o **The Content Receiver shall accept documents in a Provide and Register Document Set-b Request message in Asynchronous Web Services SOAP message format.**

C. **May comply with the AS4 Asynchronous Web Services Exchange protocol stack. When the AS4 Asynchronous Web Services Exchange Option is selected, the Content Sender shall meet all requirements specified in ITI TF-2x: Appendix V.4: Asynchronous Web Services. These are based on the AS4 profile of ebMS3.0 and use SOAP 1.2 with Attachments (AS4 in this specification).**

For the AS4 Asynchronous Web Services Exchange protocol stack, the use of AS4 is governed by the following rules:

- o **The Content Sender shall generate the Provide and Register Document Set-b Request message in AS4 format.**

- o **The Content Receiver shall accept documents in a Provide and Register Document Set-b Request message in AS4 format.**

The Provide and Register Document Set-b Response message shall carry the status of the requested operation. The response message may carry warning messages. If the requested operation fails, the response message shall carry at least one error message. The conditions of failure and possible warning and error messages are given in the ebRS standard and detailed in ITI TF-3: 4.2.4 Error Reporting. This transaction does not support a partial success response.

XML namespace prefixes used in text and in examples below are for informational purposes only and are documented in ITI TF-2x: Appendix V, Table 2.4-1.

The requirements for the **Provide and Register Document Set-b** Response message **with the Synchronous Web Services or WS-Addressing based Asynchronous Web Services stacks** are:

- the <wsa:Action> SOAP header shall contain the value urn:ihe:iti:2007:ProvideAndRegisterDocumentSet-bResponse

- the <soap12:Body> soap element shall contain one <rs:RegistryResponse> element

- See ITI TF-3: 4.2.4.1 for examples of response messages.

The requirements for the Provide and Register Document Set-b Response message with the AS4 Asynchronous Web Services stack are:

- **The <eb:Service> SOAP header shall be set to the value: ITI-41**

1365
- **The type attribute on the <eb:Service> SOAP element shall be set to the value: urn:ihe:iti:transactions**

- **The <eb:Action> SOAP header shall be set to the value: urn:ihe:iti:2007:ProvideAndRegisterDocumentSet-bResponse**

- **The <eb:From/eb:Role> element shall be set to the value: urn:ihe:iti:2018:Provider**

- **The <eb:To/eb:Role> element shall be set to the value: urn:ihe:iti:2018:Requester**

1370
- **The <soap12:Body> soap element shall contain one <rs:RegistryResponse> element**

Update Vol 2b Section 3.41.4.2.2.1 as follows:

1375 ### 3.41.4.2.2.1 XDS Document Repository Message Semantics

If the XDS Document Repository receives a Synchronous Web Services request, it shall respond as defined in ITI TF-2x: Appendix V.3.

If the XDS Document Repository supports the Asynchronous Web Services Exchange Option **(WS-Addressing based)** and it receives an Asynchronous Web Services request, it shall respond

1380 as defined in ITI TF-2x: ~~Appendix V.5~~ **V.3.**

Add a new Section 3.41.4.2.2.2 to Vol 2b:

3.41.4.2.2.2 Document Recipient Message Semantics

1385 If the Document Recipient receives a Synchronous Web Services request, it shall respond as defined in ITI TF-2x: Appendix V.3.

If the Document Recipient supports the AS4 Asynchronous Web Services Exchange Option and it receives an AS4 Asynchronous Web Services request, it shall respond as defined in ITI TF-2x: Appendix V.4.

1390

Update Volume 2b Section 3.41.5.1.1 as follows:

3.41.5.1.1 Document Source Audit Message

….

Where:

Source AuditMessage/ ActiveParticipant			
	UserID	M	If **WS-Addressing based** Asynchronous Web Services Exchange is being used, the content of the <wsa:ReplyTo/> element. **If AS4 Asynchronous Web Services Exchange is used, the content of the eb:From/eb:PartyId.** Otherwise, not specialized.
	AlternativeUserID	M	the process ID as used within the local operating system in the local system logs.
	UserName	*U*	*not specialized*
	UserIsRequestor	*U*	*not specialized*
	RoleIDCode	M	EV(110153, DCM, "Source")
	NetworkAccessPointTypeCode	M	"1" for machine (DNS) name, "2" for IP address
	NetworkAccessPointID	M	The machine name or IP address.

1395

Update Vol 2b Section 3.41.5.1.2 as follows:

3.41.5.1.2 Document Repository or Document Recipient audit message:

1400 …..

Where:

Source AuditMessage/ ActiveParticipant			
	UserID	M	If **WS-Addressing based** Asynchronous Web Services Exchange is being used, the content of the <wsa:ReplyTo/> element. **If AS4 Asynchronous Web Services Exchange is used, the content of the eb:From/eb:PartyId.** Otherwise, not specialized.
	AlternativeUserID	*U*	*not specialized*
	UserName	*U*	*not specialized*
	UserIsRequestor	*U*	*not specialized*
	RoleIDCode	M	EV(110153, DCM, "Source")
	NetworkAccessPointTypeCode	M	"1" for machine (DNS) name, "2" for IP address
	NetworkAccessPointID	M	The machine name or IP address.

…

1405

> *In Vol 2b, Section 3.43, ==Retrieve Document Set [ITI-43]==, update the sub-sections as follows.*

> *Update Vol 2b, Section 3.43 as follows:*

3.43 Retrieve Document Set [ITI-43]

This section corresponds to transaction [ITI-43] of the IHE Technical Framework. The
1410 Document Consumer, Document Repository, On-Demand Document Source, and Initiating
Gateway Actors use transaction [ITI-43].

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

~~Actors that support the Asynchronous Web Services Exchange Option shall support~~
1415 ~~Asynchronous Web Services Exchange on all XDS.b transactions they implement. Refer to~~
~~Section ITI TF-2x: V.3 Synchronous and Asynchronous (WS-Addressing based) Web~~
~~Services Exchange for an explanation of Asynchronous Web Services Exchange.~~

1420

> *Update Vol 2b Section 3.43.3 by the following updated section. MTOM and XOP as referenced*
> *standards are specific to the Web Services Stack and are covered in Appendix V. Only the*
> *references to standards specific to the "application level" payload of the transaction are kept in*
> *this section*

3.43.3 Referenced Standard

1425 Implementors 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
~~ITI TF-3:4~~	~~Metadata in Document Sharing profiles~~
~~MTOM~~	~~SOAP Message Transmission Optimization Mechanism~~ ~~http://www.w3.org/TR/soap12-mtom/~~
~~XOP~~	~~XML-binary Optimized Packaging http://www.w3.org/TR/2005/REC-xop10-20050125/~~
See ITI TF-2x: Appendix V for other referenced standards for SOAP encoding. See ITI TF-3: 4.2 for other referenced standards for metadata element encoding.	

Update Vol 2b Section 3.43.4.2.2 as follows

1430 **3.43.4.2.2 Message Semantics**

The Retrieve Document Set Response Message shall carry the following information, for each of the returned documents:

- …

1435
- The retrieved document as a XOP Infoset, **if the Synchronous or WS-Addressing based Asynchronous stack is used, or as a MIME Attachment if the AS4 Asynchronous Web Services stack is used.**

- The MIME type of the retrieved document

- Errors or warnings in case the document(s) could not be retrieved successfully

…

1440

Update Vol 2b Section 3.43.5 as follows

3.43.5 Protocol Requirements

~~Implementors of this transaction~~ **The Retrieve Document Set transaction** shall comply with
1445 all requirements described in ITI TF-2x: Appendix V: Web Services for IHE Transactions.

~~**The Retrieve Document Set transaction shall use SOAP12 and MTOM with XOP encoding (labeled MTOM/XOP in this specification). See ITI TF-2x: Appendix V.8 for details.**~~

The Retrieve Document Set transaction:

A. **shall comply with the Synchronous Web Services Exchange protocol stack with all**
1450 **requirements specified in ITI TF-2x: Appendix V.3: Synchronous and Asynchronous (WS-Addressing) Web Services. These are based on SOAP 1.2 and MTOM with XOP encoding (labeled MTOM/XOP in this specification).**

For the Synchronous Web Services Exchange protocol stack, ~~T~~the Document Repository shall:

1455
- Accept the Retrieve Document Set Request message in MTOM/XOP format.

- Generate the Retrieve Document Set Response message in MTOM/XOP format

For the Synchronous Web Services Exchange protocol stack, ~~T~~the Document Consumer shall:

- Generate the Retrieve Document Set Request message in MTOM/XOP format.

1460 • Accept the Retrieve Document Set Response message in MTOM/XOP format.

XML namespace prefixes are for informational purposes only and are documented in ITI TF-2x: Appendix V, Table V.2.4-1.

1465 Document Repository **or Initiating Gateway**: These are the requirements for the Retrieve Document Set transaction presented in the order in which they would appear in the Document Repository WSDL definition:

- The following types shall be imported (xsd:import) in the /definitions/types section:

1470   o   namespace="urn:ihe:iti:xds-b:2007", schema="IHEXDS.xsd"

- The /definitions/message/part/@element attribute of the Retrieve Document Set Request message shall be defined as "xds:RetrieveDocumentSetRequest"

- The /definitions/message/part/@element attribute of the Retrieve Document Set Response message shall be defined as "xds:RetrieveDocumentSetResponse"

1475 • Refer to Table **3.43.5-1** ~~3.43.5.b~~ below for additional attribute requirements

~~**To support the WS-Addressing Asynchronous Web Services Exchange Option on the Document Consumer, the Document Repository or Initiating Gateway shall support the use of a non-anonymous response EPR in the WS-Addressing replyTo header.**~~

1480   **Table ~~3.43.5b:~~ 3.43.5-1: ~~Additional~~ Synchronous Web Services Attribute Requirements**

Attribute	Value
/definitions/portType/operation@name	DocumentConsumer_RetrieveDocumentSet
/definitions/portType/operation/input/@wsaw:Action	urn:ihe:iti:2007:RetrieveDocumentSet
/definitions/portType/operation/output/@wsaw:Action	urn:ihe:iti:2007:RetrieveDocumentSetResponse
/definitions/binding/operation/wsoap12:operation/@soapActionRequired	false

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 Section 3.43.5.1
1485 Sample SOAP Messages.

For informative WSDL for the Document Repository see in ITI TF-2x: Appendix W.

1490

B. May comply with the WS-Addressing based Asynchronous Web Services Exchange protocol stack. When the Asynchronous Web Services Exchange Option (WS-Addressing based) is selected on a Document Consumer, Document Repository, or the Initiating Gateway, it shall meet all requirements specified in ITI TF-2x: Appendix V.3: Synchronous and WS-Addressing Asynchronous Web Services. These are based on SOAP 1.2 and MTOM with XOP encoding as used by the Synchronous Web Services Exchange protocol stack (labeled MTOM/XOP in this specification).

1495

To support the WS-Addressing Asynchronous Web Services Exchange Option on the Document Consumer, the Document Repository **or Initiating Gateway** shall support the use of a non-anonymous response EPR in the WS-Addressing replyTo header.

1500

C. May comply with the AS4 Asynchronous Web Services Exchange protocol stack with all requirements specified in ITI TF-2x: Appendix V.4: AS4 Asynchronous Web Services, when the Document Consumer, Document Repository or Initiating Gateway select the AS4 Asynchronous Web Services Exchange Option. These are based on the AS4 profile of ebMS3.0 and use SOAP 1.2 with Attachments (labelled AS4 in this specification).

1505

For the AS4 Asynchronous Web Services Exchange protocol stack, the Document Consumer shall:

- **Generate the Retrieve Document Set Request message in AS4 format as a SOAP-With-Attachments message containing a MIME Multipart/related envelope and with additional constraints described in ITI TF-2x: Appendix V.4.**

1510

- **Accept the Retrieve Document Set Response message in AS4 format as a SOAP-With-Attachments message containing a MIME Multipart/related envelope and with additional constraints described in ITI TF-2x: Appendix V.4.**

For the AS4 Asynchronous Web Services Exchange protocol stack, the Document Repository or Initiating Gateway shall:

1515

- **Accept the Retrieve Document Set Request message in AS4 format as a SOAP-With-Attachments message containing a MIME Multipart/related envelope and with additional constraints described in ITI TF-2x: Appendix V.4.**

- **Generate the Retrieve Document Set Response message in AS4 format as a SOAP-With-Attachments message containing a MIME Multipart/related envelope and with additional constraints described in ITI TF-2x: Appendix V.4.**

1520

The requirements for the request and response messages with the AS4 Asynchronous Web Services stack are:

- **The <eb:Service> SOAP element shall be set to the value: ITI-43**

- **The type attribute on the <eb:Service> SOAP element shall be set to the value: urn:ihe:iti:transactions**

1525

- **The <eb:Action> SOAP element shall be set to the value: urn:ihe:iti:2007:RetrieveDocumentSet for the request and the value: urn:ihe:iti:2007:RetrieveDocumentSetResponse for the response message**

1530
- **The <eb:From/eb:Role> element shall be set to the value: urn:ihe:iti:2018:Requester for the request message and to the value: urn:ihe:iti:2018:Provider for the response message.**

- **The <eb:To/eb:Role> element shall be set to the value : urn:ihe:iti:2018:Provider for the request message and to the value: urn:ihe:iti:2018:Requester for the response message**

1535
- **The <soap12:Body> shall contain one <xds:RetrieveDocumentSetRequest> element for the request message and the value: <xds:RetrieveDocumentSetResponse> for the response message.**

- **The <xds:RetrieveDocumentSetRequest> element shall contain:**

1540
  - **One or more <xds:DocumentRequest> element representing the Retrieve Document Set Request (see ITI TF-2b: 3.43.4.1.2 for details of expressing a Retrieve Document Set Request).**

- **The <xds:RetrieveDocumentSetResponse> element shall contain:**

  - **One <rs:RegistryResponse> element containing the status attribute**

1545
  - **Zero or more <xds:DocumentResponse> elements representing the Retrieve Document Set Response (see ITI TF-2b: 3.43.4.2.2 for details of expressing a Retrieve Document Set Response).**

  - **The document element (if present):**

1550
    - **For each document in the <xds:DocumentResponse> element, an id attribute shall be set to allow correlation to the corresponding MIME part as explained in ITI TF-2x: Appendix V.4.6.2.**

  ITI TF-2x: Appendix V.4.8 includes an example of the SOAP Body for a Provide and Register Document Set-b Request message applicable to the AS4 Asynchronous Web Services stack.

1555 The <xds:RetrieveDocumentSetRequest/> element is defined as:

- One or more <xds:DocumentRequest/> elements, each one representing an individual document that the Document Consumer wants to retrieve from the Document Repository **or Initiating Gateway**. Each <xds:DocumentRequest/> element contains:

1560
  - A required <xds:RepositoryUniqueId/> element that identifies the repository from which the document is to be retrieved. This value corresponds to XDSDocumentEntry.repositoryUniqueId.

o A required <xds:DocumentUniqueId/> that identifies the document within the repository. This value corresponds to the XDSDocumentEntry.uniqueId.

1565

o An optional <xds:HomeCommunityId/> element that corresponds to the home attribute of the Identifiable class in ebRIM.

This allows the Document Consumer to specify one or more documents to retrieve from the Document Repository **or Initiating Gateway**.

The <xds:RetrieveDocumentResponse/> element is defined as:

- A required /xds:RetrieveDocumentSetResponse/rs:RegistryResponse element

1570
- An optional sequence of <xds:DocumentResponse/> elements containing:

o A <xds:HomeCommunityId/> element. The value of this element shall be the same as the value of the /RetrieveDocumentSetRequest/DocumentRequest/HomeCommunityId element in the Retrieve Document Set Request Message. If the <xds:HomeCommunityId/> element

1575
is not present in the Retrieve Document Set Request Message, this value shall not be present.

o A required <xds:RepositoryUniqueId/> that identifies the repository from which the document is to be retrieved. The value of this element shall be the same as the value of the /RetrieveDocumentSetRequest/DocumentRequest/RepositoryUniqueId element

1580
in the original Retrieve Document Set Request Message. This value corresponds to XDSDocumentEntry.repositoryUniqueId.

o A required <xds:DocumentUniqueId/> that identifies the document within the repository. The value of this element shall be the same as the value of the /RetrieveDocumentSetRequest/DocumentRequest/DocumentUniqueId element in the

1585
original Retrieve Document Set Request Message. This value corresponds to XDSDocumentEntry.uniqueId.

o A required <xds:Document/> element that contains:

- **For the Synchronous and the WS-Addressing based Asynchronous Web Services stack,** the retrieved document using the xsi:base64Binary data type.

1590
(Note: This is the logical representation of the document in the XML. The wire format may be different; see ITI TF-2x: **Appendix 3.6 ~~Appendix V.8~~**).

- **For the AS4 Asynchronous Web Services stack. See ITI TF-2x: V.4.6.2.**

o A required <xds:mimeType/> element that indicates the MIME type of the retrieved document

1595
o An optional <xds:NewDocumentUniqueId/> element that identifies the document returned in the request when retrieval is of an On-Demand Document. This is required when retrieval is of an On-Demand Document.

o An optional <xds:NewRepositoryUniqueId/> element that identifies the Document Repository that will support retrieval of the document created as a result of retrieval of the On-Demand Document. This is required when the On-Demand Document Source supports the Persistence of Retrieved Documents Option.

1600

The /RetrieveDocumentSetResponse/rs:RegistryResponse/@status attributes provides the overall status of the request: It shall contain one of the following values:

    urn:oasis:names:tc:ebxml-regrep:ResponseStatusType:Success

1605   urn:ihe:iti:2007:ResponseStatusType:PartialSuccess

    urn:oasis:names:tc:ebxml-regrep:ResponseStatusType:Failure

See ITI TF-3: 4.2.4 Error Reporting for the interpretation of these values.

For each document requested in a /RetrieveDocumentSetRequest/DocumentRequest element:

o If a warning is reported when retrieving the document, then a /RetrieveDocumentSetResponse/rs:RegistryResponse/rs:RegistryErrorList/ rs:RegistryError element shall be returned with:

1610

- @severity is urn:oasis:names:tc:ebxml-regrep:ErrorSeverityType:Warning

- @errorCode is specified

- @codeContext contains the warning message

1615   - @location contains the DocumentUniqueId of the document requested

    o The document shall be returned in an instance of /RetrieveDocumentSetResponse/DocumentResponse/Document as a XOP Infoset **with the Synchronous or WS-Addressing based Asynchronous Web Service stacks (see ITI TF-2x: Appendix V.3) or SOAP With Attachments with the AS4 Asynchronous Web Services stack (see ITI TF-2x: Appendix V.4.6.2).** The returned document and warning are correlated via the DocumentUniqueId.

1620

o If an error is reported when retrieving a document, then a /RetrieveDocumentSetResponse/rs:RegistryResponse/rs:RegistryErrorList/ rs:RegistryError element shall be returned with:

1625   o @severity is urn:oasis:names:tc:ebxml-regrep:ErrorSeverityType:Error

    o @errorCode is specified

    o @codeContext contains the error message

    o @location contains the DocumentUniqueId of the document requested

o No corresponding RetrieveDocumentSetResponse/DocumentResponse element shall be returned

1630

o If the document is successfully retrieved (without warning) then no
/RetrieveDocumentSetResponse/rs:RegistryResponse/rs:RegistryErrorList/ rs:RegistryError
element shall be present and a
/RetrieveDocumentSetResponse/DocumentResponse/Document element shall be returned
1635 containing the document as a XOP Infoset. **with the Synchronous Web Service and WS-
Addressing Asynchronous Web Service Stack (see ITI TF-2x: V.3) or SOAP With
Attachments if the AS4 Asynchronous Web Services stack (see ITI TF-2x: V.4.6.2)**.

The /RetrieveDocumentSetResponse/rs:RegistryResponse/rs:ResponseSlotList element is not
used in this transaction.

1640 The /RetrieveDocumentSetResponse/rs:RegistryResponse/@requestId attribute is not used in this
transaction.

A full XML Schema Document for the XDS.b types is available online on the IHE FTP site, see
ITI TF-2x: Appendix W.

1645 *Update Vol 2b Section 3.43.5.1 as follows*

3.43.5.1 Sample SOAP Messages

The samples in the following two sections show a typical request and its relative response. ~~The
sample messages also show the WS-Addressing headers <Action/>, <MessageID/>,
<ReplyTo/>…; these WS-Addressing headers are populated according to ITI TF-2x:~~
1650 ~~Appendix V: Web Services for IHE Transactions.~~

3.43.5.1.1 Sample Retrieve Document Set SOAP Request

3.43.5.1.1.1 Synchronous Web Services Exchange

**The sample messages show the WS-Addressing headers <a:Action/>, <a:MessageID/>,
<a:ReplyTo/>…; these WS-Addressing headers are populated according to ITI TF-2x:**
1655 **Appendix V.3: Synchronous and Asynchronous (WS-Addressing) Web Services .**

…

3.43.5.1.1.2 Asynchronous Web Services Exchange

For the Asynchronous Web Services Exchange Option (WS-Addressing based), the sample
1660 **messages show the WS-Addressing headers <a:Action/>, <a:MessageID/>,
<a:ReplyTo/>…; these WS-Addressing headers are populated according to ITI TF-2x:
Appendix V.3: Synchronous and Asynchronous (WS-Addressing) Web Services.**

…

The sample for the AS4 Asynchronous Web Services is in ITI TF-2x: V.8.

1665 **3.43.5.1.2 Sample Retrieve Document Set SOAP Response**

3.43.5.1.2.1 Synchronous Web Services Exchange

The sample messages show the WS-Addressing headers <a:Action/>, <a:MessageID/>, <a:ReplyTo/>…; these WS-Addressing headers are populated according to ITI TF-2x: Appendix V.3: Synchronous and Asynchronous (WS-Addressing) Web Services.

1670 …

3.43.5.1.2.2 Asynchronous Web Services Exchange

For the Asynchronous Web Services Exchange Option (WS-Addressing based), the sample messages show the WS-Addressing headers <a:Action/>, <a:MessageID/>, <a:RelatesTo/>…; these WS-Addressing headers are populated according to ITI TF-2x:

1675 **Appendix V.3: Synchronous and Asynchronous (WS-Addressing) Web Services.**

…

The sample that covers the AS4 Asynchronous Web Services is in ITI TF-2x: V4.8.

1680 | *Update Vol 2b Section 3.43.6 as follows* |
|---|

3.43.6 Security Considerations

…

3.43.6.1.1 Document Consumer audit message:

…

1685 Where:

…

Destination AuditMessage/ ActiveParticipant	UserID	M	If **WS-Addressing based** Asynchronous Web Services Exchange is being used, the content of the <wsa:ReplyTo/> element. **If AS4 Asynchronous Web Services Exchange is used, the content of the eb:From/eb:PartyId.** Otherwise, not specialized.
	AlternativeUserID	M	the process ID as used within the local operating system in the local system logs.
	UserName	*U*	*not specialized*
	UserIsRequestor	*U*	*not specialized*
	RoleIDCode	M	EV(110152, DCM, "Destination")
	NetworkAccessPointTypeCode	M	"1" for machine (DNS) name, "2" for IP address
	NetworkAccessPointID	M	The machine name or IP address.

…

1690 **3.43.6.1.2 Document Repository, On-Demand Document Source, and Initiating Gateway audit message:**

…

Destination AuditMessage/ ActiveParticipant			
	UserID	M	If **WS-Addressing based** Asynchronous Web Services Exchange is being used, the content of the <wsa:ReplyTo/> element. **If AS4 Asynchronous Web Services Exchange is used, the content of the eb:From/eb:PartyId.** Otherwise, not specialized.
	AlternativeUserID	*U*	*not specialized*
	UserName	*U*	*not specialized*
	UserIsRequestor	*U*	*not specialized*
	RoleIDCode	M	EV(110152, DCM, "Destination")
	NetworkAccessPointTypeCode	M	"1" for machine (DNS) name, "2" for IP address
	NetworkAccessPointID	M	The machine name or IP address.

…

1695

In Vol 2b Section 3.55, ==Cross Gateway Patient Discovery [ITI-55]==, update the sub-sections as follows.

1700   *Update Vol 2b Section 3.55 and subsections as follows*

3.55 Cross Gateway Patient Discovery [ITI-55]

This section corresponds to transaction [ITI-55] of the IHE ITI Technical Framework. Transaction [ITI-55] is used by the Initiating Gateway and Responding Gateway Actors.

3.55.1 Scope

1705   …

The Cross Gateway Patient Discovery transaction has several modes, useful in different environments:

- Demographic Query only mode – in this mode only the demographics of the patient are included in the request. The initiating community does not have, or does not
1710   choose to specify, a patient identifier for use by the Responding Gateway.

- Demographic Query and Feed – in this mode both the demographic and initiating community identifier are included in the request.

- Shared/national Patient Identifier Query and Feed – in this mode only a shared/national identifier is specified. Demographics are not necessary because
1715   matching can be done on the identifier alone.

~~This transaction can be used synchronously and asynchronously.~~ **This transaction can use the Synchronous, Asynchronous (WS-Addressing based), or AS4 Asynchronous Web Services exchange.**

…

1720

Update Vol 2b Section 3.55.3

3.55.3 Referenced Standard

HL7 Version 3 Edition 2008, Patient Administration DSTU, Patient Topic (found at http://www.hl7.org/memonly/downloads/v3edition.cfm#V32008)

1725   ~~Implementers of this transaction shall comply with all requirements described in~~ ITI TF-2x: Appendix V Web Services for IHE Transactions

Update Vol2 b Section 3.55.4.1 and subsection as follows.

3.55.4.1 Cross Gateway Patient Discovery Request

1730 The Cross Gateway Patient Discovery Request is implemented using the HL7 Patient Registry Query by Demographics (PRPA_MT201306UV02) message.

…

3.55.4.1.2 Message Semantics

The components of the Patient Registry Query by Demographics message with cardinality
1735 greater than 0 (as shown below) are required, and the detailed description of the message is provided in Sections 3.55.4.1.2.1 to 3.55.4.1.2.3.

For each element which is required, the element shall be specified by the Initiating Gateway in the request and shall be used by the Responding Gateway as part of its demographic matching algorithm.

1740 For each element which is optional the element does not need to be specified by the Initiating Gateway in the request but, if specified, shall be used by the Responding Gateway as part of its demographic matching algorithm.

The Initiating Gateway and the Responding Gateway:

A. **Shall support the Synchronous Web Services Exchange as specified in ITI TF-2x:**
1745 **Appendix V.3 Synchronous and Asynchronous (WS-Addressing based) Web Services Exchange.**

B. **May support the Asynchronous (WS-Addressing based) Web Services Exchange. When the Asynchronous Web Services Exchange Option is selected by the Initiating or Responding Gateway, it shall meet the requirements of ITI TF-2x: Appendix V.3**
1750 **Synchronous and Asynchronous (WS-Addressing based) Web Services Exchange.**

C. **May support the AS4 Asynchronous Web Services Exchange. When the AS4 Asynchronous Web Services Exchange Option is selected by the Initiating or Responding Gateway, it shall meet the requirements of ITI TF-2x: Appendix V.4 AS4 Asynchronous Web Services Exchange.**

1755

~~The Responding Gateway shall support Asynchronous Web Services Exchange as described in ITI TF-2x: V.5, Synchronous and Asynchronous Web Services Exchange. If the Initiating Gateway declares the Asynchronous Web Services Exchange Option it shall also support Asynchronous Web Services Exchange as described in ITI TF-2x: V.5.~~

1760

Use of Asynchronous Web Services Exchange is necessary when transactions scale to large numbers of communities because it allows for more efficient handling of latency and scale.

The Initiating Gateway may specify a duration value in the **~~SOAP Header element of the~~** request. This value suggests to the Responding Gateway a length of time that the Initiating Gateway recommends caching any correlation resulting from the interaction. The duration value is **~~specified in the SOAP Header using the CorrelationTimeToLive element and contains~~** a value conformant with the xs:duration type defined in http://www.w3.org/TR/xmlschema-2/#duration. **This value shall be set as follows:**

- **When using Synchronous Web Services Exchange or WS-Addressing based Asynchronous Web Services Exchange, the value shall be set using a custom SOAP Header element named CorrelationTimeToLive in the urn:ihe:iti:xcpd:2009 namespace.**

- **When using the AS4 Asynchronous Web Services Exchange Option, the value shall be set as an AS4 message property named CorrelationTimeToLive.**

If no CorrelationTimeToLive **~~element~~** is specified in the SOAP **~~Header~~ message,** the Responding Gateway shall interpret this as a recommendation against caching, unless a mutually agreed policy states otherwise.

An example of specifying the CorrelationTimeToLive **in Synchronous Web Services Exchange or WS-Addressing based Asynchronous Web Services Exchange** element follows, which recommends caching of 7 days.

```
<xcpd:CorrelationTimeToLive>P0Y0M7D</xcpd:CorrelationTimeToLive>
```

In AS4 Asynchronous, the same information would be encoded as follows:

```
<eb:MessageProperties>
    <eb:Property name="CorrelationTimeToLive">P0Y0M7D</eb:Property>
</eb:MessageProperties>
```

Update Vol 2b Section 3.55.4.2 and subsection as follows.

3.55.4.2 Cross Gateway Patient Discovery Response

The Cross Gateway Patient Discovery Response is implemented using the HL7 Patient Registry Find Candidates Response PRPA_MT201310UV02) message.

…

3.55.4.2.2 Message Semantics

The components of the message with cardinality greater than 0 (as shown below) are required, and the detailed description of the message is provided in Sections 3.55.4.2.2.1 to 3.55.4.2.2.7. All other attributes of the message are optional.

For each element that is required this means that it shall be provided by Responding Gateway, unless not available, and shall be accepted by requestor but requestor is not required to process the value in any way, only accept it without any error.

1800 **The Initiating Gateway and the Responding Gateway:**

A. **Shall support the Synchronous Web Services Exchange as specified in ITI TF-2x: Appendix V.3 Synchronous and Asynchronous (WS-Addressing based) Web Services Exchange.**

B. **May support the Asynchronous (WS-Addressing based) Web Services Exchange.**
1805 **When the Asynchronous Web Services Exchange Option is selected by the Initiating or Responding Gateway, it shall meet the requirements of ITI TF-2x: Appendix V.3 Synchronous and Asynchronous (WS-Addressing based) Web Services Exchange.**

C. **May support the AS4 Asynchronous Web Services Exchange. When the AS4 Asynchronous Web Services Exchange Option is selected by the Initiating or**
1810 **Responding Gateway, it shall meet the requirements of ITI TF-2x: Appendix V.4 AS4 Asynchronous Web Services Exchange.**

~~The Responding Gateway shall support Asynchronous Web Services Exchange as described in ITI TF-2x: V.5, Synchronous and Asynchronous Web Services Exchange. If~~
1815 ~~the Initiating Gateway declares the Asynchronous Web Services Exchange Option it shall also support Asynchronous Web Services Exchange as described in ITI TF-2x: V.5.~~

Use of Asynchronous Web Services Exchange is necessary when transactions scale to large numbers of communities because it allows for more efficient handling of latency and scale.

1820 The Responding Gateway may specify a duration value in the ~~SOAP Header element of the~~ response. This value suggests to the Initiating Gateway a length of time that the Responding Gateway recommends caching any correlation resulting from the interaction. The duration value is ~~specified in the SOAP Header using the CorrelationTimeToLive element and contains~~ a value conformant with the xs:duration type defined in http://www.w3.org/TR/xmlschema-
1825 2/#duration. **This value shall be set as follows:**

- **When using Synchronous Web Services Exchange or WS-Addressing based Asynchronous Web Services Exchange, the value shall be set using a custom SOAP Header element named CorrelationTimeToLive in the urn:ihe:iti:xcpd:2009 namespace.**

1830 - **When using the AS4 Asynchronous Web Services Exchange Option, the value shall be set as an AS4 message property named CorrelationTimeToLive.**

If no CorrelationTimeToLive ~~element~~ is specified in the SOAP ~~Header~~ **message,** the Initiating Gateway shall interpret this as a recommendation against caching, unless a mutually agreed policy states otherwise.

1835 An example of specifying the CorrelationTimeToLive element follows, which recommends caching of 7 days.

```
<xcpd:CorrelationTimeToLive>P0Y0M7D</xcpd:CorrelationTimeToLive>
```

An example of specifying the CorrelationTimeToLive **in Synchronous Web Services Exchange or WS-Addressing based Asynchronous Web Services Exchange** element follows, which

1840 recommends caching of 7 days.

```
<xcpd:CorrelationTimeToLive>P0Y0M7D</xcpd:CorrelationTimeToLive>
```

In AS4 Asynchronous, the same information would be encoded as follows:

```
<eb:MessageProperties>
    <eb:Property name="CorrelationTimeToLive">P0Y0M7D</eb:Property>
</eb:MessageProperties>
```
1845

Update Vol 2b Section 3.55.5 as follows.

3.55.5 Security Considerations

1850 …

3.55.5.1.1 Initiating Gateway audit message:

…

Where:

Source AuditMessage/ ActiveParticipant			
	UserID	M	If **WS-Addressing based** Asynchronous Web Services Exchange is being used, the content of the <wsa:ReplyTo/> element. **If AS4 Asynchronous Web Services Exchange is used, the content of the eb:From/eb:PartyId.** Otherwise, not specialized.
	AlternativeUserID	M	the process ID as used within the local operating system in the local system logs.
	UserName	*U*	*not specialized*
	UserIsRequestor	*U*	*not specialized*
	RoleIDCode	M	EV(110153, DCM, "Source")
	NetworkAccessPointTypeCode	M	"1" for machine (DNS) name, "2" for IP address
	NetworkAccessPointID	M	The machine name or IP address.

…

1855 ### 3.55.5.1.2 Responding Gateway audit message:

…

Where:

Source AuditMessage/ ActiveParticipant	UserID	M	If **WS-Addressing based** Asynchronous Web Services Exchange is being used, the content of the <wsa:ReplyTo/> element. **If AS4 Asynchronous Web Services Exchange is used, the content of the eb:From/eb:PartyId.** Otherwise, not specialized.
	AlternativeUserID	*U*	*not specialized*
	UserName	*U*	*not specialized*
	UserIsRequestor	*U*	*not specialized*
	RoleIDCode	M	EV(110153, DCM, "Source")
	NetworkAccessPointTypeCode	M	"1" for machine (DNS) name, "2" for IP address
	NetworkAccessPointID	M	The machine name or IP address.

1860   …

> *Update Vol 2b Section 3.55.6 and Subsection 3.55.6.1 as follows. Leave Subsections 3.55.1.1 and 3.55.6.1.2 unchanged.*

3.55.6 Protocol Requirements

1865 The Cross Gateway Patient Discovery request and response will be transmitted using Synchronous or Asynchronous Web Services Exchange, according to the requirements specified in ITI TF-2x: Appendix V. ~~If the Deferred Response Option is being used the request and response will be transmitted as described in Section 3.55.6.2.~~

The following WSDL naming conventions shall apply:
1870
```
        query message    -> "PRPA_IN201305UV02_Message"
```

The following WSDL snippet describes the type for this message:

```
      …
 <types>
<xsd:schema elementFormDefault="qualified" targetNamespace="urn:hl7-org:v3"
xmlns:hl7="urn:hl7-org:v3">
<!-- Include the message schema -->
<xsd:import namespace="urn:hl7-org:v3"
schemaLocation="../schema/HL7V3/NE2008/multicacheschemas/PRPA_IN201305UV02.xsd"/>
<xsd:element name="PRPA_IN201305UV02"/>
</xsd:schema>
  </types>
…
```

The message is described by the following snippet:
1885
```
      …
  <message name="PRPA_IN201305UV02_Message">
<part element="hl7:PRPA_IN201305UV02" name="Body"/>
  </message>
      …
```

1890

This section contains the SOAP mapping to the Synchronous and WS-Addressing based Asynchronous Web Services Port Type and Binding Definitions (Section 3.55.6.1), the Deferred Response Option (Section 3.55.6.2), and the SOAP Requirements for AS4 Asynchronous Web Services (Section 3.55.6.3).

1895 **3.55.6.1 Web Services Port Type and Binding Definitions**

Responding Gateway:

IHE-WSP201) The attribute /wsdl:definitions/@name SHALL be "RespondingGateway".

The following WSDL naming conventions shall apply:

```
        wsdl:definitions/@name="RespondingGateway":
1900    ITI-55 query                    -> "PRPA_IN201305UV02_Message"
        ITI-55 response                 -> "PRPA_IN201306UV02_Message"
        accept acknowledgement          -> "MCCI_IN000002UV01_Message"
        portType                        -> "RespondingGateway_PortType"
        ITI-55 operation                -> "RespondingGateway_PRPA_IN201305UV02"
1905    ITI-55 Deferred Response operation ->
                            "RespondingGateway_Deferred_PRPA_IN201305UV02"
        SOAP 1.2 binding                -> "RespondingGateway_Binding_Soap12"
        SOAP 1.2 port                   -> "RespondingGateway_Port_Soap12"
```

1910 **Initiating Gateway:**

IHE-WSP201) The attribute /wsdl:definitions/@name SHALL be "InitiatingGateway".

The following WSDL naming conventions shall apply:

```
        wsdl:definitions/@name="InitiatingGateway":
        ITI-55 response                 -> "PRPA_IN201306UV02_Message"
1915    accept acknowledgement          -> "MCCI_IN000002UV01_Message"
        portType                        -> "InitiatingGateway_PortType"
        ITI-55 Deferred Response operation ->
                            "InitiatingGateway_Deferred_PRPA_IN201306UV02"
        SOAP 1.2 binding                -> "InitiatingGateway_Binding_Soap12"
1920    SOAP 1.2 port                   -> "InitiatingGateway_Port_Soap12"
```

The following WSDL snippets specify the Cross Gateway Patient Discovery Query Port Type and Binding definitions, according to the requirements specified in ITI TF-2x: Appendix V.**3 Synchronous and Asynchronous (WS-Addressing based) Web Services Exchange.**

1925

1930

In Vol 2b, after Section 3.55.6.2, create a new Section 3.55.6.3 as follows. 3.55.6.3 SOAP Requirements for AS4 Asynchronous Web Services

---

3.55.6.3 SOAP Requirements for AS4 Asynchronous Web Services

1935   The Cross Gateway Patient Discovery request and response may be transmitted using AS4 Asynchronous Web Services Exchange, according to the requirements specified in ITI TF-2x: **Appendix** V.4. If the Deferred Response Option is being used the request and response will be transmitted as described in Section 3.55.6.2.

Initiating Gateway: These are the requirements for the Cross Gateway Patient Discovery AS4 Asynchronous Request:

1940
- The <eb:Service> SOAP element shall be set to the value: ITI-55

- The type attribute on the <eb:Service> SOAP element shall be set to the value: urn:ihe:iti:transactions

- The <eb:Action> SOAP element shall be set to the value: urn:hl7-org:v3:PRPA_IN201305UV02:CrossGatewayPatientDiscovery

1945
- The <eb:From/eb:Role> element shall be set to the value: urn:ihe:iti:2018:Requester

- The <eb:To/eb:Role> element shall be set to the value: urn:ihe:iti:2018:Provider

- The <soap12:Body> shall contain one <hl7:PRPA_IN201305UV02_Message> element

Responding Gateway: These are the requirements for the Cross Gateway Patient Discovery AS4 Asynchronous Response:

1950
- The <eb:Service> SOAP element shall be set to the value: ITI-55

- The type attribute on the <eb:Service> SOAP element shall be set to the value: urn:ihe:iti:transactions

- The <eb:Action> SOAP element shall be set to the value: urn:hl7-org:v3:PRPA_IN201306UV02:CrossGatewayPatientDiscovery

1955
- The <eb:From/eb:Role> element shall be set to the value: urn:ihe:iti:2018:Provider

- The <eb:To/eb:Role> element shall be set to the value: urn:ihe:iti:2018:Requester

- The <soap12:Body> shall contain one <hl7:PRPA_IN201306UV02_Message> element

1960

---

*In Vol 2b Section 3.56, ==**Patient Location Query [ITI-56]**==, update the sub-sections as follows.*

1965   *Note, the changes related to the Patient Location Query [ITI-56] transaction assume that the XCPD HDL Supplement is integrated in the TF prior to the changes below.*

Update Vol 2b Section 3.56.4.1.2 as follows:

3.56.4.1.2 Message Semantics

1970   The Patient Location Query request is a Web Service request complying with all requirements in ITI TF-2x: Appendix V: Web Services for IHE Transactions. The content of the message is a single <xcpd:PatientLocationQueryRequest/> element which contains a single <xcpd:RequestedPatientId/> element. The <xcpd:RequestedPatientId/> contains the patient identifier which shall be coded consistent with the HL7 V3 II Data Type.

1975   The Responding Gateway shall support **either WS-Addressing based** Asynchronous Web Services Exchange as described in ITI TF-2x: V.~~3~~5 Synchronous and Asynchronous (**WS-Addressing based)** Web Services Exchange **or the AS4 Asynchronous Web Services as described in ITI TF-2x: V.4 AS4 Asynchronous Web Services Exchange**.

If the Initiating Gateway declares the **Asynchronous Web Services Exchange Option (WS-Addressing based)**, it shall also support Asynchronous Web Services Exchange as described in
1980   ITI TF-2x: V.~~5~~3. **If the Initiating Gateway declares the AS4 Asynchronous Web Services Exchange Option, it shall also support AS4 Asynchronous Web Services Exchange as described in ITI TF-2x: V.4.** Use of Asynchronous Web Services Exchange is necessary when transactions scale to large numbers of communities because it allows for more efficient handling
1985   of latency and scale.

The Initiating Gateway has acquired the correct patient identifier to use in this transaction through some other interactions outside the scope of this transaction. One approach is to use the Cross Gateway Patient Discovery transaction, which returns the identifier associated with a set of demographics.

1990   An example of the Patient Location Query request:

```
<xcpd:PatientLocationQueryRequest xmlns:xcpd="urn:ihe:iti:xcpd:2009
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="urn:ihe:iti:xcpd:2009>
  <xcpd:RequestedPatientId
      root="1.2.840.114350.1.13.99997.2.3412" extension="38273N237"/>
</xcpd:PatientLocationQueryRequest>
```

2000

> *Update Vol 2b Section 3.56.4.2.2 as follows:*

3.56.4.2.2 Message Semantics

2005 The Patient Location Query response is a Web Services response complying with all requirements in ITI TF-2x: Appendix V: Web Services for IHE Transactions.

The Responding Gateway shall support **either WS-Addressing based** Asynchronous Web Services Exchange as described in ITI TF-2x: V.~~5~~3 Synchronous and Asynchronous (**WS-Addressing based)** Web Services Exchange**, or the AS4 Asynchronous Web Services as described in ITI TF-2x: V.4 AS4 Asynchronous Web Services Exchange**.

2010 If the Initiating Gateway declares the Asynchronous Web Services Exchange Option **(WS-Addressing based)**, it shall also support **WS-Addressing based** Asynchronous Web Services Exchange as described in ITI TF-2x: V.~~5~~3. . **If the Initiating Gateway declares the AS4 Asynchronous Web Services Exchange Option, it shall also support AS4 Asynchronous Web Services Exchange as described in ITI TF-2x: V.4.** Use of Asynchronous Web Services
2015 Exchange is necessary when transactions scale to large numbers of communities because it allows for more efficient handling of latency and scale.

The Responding Gateway has acquired the data returned in this transaction through some other interactions outside the scope of this transaction. One approach is to use the Cross Gateway Patient Discovery transaction.

2020 The content of the message is a single <xcpd:PatientLocationQueryResponse/> element which is defined as:

- An optional sequence of <xcpd:PatientLocationResponse/> elements which contain:

  - A required <xcpd:HomeCommunityId/> element. The value of this element shall be the identifier of a community which might have data about the patient
2025 identified in the request. Shall be coded consistent with the anyURI Data Type.

  - A required <xcpd:CorrespondingPatientId/> element that contains the patient identifier that the requested patient is known by within the community identified by the xds:HomeCommunityId element. Shall be coded consistent with the HL7 V3 II Data Type.

2030   - A required <xcpd:RequestedPatientId/> that is the same identifier specified in the query request. Shall be coded consistent with the HL7 V3 II Data Type.

The <xcpd:PatientLocationResponse/> element in the schema may have additional sub-elements defined by national committees. Initiating Gateways shall accept extra sub-elements and may ignore them. National committees are responsible for providing an extended schema if the
2035 schema is extended. The schema shall not be extended outside of IHE national/regional committees.

If the Responding Gateway is not managing patient data locations for the identified patient, or does not know the patient identifier, it shall respond with a SOAP Fault see ITI TF-2b: 3.56.4.1.3.

2040

> *Update Vol 2b Section 3.56.5.1.1, 3.56.1.2 as follows:*

3.56.5.1.1 Initiating Gateway audit message:

…

Where:

Source AuditMessage/ ActiveParticipant			
	UserID	M	If **WS-Addressing based** Asynchronous Web Services Exchange is being used, the content of the <wsa:ReplyTo/> element. **If AS4 Asynchronous Web Services Exchange is used, the content of the eb:From/eb:PartyId.** Otherwise, not specialized.
	AlternativeUserID	M	the process ID as used within the local operating system in the local system logs.
	UserName	*U*	*not specialized*
	UserIsRequestor	*U*	*not specialized*
	RoleIDCode	M	EV(110153, DCM, "Source")
	NetworkAccessPointTypeCode	M	"1" for machine (DNS) name, "2" for IP address
	NetworkAccessPointID	M	The machine name or IP address.

2045   …

3.56.5.1.2 Responding Gateway audit message:

…

Where:

Source AuditMessage/ ActiveParticipant			
	UserID	M	If **WS-Addressing based** Asynchronous Web Services Exchange is being used, the content of the <wsa:ReplyTo/> element. **If AS4 Asynchronous Web Services Exchange is used, the content of the eb:From/eb:PartyId.** Otherwise, not specialized.
	AlternativeUserID	*U*	*not specialized*
	UserName	*U*	*not specialized*
	UserIsRequestor	*U*	*not specialized*
	RoleIDCode	M	EV(110153, DCM, "Source")
	NetworkAccessPointTypeCode	M	"1" for machine (DNS) name, "2" for IP address
	NetworkAccessPointID	M	The machine name or IP address

…

2050

2055

> *Update Vol 2b Section 3.56.6 as follows. This includes adding new subsection header 3.56.6.1 and new subsection 3.56.6.1 including header and section content.*
>
> <mark>*Green highlighted text*</mark> *shall be in Bold*

3.56.6 Protocol Requirements

This section describes requirements for Web Services transport for;

    Synchronous

2060   **WS-Addressing based Asynchronous**

    AS4 Asynchronous

3.56.6.1 Support of Synchronous and WS-Addressing based Asynchronous web service exchange requirements

The Patient Location Query request and response will be transmitted using Web Services, according to the requirements specified in ITI TF-2x: Appendix V.3. The specific values for the WSDL describing the Patient Location Query transaction are described in this section.

2065

The Responding Gateway shall accept a Patient Location Query Request formatted as a SIMPLE SOAP message and respond with a Patient Location Query Response formatted as a SIMPLE SOAP message. The Initiating Gateway shall generate the Patient Location Query Request formatted as a SIMPLE SOAP message and accept a Patient Location Query Response formatted as a SIMPLE SOAP message.

2070

<mark>**IHE-WSP201)**</mark> The attribute /wsdl:definitions/@name shall be "RespondingGateway".

The following WSDL naming conventions shall apply:

    wsdl:definitions/@name="RespondingGateway":

2075   query message   -> "PatientLocationQuery_Message"

    query response   -> "PatientLocationQueryResponse_Message"

    portType   -> "RespondingGateway_PortType"

    operation   -> "PatientLocationQuery"

    SOAP 1.2 binding -> "RespondingGateway_Binding_Soap12"

2080   SOAP 1.2 port   -> "RespondingGateway_Port_Soap12"

<mark>**IHE-WSP202)**</mark> The targetNamespace of the WSDL shall be "urn:ihe:iti:xcpd:2009"

These are the requirements for the Patient Location Query transaction presented in the order in which they would appear in the WSDL definition:

2085
- The following types shall be imported (xsd:import) in the /definitions/types section:
  - namespace=" urn:ihe:iti:xcpd:2009"
- The /definitions/message/part/@element attribute of the Patient Location Query Request message shall be defined as "xcpd: PatientLocationQueryRequest"

2090
- The /definitions/message/part/@element attribute of the Patient Location Query Response message shall be defined as "xcpd: PatientLocationQueryResponse"
- The /definitions/portType/operation/input/@wsaw:Action attribute for the Patient Location QueryRequest message shall be defined as "urn:ihe:iti:2009:PatientLocationQuery"

2095
- The /definitions/portType/operation/output/@wsaw:Action attribute for the Patient Location Query Response message shall be defined as "urn:ihe:iti:2009:PatientLocationQueryResponse"
- The /definitions/binding/operation/soap12:operation/@soapActionRequired attribute should be defined as "false"

A full WSDL for the Initiating and Responding Gateway Actors is found in ITI TF-2x: Appendix
2100 W.

3.56.6.2 Support of AS4 Asynchronous web service exchange requirements

The requirements for the Patient Location Query Request using the AS4 Asynchronous transport are:

- **The <eb:Service> SOAP element shall be set to the value: ITI-56**

2105
- **The type attribute on the <eb:Service> SOAP element shall be set to the value: urn:ihe:iti:transactions**
- **The <eb:Action> SOAP element shall be set to the value: urn:ihe:iti:2009:PatientLocationQuery**
- **The <eb:From/eb:Role> element shall be set to the value: urn:ihe:iti:2018:Requester**

2110
- **The <eb:To/eb:Role> element shall be set to the value: urn:ihe:iti:2018:Provider**
- **The AS4 message shall be a SIMPLE SOAP 1.2 message. No use shall be made of SOAP-With-Attachments MIME Multipart/Related packaging.**
- **The <soap12:Body> shall contain one <xcpd:PatientLocationQueryRequest> element**

2115 **The requirements for the Patient Location Query Response using the AS4 Asynchronous transport are:**

- **The <eb:Service> SOAP element shall be set to the value: ITI-56**

- **The type attribute on the <eb:Service> SOAP element shall be set to the value: urn:ihe:iti:transactions**

2120
- **The <eb:Action> SOAP element shall be set to the value: urn:ihe:iti:2009:PatientLocationQueryResponse**

- **The <eb:From/eb:Role> element shall be set to the value: urn:ihe:iti:2018:Provider**

- **The <eb:To/eb:Role> element shall be set to the value: urn:ihe:iti:2018:Requester**

2125
- **The AS4 message shall be a SIMPLE SOAP 1.2 message. No use shall be made of SOAP-With-Attachments MIME Multipart/Related packaging.**

- **The <soap12:Body> shall contain one <xcpd:PatientLocationQueryResponse> element**

2130

In the XCDR TI Supplement, in Section 3.80, Cross-Gateway Document Provide [ITI-80], update the sub-sections as follows.

2135

Update the existing 3.80.5 content and existing subsections 3.80.5.1, 3.80.5.1.1 and 3.80.5.1.2, content unchanged, by renumbering 30.80.5 into a new Section 3.80.5.1. and renumbering the lower level sections as 3.80.5.1.1, 3.80.5.1.1.1 and 3.80.5.1.1.2. Those updates apply to XCDR Trial Implementation Supplement

3.80.5 Protocol Requirements

3.80.5.1 Protocol Requirements for Synchronous and Asynchronous (WS-Addressing based) Web Services

2140 ~~Implementers of this transaction shall comply with all requirements described in ITI TF-2x: Appendix V: Web Services for IHE Transactions.~~

For Synchronous and Asynchronous (WS-Addressing based) exchange, ~~Tt~~he Cross-Gateway Document Provide transaction shall use SOAP1.2 and MTOM with XOP encoding (labeled MTOM/XOP in this specification). See ITI TF-2x: Appendix V for details.

2145 **Implementers of this transaction shall comply with all requirements described in ITI TF-2x: Appendix V.3: Synchronous and Asynchronous (WS-Addressing based) Web Services.**

XML namespace prefixes used in text and examples below are for informational purposes only and are documented in ITI TF-2x: Appendix V, Table 2.4-1.

A full XML Schema Document for the XDS types is available online on the IHE FTP site, see
2150 ITI TF-2x: Appendix W.

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

2155
- The following types shall be imported (xsd:import) in the /definitions/types section:
  - namespace="urn:oasis:names:tc:ebxml-regrep:xsd:rs:3.0", schema="rs.xsd"
  - namespace="urn:ihe:iti:xds-b:2007", schema="IHEXDS.xsd"
- The /definitions/message/part/@element attribute of the Cross-Gateway Document
2160   Provide Request message shall be defined as "xds:ProvideAndRegisterDocumentSetRequest"
- The /definitions/message/part/@element attribute of the Cross-Gateway Document Provide Response message shall be defined as "rs:RegistryResponse"

- Refer to Table 3.80.5-1 below for additional attribute requirements

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-2c: 3.80.5.1 Sample SOAP Messages. For informative WSDL for the Responding Gateway see ITI TF-2x: Appendix W. The <xds:ProvideAndRegisterDocumentSetRequest /> element is defined as:

- One <lcm:SubmitObjectsRequest/> element that contains the submission set metadata

- Zero or more <xds:Document/> elements that contain document content being submitted to the Responding Gateway. The <xds:Document/> element also includes the document id attribute (xds:Document/@id) of type xsd:anyURI to match the document ExtrinsicObject id in the metadata and providing the necessary linkage

The use of MTOM/XOP is governed by the following rules:

- The Responding Gateway shall accept documents in a Cross Gateway Document Provide transaction in MTOM/XOP format. The response message shall use MTOM/XOP format.

- The Initiating Gateway shall generate Cross Gateway Document Provide transactions in MTOM/XOP format. It shall accept the response message in MTOM/XOP format.

Table 3.80.5-1: Additional Attribute Requirements

Attribute	Value
/definitions/portType/operation @name	RespondingGateway_CrossGatewayDocumentProvide
/definitions/portType/operation/input/@wsaw:Action	urn:ihe:iti:2015:CrossGatewayDocumentProvide
/definitions/portType/operation/output/@wsaw:Action	urn:ihe:iti:2015:CrossGatewayDocumentProvideResponse
/definitions/binding/operation/wsoap12:operation/@soapActionRequired /definitions/binding/operation/soap12:operation/@soapAction	falseurn:ihe:iti:2015:CrossGatewayDocumentProvide

3.80.5.1.1 Sample Synchronous Web services 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 ITI TF-2x: Appendix V: Web Services for IHE Transactions. 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.

3.80.5.1.1.1 Sample Cross Gateway Document Provide SOAP Request

2190

```
<soap12:Envelope
  xmlns:soap12="http://www.w3.org/2003/05/soap-envelope"
  xmlns:wsa="http://www.w3.org/2005/08/addressing"
  xmlns:xdr="urn:ihe:iti:xdr:2014"
  xmlns:xds="urn:ihe:iti:xds-b:2007"
  xmlns:lcm="urn:oasis:names:tc:ebxml-regrep:xsd:lcm:3.0"
  xmlns:rs="urn:oasis:names:tc:ebxml-regrep:xsd:rs:3.0"
  xmlns:rim=" urn:oasis:names:tc:ebxml-regrep:xsd:rim:3.0">
  <soap12:Header>
    <!--Other SOAP Header elements go here-->
    <wsa:Action soap12:mustUnderstand="true">
urn:ihe:iti:2015:CrossGatewayDocumentProvide</wsa:Action>
    <xdr:homeCommunityBlock>
<xdr:homeCommunityId>urn:oid:1.2.3.4.5.6.2333.23</xdr:homeCommunityId>
    </xdr:homeCommunityBlock>
  </soap12:Header>
  <soap12:Body>
    <xds:ProvideAndRegisterDocumentSetRequest>
      <lcm:SubmitObjectsRequest>
        <rs:RequestSlotList>
          <rim:Slot name="homeCommunityId">
            <rim:ValueList>
              <rim:Value>urn:oid:1.2.3.4.5.6.2333.23</rim:Value>
            </rim:ValueList>
          </rim:Slot>
        </rs:RequestSlotList>
        <rim:RegistryObjectList>
          <!-- Registry Metadata goes here -->
        </rim:RegistryObjectList>
      </lcm:SubmitObjectsRequest>
      <xds:Document id="Document01">
  <!-- Document binary goes here -->
      </xds:Document>
    </xds:ProvideAndRegisterDocumentSetRequest>
  </soap12:Body>
</soap12:Envelope>
```

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2215

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2225

3.80.5.1.1.2 Sample Cross Gateway Document Provide SOAP Response

```
<?xml version="1.0" encoding="UTF-8"?>
<soap12:Envelope
  xmlns:soap12="http://www.w3.org/2003/05/soap-envelope"
  xmlns:wsa="http://www.w3.org/2005/08/addressing"
  xmlns:rs="urn:oasis:names:tc:ebxml-regrep:xsd:rs:3.0">
 <soap12:Header>
   <!--Other SOAP Header elements go here-->
   <wsa:Action soap12:mustUnderstand="true">
     urn:ihe:iti:2015:CrossGatewayDocumentProvideResponse
   </wsa:Action>
  </soap12:Header>
 <soap12:Body>
```

2230

2235

2240

```
 <rs:RegistryResponse status="urn:oasis:names:tc:ebxml-
regrep:ResponseStatusType:Success"/>
 </soap12:Body>
</soap12:Envelope>
```

2245

> *Create a new Section 3.80.5.2 as follows.*

3.80.5.2 Protocol Requirements for AS4 Asynchronous Web Services Exchange

When the AS4 Asynchronous Web Services Exchange Option is supported, the AS4 protocol stack is governed by the following rules:

2250
- The Initiating Gateway shall generate the Cross-Gateway Document Provide Request in AS4 format.

- The Responding Gateway shall accept documents in a Cross-Gateway Document Provide Request in AS4 format.

- The AS4 Asynchronous Web Services Exchange protocol stack shall meet the
2255 requirements specified in: ITI TF-2x: V.4: Asynchronous Web Services. These are based on the AS4 profile of ebMS3.0 and use SOAP 1.2 with Attachments (AS4 in this specification). The Cross-Gateway Document Provide Request shall contain a Submission Request, as defined in ITI TF-3: 4.1.4, and may contain documents. See ITI TF-3: 4.2.1.4 for a description of the ebRS/ebRIM representation of a Submission
2260 Request. The metadata requirements for this Submission Request are defined in ITI TF-3: 4.3.1. The Submission Request shall contain exactly one DocumentEntry object for each Document contained in the request message, and vice versa.

- All DocumentEntry objects in this Submission Request shall be Stable DocumentEntry objects and, therefore, will not be On-Demand DocumentEntry
2265 objects. Associations included in the Submission Request may reference On-Demand DocumentEntry objects that have been registered previously.

- The sections in ITI TF-3: 4.1 specify the mapping of XDS concepts to ebRS and ebRIM semantics and document metadata.

The requirements for the request message with the AS4 Asynchronous Web Services stack are:

2270
- The <eb:Service> SOAP element shall be set to the value: ITI-80

- The type attribute on the <eb:Service> SOAP element shall be set to the value: urn:ihe:iti:transactions

- The <eb:Action> SOAP element shall be set to the value: urn:ihe:iti:2015:CrossGatewayDocumentProvide

2275
- The <eb:From/eb:Role> element shall be set to the value: urn:ihe:iti:2018:Requester

- The <eb:To/eb:Role> element shall be set to the value: urn:ihe:iti:2018:Provider

- The <soap12:Body> shall contain one <xds:ProvideAndRegisterDocumentSetRequest> element

- The <xds:ProvideAndRegisterDocumentSetRequest> element shall contain:

  - One <lcm:SubmitObjectsRequest> element representing the Submission Request (see ITI TF-3: 4.2.1.4 for details of expressing a Submission Request).

- For each <rim:ExtrinsicObject> contained in the <xds:SubmitObjectsRequest> element, an @id attribute shall be set in order to allow correlation to the corresponding MIME part as explained in ITI TF-2x: Appendix V.4.6.2.

ITI TF-2x: Appendix V.4.8 includes an example of the SOAP Body for a Cross-Gateway Document Provide request message applicable to the AS4 Asynchronous Web Services stack.

XML namespace prefixes used in text and in examples below are for informational purposes only and are documented in ITI TF-2x: Appendix V, Table 2.4-1.

The requirements for the response message with the AS4 Asynchronous Web Services stack are:

- The <eb:Service> SOAP element shall be set to the value: ITI-80

- The type attribute on the <eb:Service> SOAP element shall be set to the value: urn:ihe:iti:transactions

- The <eb:Action> SOAP element shall be set to the value: urn:ihe:iti:2015:CrossGatewayDocumentProvideResponse

- The <eb:From/eb:Role> element shall be set to the value: urn:ihe:iti:2018:Provider

- The <eb:To/eb:Role> element shall be set to the value: urn:ihe:iti:2018:Requester

- the <soap12:Body> soap element shall contain one <rs:RegistryResponse> element

2310 | *Update Section 3.80.7 as follows:*

3.80.7.1 Initiating Gateway audit message:

…

Where:

Source AuditMessage/ ActiveParticipant			
	UserID	M	If **WS-Addressing based** Asynchronous Web Services Exchange is being used, the content of the <wsa:ReplyTo/> element. **If AS4 Asynchronous Web Services Exchange is used, the content of the eb:From/eb:PartyId.** Otherwise, not specialized.
	AlternativeUserID	M	The process ID as used within the local operating system in the local system logs.
	UserName	*U*	*not specialized*
	UserIsRequestor	*U*	*not specialized*
	RoleIDCode	M	EV(110153, DCM, "Source")
	NetworkAccessPointTypeCode	M	"1" for machine (DNS) name, "2" for IP address
	NetworkAccessPointID	M	The machine name or IP address

…

2315

3.80.7.2 Responding Gateway audit message:

…

Where:

Source AuditMessage/ ActiveParticipant			
	UserID	M	If **WS-Addressing based** Asynchronous Web Services Exchange is being used, the content of the <wsa:ReplyTo/> element. **If AS4 Asynchronous Web Services Exchange is used, the content of the eb:From/eb:PartyId.** Otherwise, not specialized.
	AlternativeUserID	*U*	*not specialized*
	UserName	*U*	*not specialized*
	UserIsRequestor	*U*	*not specialized*
	RoleIDCode	M	EV(110153, DCM, "Source")
	NetworkAccessPointTypeCode	M	"1" for machine (DNS) name, "2" for IP address
	NetworkAccessPointID	M	The machine name or IP address

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2320

> ***Appendix V:*** *Web Service for IHE Transactions" was updated by CP-ITI-1122 to reorganize content within the appendix. The updates to Appendix V below assume ITI TF Vol 2x version 15.1 or later.*

2325

> *Update Section V.2.4.2 Name Space to add a row to the table, as follows:*

V.2.4 XML Namespaces

Table V.2.4-1 lists XML namespaces that are used in this appendix. The choice of any namespace prefix is arbitrary and not semantically significant.

2330

Table V.2.4-1: XML Namespaces and Prefixes

Prefix	Namespace	Specification
wsdl (or default)	http://schemas.xmlsoap.org/wsdl/	WSDL 1.1 binding for SOAP 1.2
…		
xop	http://www.w3.org/2004/08/xop/include	
eb	**http://docs.oasis-open.org/ebxml-msg/ebms/v3.0/ns/core/200704/**	**ebms core-3.0**

> *Replace Vol 2x Appendix V.4, currently Intentionally Left Blank with, the following new Section V.4, and subsections.*

V.4 Asynchronous AS4 Web Services

2335 ### V.4.1 Overview

Asynchronous use of Web Services in IHE is based on the OASIS AS4 standard [AS4]. AS4 is itself a profile of the OASIS ebMS3 standard [EBMS3CORE], a messaging protocol standard based on Web Services.

AS4 for Asynchronous Web Services Exchange provides added value for reliability and security
2340 as presented in Section V.5.

The use of AS4 for IHE Web Services shall conform to the Common Profiling specified in Section V.2 and uses standards referenced in Section V.2.2.

A component that implements ebMS3 messaging is referred to as an AS4 Message Service Handler (MSH) in the ebMS3 specification [ebMS3]. IHE profile actors may implement the
2345 functionality of an AS4 MSH natively or use an off-the-shelf component or module to implement the AS4 MSH functionality.

AS4 for IHE Web Services is based on the AS4 profile of ebMS3. It is not related to, and not interoperable with, the HL7 transport specification for ebMS3 [HL7EBMS3]. However, the IHE AS4 Asynchronous Usage Profile adopts one of the HL7 naming conventions (see Section V.4.6).

The OASIS ebXML Messaging Services Technical Committee that maintains the AS4, ebMS 3.0 Core and other related specifications, is tracking and resolving issues in the specifications [EBMSERRATA]. These resolutions will eventually be published as a consolidated Specification Errata but should already be taken into account by implementers, to avoid functional or interoperability issues.

V.4.2 Referenced Standards

[AP] WS-I Attachments Profile Version 1.0. Final Material. 2006-04-20. http://www.ws-i.org/Profiles/AttachmentsProfile-1.0.html

[AS4] AS4 Profile of ebMS 3.0 Version 1.0. OASIS Standard, 23 January 2013. http://docs.oasis-open.org/ebxml-msg/ebms/v3.0/profiles/AS4-profile/v1.0/

[EBMS3CORE] OASIS ebXML Messaging Services Version 3.0: Part 1, Core Features. OASIS Standard. 1 October 2007. http://docs.oasis-open.org/ebxml-msg/ebms/v3.0/core/os/

[EBMSERRATA] OASIS ebXML Messaging TC Issue Tracker https://tools.oasis-open.org/issues/browse/EBXMLMSG

[HL7EBMS3] ANSI/HL7 V3 ebXML, R1-2008 (R2013) HL7 Version 3 Standard: Transport Specification – ebXML, Release 1 7/3/2008 (reaffirmed 6/7/2013)

[RFC1952] GZIP file format specification version 4.3. IETF RFC. May 1996, http://tools.ietf.org/html/rfc1952

[RFC2392] Levinson, E., "Content-ID and Message-ID Uniform Resource Locators", RFC 2392, DOI 10.17487/RFC2392, August 1998, https://www.rfc-editor.org/info/rfc2392.

[RFC5322] Resnick, P., Ed., "Internet Message Format", RFC 5322, DOI 10.17487/RFC5322, October 2008, https://www.rfc-editor.org/info/rfc5322.

[SOAPATTACH] SOAP Messages with Attachments, W3C Note. 11 December 2000. http://www.w3.org/TR/SOAP-attachments.

[WSSSWA] OASIS Web Services Security: Web Services Security SOAP Message with Attachments (SwA) Profile Version 1.1.1. OASIS Standard, May 2012. http://docs.oasis-open.org/wss-m/wss/v1.1.1/wss-SwAProfile-v1.1.1.doc

V.4.3 Configuring Asynchronous AS4 Web Services

AS4 uses the ebMS3 mechanism of Processing Modes (or P-Modes) for configuration. A P-Mode is a structured set of parameters that determine how messages are exchanged. Aspects covered by the P-Mode include security, reliability, transmission mode, error handling and the use of AS4 advanced features. A P-Mode may be viewed and used as an agreement between two

parties as to how messages must be processed, and as declarative configuration data for a Sending MSH, as well as for a Receiving MSH.

The AS4 standard pre-defines three so-called Conformance Profiles. A Conformance Profile defines a specific functional subset of the version 3.0 ebXML Messaging, Core Specification and corresponds to a class of conformant software applications. For each Conformance Profile, the AS4 standard specifies which processing parameters it supports, possibly constraining its value sets, and therefore (indirectly) the feature set it supports. (Note that the provision of pre-defined Conformance Profiles does not preclude third parties from defining custom Conformance Profiles).

The AS4 specifications define the following Conformance Profiles.

- The AS4 ebHandler Conformance Profile provides (among others) full support for sender and receiver mode, client and server mode AS4 messaging, supports WS-Security using X.509 tokens and supports the AS4 Advanced Features. It is the most capable and most widely implemented of the AS4 Conformance Profiles. It provides more capabilities and flexibility than the other two predefined Conformance Profiles.

- The Light Client Conformance Profile is targeted to client implementations. It interoperates with AS4 servers that conform to the above ebHandler Conformance Profile.

- The Minimal Client Profile is not supported by this appendix.

The AS4 Conformance profiles *ebHandler* and the *Light Client* are selected for use in IHE Transactions when an AS4 ebHandler or Light Client interacts with an AS4 ebHandler Server.

V.4.4 Feature Set

AS4 is a profile of ebMS3 and therefore supports a subset of its feature set. This section gives a high-level overview of some of these features, providing considerations for use to implement IHE Transactions and defining options to guarantee minimum interoperability. These features and corresponding P-Mode parameters are referenced by Conformance Profiles and require functionality in software implementations. This Appendix constrains some of the AS4 options for consistency and highlights specific capabilities. Full details are provided in the relevant underlying specifications [EBMS3CORE, AS4]. Section V.4.6 complements this section by discussing parameters that are more related to deployment environments.

V.4.4.1 Message Exchange Patterns

AS4 uses the ebMS3 concepts of Message Exchange Patterns (MEPs) and MEP Bindings.

In a One Way exchange, the Sender sends a User Message to the Receiver without there being an expectation that a business response is to be returned. This message is typically a notification.

In a Two Way exchange, the exchange consists of two legs. In the first leg, the sender sends a User Message to the Receiver, and there is an expectation that the Receiver in turn will send a correlated message back in a second leg. The first leg message is typically a business request and

2420   the second leg message is the business response to the business request. In that case, the Sender of the request (which is also the Receiver of the Response), is the (business-level) Requester and the Receiver of the request (which is also the Sender of the Response) is the (business-level) Provider.

There is a conceptual difference between Sender and Initiator. In an ebMS3 One Way MEP, the
2425   Sender is the Initiator and the Receiver is the Responder in a so-called Push exchange. If the exchange is initiated by the Receiver, the Sender is the Responder and the Receiver is the Initiator. This is the case in a Pull exchange.

AS4 supports MEP Bindings to the HTTP transport protocol.

In a One Way Push binding, the Sender is the Initiator and uses HTTP as a client. The Receiver
2430   is the Responder and uses HTTP as the server. The AS4 message is transmitted as a SOAP request message.

In a One Way Pull binding, the Sender is the Responder and uses HTTP as a server. The Receiver is the Initiator and uses HTTP as the client. The AS4 message is transmitted as a SOAP response message.

2435   The Pull binding involves the Initiator sending a predefined "Pull Request" signal to the Responder that provides authorization information and an indication of the expected (subset of) user messages. The "pulled" user message is returned on the HTTP back-channel. In AS4, the concepts of client/server, initiator/responder and sender/receiver are decoupled.

While the OASIS AS4 Standard [AS4] does not mandate support for any MEP other than the
2440   One Way MEP, support for the Two Way MEP is required for use with IHE transactions and uses a specific SOAP Header value named *eb:RefToMessageId* to correlate the request and the response.

In a Two Way MEP, the selection of Push or Pull bindings can be decided separately for each of the two legs. A Two Way "Push-and-Push" binding is a combination of two Push exchanges,
2445   each using their own HTTP connections. Sender and Receiver alternate in their roles as Initiator/Responder and Client/Server.
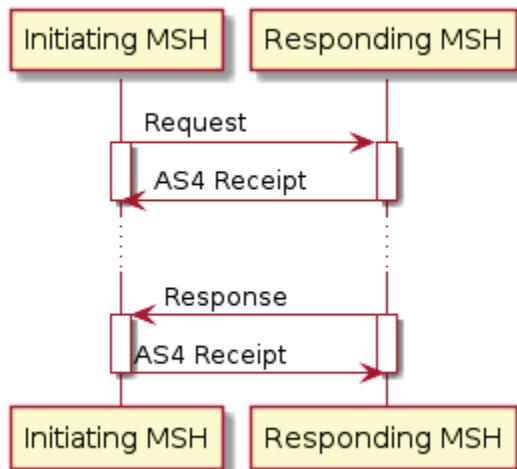
This exchange has the following characteristics:

- Both parties in the exchange need to support both client and server HTTP functionality.
- At network level, both parties need to allow incoming connections from their counterparty (and from any other counterparty).
- There is no (or only limited) delay between submission of the message to the Sender and its delivery by the Consumer. As soon as the request is processed, the back-end application can submit a response to its MSH which will initiate the transmission.

A Two Way MEP can also be bound to a "Push-and-Pull" binding. This is a combination of a Push exchange (from Sender/Initiator to Receiver/Responder) followed by a Pull exchange (from the Sender/Responder to the Receiver/Initiator).
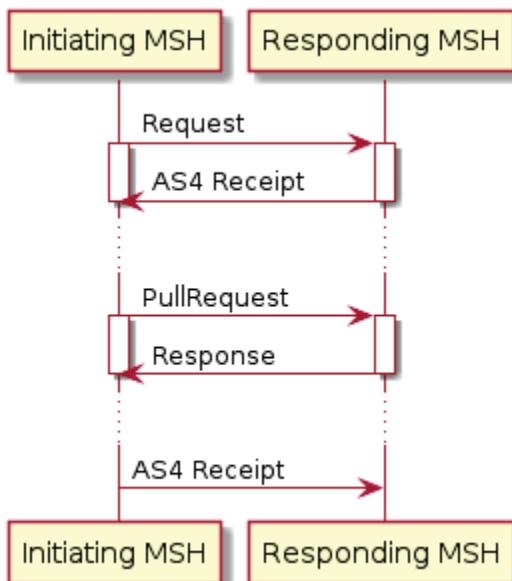
This exchange has the following characteristics:

- One party in the exchange only needs to support client functionality, to initiate sending of the first (pushed) message and to initiate pulling of the second message.
- The other party needs to support server functionality, first to receive the first (pushed) message and then to process a pull request and (subject to authorization, response message availability) return a submitted response.
- At network level, only one party needs to allow incoming connections from its counterparty.
- There is a delay between submission of the message to the Sender and its delivery by the Consumer. As soon as the request is processed, the back-end application can submit a response to its MSH, but the transmission will only happen with the next Pull request.

2470   Note, however, that the Pull Requests for the second leg can be timed to follow the first
            leg Push, proportional to the expected request processing time.

Similar to the Push-and-Pull binding, a Pull-and-Push binding is defined. It is the reverse of the
Push-and-Pull binding and allows a client-only MSH to pull requests and push back responses.

Specific user communities deploying Asynchronous AS4 Web Services for IHE Transactions
2475   may constrain the use of AS4 Message Exchange Patterns and their Channel Bindings.

V.4.4.2 Message Structure

An AS4 message uses the SOAP 1.2 [SOAP12] envelope structure in which an *eb:Messaging*
header block is present in the SOAP Header. This block provides rich metadata on the message
and its payloads.

2480   Two situations can be distinguished:

- The IHE transaction defines only messages containing a SOAP envelope with no
  attachments (e.g., Cross Gateway Query)

- The transaction defines at least one message containing multiple payloads

If the transaction defines only messages containing a SOAP envelope with no attachments, AS4
2485   allows that it may use the SOAP Body for the payload, or the payload can be carried in a
separate MIME part in a SOAP 1.2 Messages with Attachments [SOAPATTACH] envelope.
IHE profiles this optionality so that the XML payload shall be always packaged in the SOAP
body. In this case no use shall be made of SOAP-With-Attachments MIME Multipart/Related
packaging. Instead the message shall be a SOAP 1.2 message not packaged in a MIME Multipart
2490   envelope.
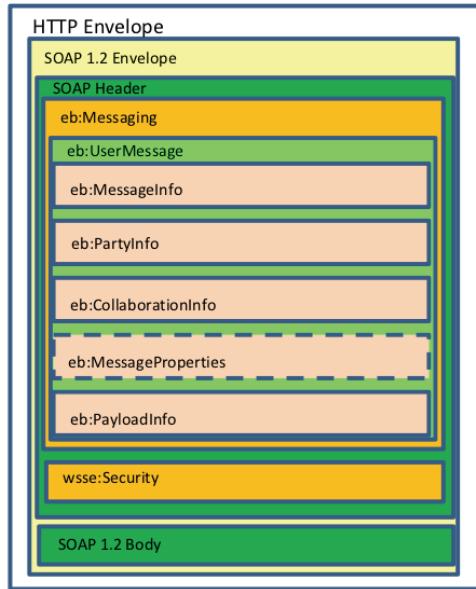
Figure V.4.4.2-1: Envelope with one single XML payload

If at least one of the messages in the transaction contains additional payloads, all messages in the transaction shall be packaged as SOAP-With-Attachments messages containing a MIME Multipart/Related envelope. Additional payloads shall be packaged as separated MIME parts (see also Section V.4.6.2).
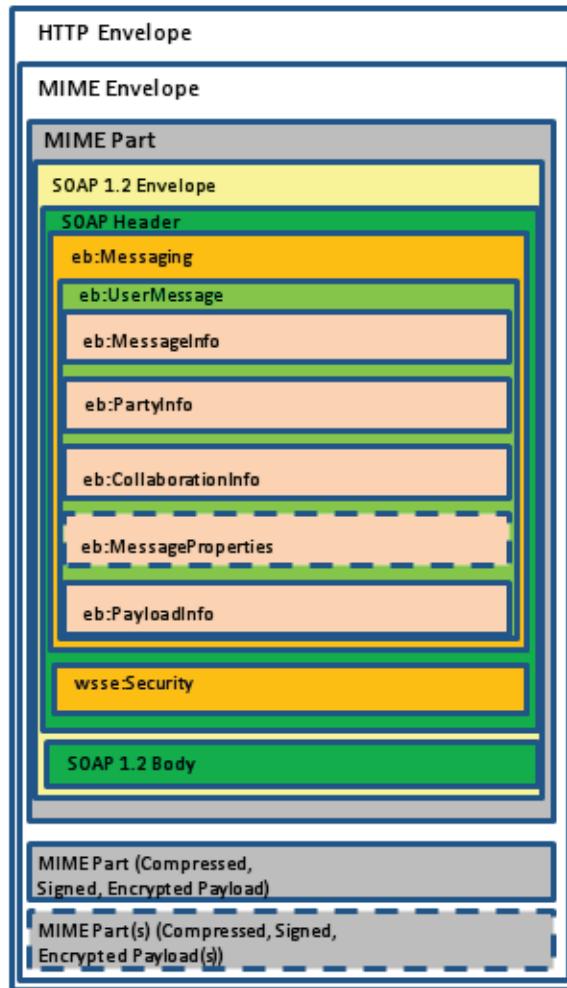
Figure V.4.4.2-2: Envelope with multiple payloads

V.4.4.3 Test Service

2500   Section 5.2.2 of [EBMS3] defines a server test feature that allows a party to "Ping" a communication partner. The feature is based on messages in which the *eb:UserMessage/eb:CollaborationInfo/eb:Service* is set to http://docs.oasis-open.org/ebxml-msg/ebms/v3.0/ns/core/200704/service an *eb:UserMessage/eb:CollaborationInfo/eb:Action* is set to http://docs.oasis-open.org/ebxml-msg/ebms/v3.0/ns/core/200704/test.

2505   Implementations of Asynchronous AS4 Web Services for IHE shall implement this feature. It allows communication partners to perform a basic test of the run-time communication configuration (including security at network, transport and message layer, and reliability) in any environment, including the production environment. A conformant implementation shall allow configuration of processing modes for exchanges involving these values for service and action,

2510   such that messages with these values are not delivered to any Consumer business application. This (product) feature is activated and configured by deploying P-Modes (see Section V.4.6.5).

Note that the Test Service is a run-time test service supporting deployments. It is not a service to support testing conformance or interoperability of an AS4 software product.

V.4.4.4 Error Handling

2515   When used in conjunction with the Push channel binding, ebMS3 errors on pushed messages shall be returned synchronously using the HTTP backchannel. This is done by setting the PMode[].Errorhandling.Report.AsResponse P-Mode parameter to a true value.

When used in conjunction with the Pull channel binding, ebMS3 errors on pulled messages shall be posted using a separate outbound connection. The URI address of the MSH from which
2520   messages are pulled shall also serve as address for errors.

V.4.4.5 Receipt Handling

When used in conjunction with the Push channel binding, ebMS3 receipts on pushed messages shall be returned synchronously using the HTTP backchannel. This is done by setting the PMode[1].Security.SendReceipt.ReplyPattern P-Mode parameter to the "response" value.

2525   When used in conjunction with the Pull channel binding, ebMS3 receipts on pulled messages shall be posted using a separate outbound connection. The URI address of the MSH from which messages are pulled shall also serve as address for receipts.

V.4.4.6 Message Layer Security

Implementations of Asynchronous AS4 Web Services that use of WS-Security to secure AS4
2530   message exchanges shall support, in addition to the general requirements laid out in section V.2.3, the OASIS Web Services Security SOAP Message with Attachments (SwA) Profile Version 1.1.1 [WSSSWA] specification, as specified for use in the ebMS3 and AS4 specifications [EBMS3CORE, AS4]. Support for these specifications is available in AS4 implementations that conform to the AS4 ebHandler and AS4 Light Client Conformance
2535   Clauses.

Signing and encryption are configured using P-Modes. The use of message layer signing is configured using the PMode[].Security. X509.Signature parameter set. The use of message layer encryption is configured using the PMode[].Security. X509.Encryption parameter set.

V.4.4.7 Pull Handling

2540   If Pull is used, and if the WS-Security module of the AS4 client and server support the use of X.509 tokens [WSSX509], Pull requests shall be authorized using the AS4 Authorization Option 2 as specified in Section 2.1.1 of the AS4 specification [AS4].

Implementations may restrict the ability to authorize Pull requests to authorization at the MPC (Message Partition Channel) level, rather than per individual P-Mode level. For more
2545   information on MPC, see Section 3.4 of ebMS3 specification [ebMS3].

V.4.5 Use of AS4 Additional Features

AS4 provides some additional features that are not in ebMS3 and not in other Web Services standards. The two most useful ones are the Compression and Reception Awareness features. Both these features are available in implementations that conform to the AS4 ebHandler and AS4 Light Client Conformance Clauses.

V.4.5.1 Compression

The AS4 Compression feature provides message layer (de)compression of application payloads. AS4 messages containing compressed application payloads are built in conformance with the SOAP with Attachments (SwA) [SOAPATTACH] specification for use with SOAP 1.2 as specified in [EBMS3CORE].

The use of AS4 compression is configured using the P-Mode parameter PMode[].Payload-Service.CompressionType with the value "application/gzip". This indicates that the GZIP [RFC1952] compression algorithm may be used by the sender to compress payloads and that GZIP decompression must be applied by the receiver prior to delivery. Each compressed payload is carried in a separate MIME message part. Compression must be applied before payloads are attached to the SOAP Message.

The benefit of AS4 compression is that it speeds up message layer security processing (as there is less data to be signed/validated and encrypted/decrypted) and transmission of data over networks (as the message is smaller).

V.4.5.2 Reception Awareness

The AS4 Reception Awareness feature uses the ebMS3 Receipt signal message [EBMS3CORE]. It provides at-least-once delivery using a built-in Retry mechanism that helps to overcome temporary network or message processing issues and at-most-once delivery based on detection of message duplicates. Reception Awareness is a simple, effective reliable messaging protocol for Web Services with no known interoperability issues.

The use of AS4 Reception Awareness is configured using the PMode[].ReceptionAwareness P-Mode parameters.

V.4.6 Usage Profile for IHE Transactions

Some AS4 configuration aspects relate less to how AS4 functionality is implemented in software (as covered in Section V.4.4 and V.4.5) but rather to aspects related to deployment of an AS4 MSH within a particular organization and/or within a particular community.

V.4.6.1 Message Structure

AS4 supports including multiple payloads in a single message. AS4 supports exchanging *application/xml* payloads in either the SOAP Body or as a MIME attachment. AS4 products typically allow this choice to be made per individual message. If compression is used (see Section V.4.5.1), it only operates on MIME parts.

For the use of AS4 in IHE Transactions, the following constraints apply:

- For transactions that have both a request/response (ebRS request, HL7 V3 message) and documents attached:

  - the request/response shall be placed in the SOAP Body

  - the SOAP envelope shall be placed in the start MIME Part

  - the attached documents shall be separate MIME parts

- For transactions that have only a request/response (ebRS request, HL7 V3 message) and no documents attached,

  - the request/response shall be placed in the SOAP Body

This approach ensures that there is only one way to encode an AS4 message payload with IHE transactions and the payload elements that benefit from best compression are the attached documents (not the request/response XML because they are typically of limited size).

V.4.6.2 Document Content Support

IHE transactions that involve the inclusion of document metadata along with document content, when conveyed as attachments using the AS4 Asynchronous Web Services are:

- Cross Gateway Retrieve [ITI-39]

- Provide and Register Document Set-b [ITI-41]

- Retrieve Document Set [ITI-43]

- Cross Gateway Document Provide [ITI-80]

These transactions make use of SOAP-With-Attachments because they include more than one payload.

The following profiling shall apply to document content encoding:

- The document repository XML document shall be referenced by the first *eb:PartInfo* element in the *eb:PayloadInfo* element in the AS4 header.

- The content of documents that are submitted or retrieved shall be carried in separate AS4 MIME payload parts.

- The content of each *xdsb:Document* element shall be an *xop:Include* element that references the correlated MIME Part using the MIME Content ID value.

- Submitted or retrieved documents shall be exchanged in their native (possibly binary) data format. No Base64 encoding shall be applied.

- As any message part, payload parts carrying submitted or retrieved documents shall be identified using a MIME Content Identifier. For each document payload part, a separate *eb:PartInfo* shall be added to list of children of the *eb:PayloadInfo*.

- For each payload part carrying submitted or retrieved documents a part property with name *id* shall be added to the *eb:PartInfo* for that part as follows:

  - For [ITI-41] or [ITI-80] transactions, the value of the property shall be set to the value of the *id* attribute of the *rim:ExtrinsicObject* in the *rim:RegistryObjectList*.

  - For [ITI-43] or [ITI-39] transactions, the value of the property shall be set to the concatenation of the value conveyed in the *xdsb:DocumentUniqueId* element and (if present) the value conveyed in the *xdsb:HomeCommunityId* element using the "|" character separator.

As an example, the following fragment of the *eb:Messaging* header of an AS4 message indicates the message contains three message parts, carried in separate MIME parts.

```
<eb:PayloadInfo xmlns:eb="http://docs.oasis-open.org/ebxml-
msg/ebms/v3.0/ns/core/200704/">
    <eb:PartInfo>
        <!-- The first part is the XML XDS-b
ProvideAndRegisterDocumentSetRequest document. Absence of an @href indicates
the content is in the SOAP Body.
        -->
    </eb:PartInfo>
    <eb:PartInfo href="cid:0e3f6331-b5a8-4758-8cfd-
c562d2ea1c86@requester.com">
        <!-- the first document in the package -->
        <eb:PartProperties>
            <eb:Property name="id">Document01</eb:Property>
        </eb:PartProperties>
    </eb:PartInfo>
    <eb:PartInfo href="cid:9cf5c59a-068c-4c4d-a3ed-
a24becee643f@requester.com">
        <!-- the second document in the package -->
        <eb:PartProperties>
            <eb:Property name="id">Document02</eb:Property>
        </eb:PartProperties>
    </eb:PartInfo>
</eb:PayloadInfo>
```

The first part is an *xdsb:ProvideAndRegisterDocumentSetRequest* document. It is a submission of two documents with identifiers *Document01* and *Document02*, respectively, and metadata about those documents. In ebMS3, absence of an *href* attribute indicates that the XML content of the part is placed as a child element in the SOAP *Body*.

```
<xdsb:ProvideAndRegisterDocumentSetRequest xmlns:xdsb="urn:ihe:iti:xds-
b:2007"
    xmlns:rim="urn:oasis:names:tc:ebxml-regrep:xsd:rim:3.0"
    xmlns:lcm="urn:oasis:names:tc:ebxml-regrep:xsd:lcm:3.0">
    <lcm:SubmitObjectsRequest>
        <rim:RegistryObjectList>
            <rim:RegistryPackage id="SubmissionSet01">
                <!-- details omitted -->
            </rim:RegistryPackage>
            <rim:ExtrinsicObject id="Document01">
                <!-- details omitted -->
            </rim:ExtrinsicObject>
            <rim:Association id="assoc1"
                associationType="urn:oasis:names:tc:ebxml-
regrep:AssociationType:HasMember"
                sourceObject="SubmissionSet01"
                targetObject="Document01">
                <rim:Slot name="SubmissionSetStatus">
                    <rim:ValueList>
                        <rim:Value>Original</rim:Value>
                    </rim:ValueList>
                </rim:Slot>
            </rim:Association>
            <rim:ExtrinsicObject id="Document02">
                <!-- details omitted -->
            </rim:ExtrinsicObject>
            <rim:Association id="assoc2"
                associationType="urn:oasis:names:tc:ebxml-
regrep:AssociationType:HasMember"
                sourceObject="SubmissionSet01"
                targetObject="Document02">
                <rim:Slot name="SubmissionSetStatus">
                    <rim:ValueList>
                        <rim:Value>Original</rim:Value>
                    </rim:ValueList>
                </rim:Slot>
            </rim:Association>
        </rim:RegistryObjectList>
    </lcm:SubmitObjectsRequest>
    <xdsb:Document id="Document01">
        <xop:Include
            href="cid:0e3f6331-b5a8-4758-8cfd-c562d2ea1c86@requester.ro"/>
    </xdsb:Document>
    <xdsb:Document id="Document02">
        <xop:Include
            href="cid:9cf5c59a-068c-4c4d-a3ed-a24becee643f@requester.ro"/>
    </xdsb:Document>
</xdsb:ProvideAndRegisterDocumentSetRequest>
```

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The payload part property *id* is specified for the two *eb:PartInfo* elements corresponding to these payload parts. The values are set to the *id* attributes of the related *rim:ExtrinsicObject* elements.

V.4.6.3 Party Identification

In AS4 messages, the *eb:From/eb:PartyId* and *eb:To eb:PartyId* elements are used to identify sender and receiver parties. If the value of these elements is not a URI, a *type* attribute is required to indicate the namespace or domain code list from which the identifier value is drawn. ebMS3 requires this value.

No specific party identification namespace is mandated by IHE, as this is typically left to each deployment to assign values for configuration. Following [HL7EBMS3], if the party identifier is an HL7 instance identifier, the type attribute shall be set to the value "`urn:hl7ii`".

V.4.6.4 Message Identification and Correlation

The value of the *eb:MessageId* and *eb:RefToMessageId* elements shall use the Internet message identifier syntax [RFC5322] without enclosing angle brackets [EBMS3CORE]. In Two Way message exchanges, the value of the *eb:RefToMessageId* in the response leg user message shall be set to the value of the *eb:MessageId* header in the request leg user message.

The value of the *eb:ConversationId* in request and response user messages shall be the same. Any conventions for values of *eb:ConversationId* are out of scope of this specification. The only constraint of the ebMS3 schema is that the value be of XML schema token type.

V.4.6.5 Test Service

Using the Test Service feature described in Section V.4.4.3, deployments of the Asynchronous AS4 Web Services shall deploy a test P-Mode, for each triplet: PMode.Initiator.Party, PMode.Responder.Party, and PMode.Agreement. This test P-Mode shall have these values for these three parameters and uses the test service and action.

For these three parameters, for each configured leg, for parameters other than PMode[].BusinessInfo.Service and PMode[].BusinessInfo.Action, this test service configuration shall have the same parameters as the non-test service. This includes the values of the PMode[].Security.X509 parameters, if used. The effect of this is that for every IHE transaction type, for every communication partner, it is possible to use the AS4 test service to test correct configuration on both requester and provider side.

V.4.6.6 Service, Action and Role

AS4 has mandatory headers to express the *eb:Service*, *eb:Action* and sender and receiver *eb:Role* headers for a message.

V.4.6.6.1 Service

The ebMS3 specification [EBMS3] defines the *eb:Service* element as: "This REQUIRED element occurs once. It is a string identifying the service that acts on the message and it is specified by the designer of the service." The header is of XML schema type non-empty-string and specific values can be set for specific P-Modes and differentiate various types of messages.

For IHE Transactions, the value of the *eb:Service* header shall be set to a value specified in the transaction. The eb:Service shall contain the attribute @type set to "urn:ihe:iti:transactions".

2745 The AS4 test message shall use the value http://docs.oasis-open.org/ebxml-msg/ebms/v3.0/ns/core/200704/service value for *eb:Service*.

AS4 message service handler implementations can generally be configured with a value for *eb:Service* using the *PMode[].BusinessInfo.Service* P-Mode parameter.

V.4.6.6.2 Action

2750 In [EBMS3], *eb:Action* is defined as: "This REQUIRED element occurs once. It is a string identifying the action the User Message is intended to invoke on a particular service and it is specified by the designer of the service."

For IHE Transactions, the value of the *eb:Action* shall be set to a value defined in the specification of the transaction.

2755 The AS4 test message shall use the http://docs.oasis-open.org/ebxml-msg/ebms/v3.0/ns/core/200704/test value for *eb:Action*.

AS4 message service handler implementations can generally be configured with a value for *eb:Action* using the *PMode[].BusinessInfo.Action* P-Mode parameter.

V.4.6.6.3 Role

2760 For each message exchange, [EBMS3] requires setting the values PMode.Initiator.Role and PMode.Responder.Role, which are used to set the *eb:From/eb:Role* and *eb:To/eb:Role* headers.

For IHE transactions, the values to use for these headers are specified in the specification of these transactions.

For the AS4 test service, the default initiator and responder roles defined in Section 5.2.5 of the 2765 OASIS AS4 specification [AS4] shall be used.

V.4.6.7 Message Partition Channel

The ebMS3 optional message attribute *mpc* is used to indicate that a message is part of a specific Message Partition Channel. Its value is set using the PMode[].BusinessInfo.MPC parameter.

When used with Push exchanges, the MPC feature has no added value. The attribute shall 2770 therefore be absent, or (equivalently) present with the *http://docs.oasis-open.org/ebxmlmsg/ebms/v3.0/ns/core/200704/defaultMPC* value.

When used with Pull exchanges, the MPC shall be set to a specific non-default value. For each counterparty a distinct MPC shall be used.

V.4.7 P-Mode Parameters

2775 Table 4.7-1 summarizes AS4 P-Mode parameters and indicates, for each, if its use is constrained by this Appendix.

Table V.4.7-1: Constraints to AS4 P-Mode parameters

Processing Mode Parameter	Value Profiling
PMode.ID	Not Constrained
PMode.Agreement	Not Constrained
PMode.MEP	Support required for the following values: http://docs.oasis-open.org/ebxml-msg/ebms/v3.0/ns/core/200704/oneWay http://docs.oasis-open.org/ebxml-msg/ebms/v3.0/ns/core/200704/twoWay
PMode.MEPBinding	AS4 defines the following values: http://docs.oasis-open.org/ebxml-msg/ebms/v3.0/ns/core/200704/push http://docs.oasis-open.org/ebxml-msg/ebms/v3.0/ns/core/200704/pushAndPush http://docs.oasis-open.org/ebxml-msg/ebms/v3.0/ns/core/200704/pushAndPull http://docs.oasis-open.org/ebxml-msg/ebms/v3.0/ns/core/200704/pullAndPush Support is required for pushAndPush. Others are optional.
PMode.Initiator.Party	Party identifier of the party that initiates the MEP
PMode.Initiator.Role	Role of the party that initiated the MEP
PMode.Initiator.Authorization. username	Not Used
PMode.Initiator.Authorization. password	Not Used
PMode.Responder.Party	Party identifier of the party that responds in the MEP
PMode.Responder.Role	Role of the party that responds in the MEP
PMode.Responder.Authorizati on. username	Not Used
PMode.Responder.Authorizati on. password	Not Used
PMode[].Protocol.Address	Required, https URI of the responder

Processing Mode Parameter	Value Profiling
PMode[].Protocol.SOAPVersion	1.2
PMode[].BusinessInfo.Service	See Section V.6.6.1
PMode[].BusinessInfo.Action	See Section V.6.6.2
PMode[].BusinessInfo.Properties	Support Required; no profiling for specific values
PMode[].BusinessInfo.MPC	When used with Push, only default MPC is used When used with Pull, one MPC per counterparty.
PMode[].BusinessInfo.Payload Profile	Not Constrained
PMode[].Errorhandling.Report. SenderErrorsTo	Not Used.
PMode[].Errorhandling.Report. ReceiverErrorsTo	Not used if the MEP Binding is Push If the MEP Binding is Pull, this parameter is set to the same URI as PMode[].Protocol.Address.
PMode[].Errorhandling.Report. AsResponse	If the MEP Binding is Push, set to True. If the MEP Binding is Pull, set to the same URI as PMode[].Protocol.Address
PMode[].Errorhandling.Report. ProcessErrorNotifyConsumer	True (Recommended)
PMode[].ErrorHandling.Report . ProcessErrorNotifyProducer	True (Recommended)
PMode[].Errorhandling. DeliveryFailuresNotifyProducer	True (Recommended)
PMode[].ErrorHandling.Report . MissingReceiptNotifyProducer	True (used with ReceptionAwareness)
PMode[].Reliability	Not Used
PMode[].Security.WSSversion	1.1
PMode[].Security.X509.Sign	Optional
PMode[].Security. X509.Signature.Certificate	X.509 signing certificate of Sender

Processing Mode Parameter	Value Profiling
PMode[].Security. X509.Signature.HashFunction	Not Constrained
PMode[].Security.X509.Signature. Algorithm	Not Constrained
PMode[].Security.X509.Encryption. Encrypt	Optional
PMode[].Security.X509.Encryption. Certificate	Not Constrained
PMode[].Security.X509.Encryption. Algorithm	X.509 Encryption certificate of receiver
PMode[].Security.X509.Encryption. MinimalStrength	Not Constrained
PMode[].Security.UsernameToken. username	Not Constrained
PMode[].Security.UsernameToken. password	Not Constrained
PMode[].Security.UsernameToken. Digest	Not Constrained
PMode[].Security.UsernameToken. Nonce	Not Constrained
PMode[].Security.UsernameToken. Created	Not Constrained
PMode[].Security.PModeAuthorize	False
PMode[].Security.SendReceipt	Optional
PMode[].Security.SendReceipt. NonRepudiation	Optional
PMode[].Security.SendReceipt. ReplyPattern	For Push, set to the value "response". For Pull, set to the value "callback".
PMode[].PayloadService. CompressionType	Optional; if used, fixed value "application/gzip"
PMode[].ReceptionAwareness	Optional

Processing Mode Parameter	Value Profiling
PMode[].ReceptionAwareness. Retry	Not Constrained
PMode[].ReceptionAwareness. Retry. Parameters	Not Constrained
PMode[].ReceptionAwareness. DuplicateDetection	Optional
PMode[].ReceptionAwareness. DetectDuplicates.Parameters	Not Constrained
PMode[].BusinessInfo.subMP Cext	Not Used

V.4.8 Sample SOAP Messages

2780   Several sample messages for different IHE Transactions are available online on the IHE FTP site, see ITI TF-2x: Appendix W.

The samples provided in this section show the building blocks typically how SOAP requests and their relative SOAP responses are built for the Provide and Register Set-b [ITI-41] transaction.

V.4.8.1 Sample SOAP AS4 Asynchronous Request

2785   This is a sample of Provide and Register Document Set-b [ITI-41] Request message. For brevity, and to focus on the AS4 specific aspects, it assumes the exchange does not involve use of WS-Security.

Other transactions will differ in their elements values that are transaction specific:

- the <eb:Service> SOAP header

2790   - the <eb:Action> SOAP header

- the <eb:From/eb:Role> element

- the <eb:To/eb:Role> element

- the <soap12:Body> SOAP element

2795
```
Content-Type:multipart/related; type="application/soap+xml";
      boundary="b6e68776-47ea2784152c-de60-4b15-b324-b399052af5f1";
      start="<cf5e08c5-5b11-4cef-bc59-6f5ac572722d@requester.ro>"; start-
info="application/soap+xml"
Content-Length:8462

--b6e68776-47ea2784152c-de60-4b15-b324-b399052af5f1
```
2800

```
      Content-Type:application/soap+xml; charset=UTF-8
      Content-Transfer-Encoding:binary
      Content-ID:<cf5e08c5-5b11-4cef-bc59-6f5ac572722d@requester.ro>

2805
      <?xml version="1.0" encoding="UTF-8"?>
      <env:Envelope xmlns:env="http://www.w3.org/2003/05/soap-envelope">
          <env:Header>
              <eb:Messaging xmlns:eb="http://docs.oasis-open.org/ebxml-
2810  msg/ebms/v3.0/ns/core/200704/"
                  env:mustUnderstand="true">
                  <eb:UserMessage>
                      <eb:MessageInfo>
                          <eb:Timestamp>2018-03-23T15:07:36.000Z</eb:Timestamp>
2815                      <eb:MessageId>8196c8e2-820f-4aec-a1ca-
      288a4d1d4020@requester.ro</eb:MessageId>
                      </eb:MessageInfo>
                      <eb:PartyInfo>
                          <eb:From>
2820                          <eb:PartyId
      type="urn:hl7ii">2.1.34567.43:2</eb:PartyId>
                              <eb:Role>urn:ihe:iti:2018:Requester</eb:Role>
                          </eb:From>
                          <eb:To>
2825                          <eb:PartyId type="urn:hl7ii">1.2.3.4:5</eb:PartyId>
                              <eb:Role>urn:ihe:iti:2018:Provider</eb:Role>
                          </eb:To>
                      </eb:PartyInfo>
                      <eb:CollaborationInfo>
2830
      <eb:Service type="urn:ihe:iti:transactions">ITI-41</eb:Service>

      <eb:Action>urn:ihe:iti:2007:ProvideAndRegisterDocumentSet-b</eb:Action>
                          <eb:ConversationId>E5D7CFEE-E6A9-4855-A67E-
2835  6C24403E35E6</eb:ConversationId>
                      </eb:CollaborationInfo>
                      <eb:PayloadInfo>
                          <eb:PartInfo>
                              <!-- The first part is the XML XDS-b
2840                              ProvideAndRegisterDocumentSetRequest document.
                                  Absence of an @href indicates the content is in
                                  the SOAP Body.
                              -->
                          </eb:PartInfo>
2845                      <eb:PartInfo href="cid:0e3f6331-b5a8-4758-8cfd-
      c562d2ea1c86@requester.ro">
                              <!-- the first document in the package (PDF) -->
                              <eb:PartProperties>
                                  <eb:Property name="id">Document01</eb:Property>
2850                          </eb:PartProperties>
                          </eb:PartInfo>
                          <eb:PartInfo href="cid:9cf5c59a-068c-4c4d-a3ed-
      a24becee643f@requester.ro">
                              <!-- the second document in the package (JPEG) -->
```

```
2855                           <eb:PartProperties>
                                  <eb:Property name="id">Document02</eb:Property>
                              </eb:PartProperties>
                          </eb:PartInfo>
                      </eb:PayloadInfo>
2860              </eb:UserMessage>
              </eb:Messaging>
          </env:Header>
          <env:Body>
              <xdsb:ProvideAndRegisterDocumentSetRequest
2865  xmlns:xdsb="urn:ihe:iti:xds-b:2007"
                  xmlns:xop="http://www.w3.org/2004/08/xop/include"
                  xmlns:rim="urn:oasis:names:tc:ebxml-regrep:xsd:rim:3.0"
                  xmlns:lcm="urn:oasis:names:tc:ebxml-regrep:xsd:lcm:3.0">
                  <lcm:SubmitObjectsRequest>
2870                  <rim:RegistryObjectList>
                          <rim:RegistryPackage id="SubmissionSet01">
                              <!-- details omitted -->
                          </rim:RegistryPackage>
                          <rim:ExtrinsicObject id="Document01">
2875                          <!-- details omitted -->
                          </rim:ExtrinsicObject>
                          <rim:Association id="assoc1"
                              associationType="urn:oasis:names:tc:ebxml-
      regrep:AssociationType:HasMember"
2880                          sourceObject="SubmissionSet01"
                              targetObject="Document01">
                              <rim:Slot name="SubmissionSetStatus">
                                  <rim:ValueList>
                                      <rim:Value>Original</rim:Value>
2885                              </rim:ValueList>
                              </rim:Slot>
                          </rim:Association>
                          <rim:ExtrinsicObject id="Document02">
                              <!-- details omitted -->
2890                          </rim:ExtrinsicObject>
                          <rim:Association id="assoc2"
                              associationType="urn:oasis:names:tc:ebxml-
      regrep:AssociationType:HasMember"
                              sourceObject="SubmissionSet01"
2895                          targetObject="Document02">
                              <rim:Slot name="SubmissionSetStatus">
                                  <rim:ValueList>
                                      <rim:Value>Original</rim:Value>
                                  </rim:ValueList>
2900                          </rim:Slot>
                          </rim:Association>
                      </rim:RegistryObjectList>
                  </lcm:SubmitObjectsRequest>
                  <xdsb:Document
2905                  id="Document01"><xop:Include
                          href="cid:0e3f6331-b5a8-4758-8cfd-
      c562d2ea1c86@requester.ro"/>
```

```
                </xdsb:Document>
                <xdsb:Document
2910                id="Document02"><xop:Include
                    href="cid:9cf5c59a-068c-4c4d-a3ed-
a24becee643f@requester.ro"/></xdsb:Document>
            </xdsb:ProvideAndRegisterDocumentSetRequest>
        </env:Body>
2915 </env:Envelope>
--b6e68776-47ea2784152c-de60-4b15-b324-b399052af5f1
Content-Type:application/pdf
Content-Transfer-Encoding:binary
Content-ID:<0e3f6331-b5a8-4758-8cfd-c562d2ea1c86@requester.ro>
2920
âÇ•œÙ
„oFðGÌ|Ò–NÑ ÜóB:á"&' ›¾l»À'™TÜŸõŠ'4¥™tFd³L
--b6e68776-47ea2784152c-de60-4b15-b324-b399052af5f1
Content-Type:image/jpeg
2925 Content-Transfer-Encoding:binary
Content-ID:<9cf5c59a-068c-4c4d-a3ed-a24becee643f@requester.ro>

âÇ•œÙ
„oFðGÌ|Ò–NÑ ÜóB:á"&' ›¾l»À'™TÜŸõŠ'4¥™tFd³L
2930 --b6e68776-47ea2784152c-de60-4b15-b324-b399052af5f1—
```

V.4.8.2 Sample SOAP AS4 Asynchronous Response

This is a sample of Provide and Register Document Set-b [ITI-41] Response message. As in the previous example, for brevity and to focus on the AS4 specific aspects, it assumes the exchange
2935 does not involve use of WS-Security.

Other transaction will differ in their elements values that are transaction specific:

- the <eb:Service> SOAP header

- the <eb:Action> SOAP header

- the <eb:From/eb:Role> element

2940 - the <eb:To/eb:Role> element

- the <soap12:Body> SOAP element

```
Content-Type:multipart/related; type="application/soap+xml";
    boundary="ecca3c97-ebc7-4f1b-838c-83c0d18ee40c";
2945    start="<c3818f2b-7f09-495a-9245-84542438d166@responder.nl>"; start-
info="application/soap+xml"
Content-Length:8462

--ecca3c97-ebc7-4f1b-838c-83c0d18ee40c
2950 Content-Type:application/soap+xml; charset=UTF-8resp
Content-Transfer-Encoding:binary
```

```
      Content-ID:<c3818f2b-7f09-495a-9245-84542438d166@responder.nl>

2955  <?xml version="1.0" encoding="UTF-8"?>
      <env:Envelope xmlns:env="http://www.w3.org/2003/05/soap-envelope">
          <env:Header>
              <eb:Messaging xmlns:eb="http://docs.oasis-open.org/ebxml-
      msg/ebms/v3.0/ns/core/200704/"
                  env:mustUnderstand="true">
2960              <eb:UserMessage>
                      <eb:MessageInfo>
                          <eb:Timestamp>2018-03-23T15:11:21.000Z</eb:Timestamp>
                          <eb:MessageId>4d7081ed-1c7e-437d-9202-
      fe109643e2b6@responder.nl</eb:MessageId>
2965                      <eb:RefToMessageId>8196c8e2-820f-4aec-a1ca-
      288a4d1d4020@requester.ro</eb:RefToMessageId>
                      </eb:MessageInfo>
                      <eb:PartyInfo>
                          <eb:From>
2970                          <eb:PartyId type="urn:hl7ii">1.2.3.4:5</eb:PartyId>
                              <eb:Role>urn:ihe:iti:2018:Provider</eb:Role>
                          </eb:From>
                          <eb:To>
                              <eb:PartyId
2975  type="urn:hl7ii">2.1.34567.43:2</eb:PartyId>
                              <eb:Role>urn:ihe:iti:2018:Requester</eb:Role>
                          </eb:To>
                      </eb:PartyInfo>
                      <eb:CollaborationInfo>
2980  <eb:Service type="urn:ihe:iti:transactions">ITI-41</eb:Service>


      <eb:Action>urn:ihe:iti:2007:ProvideAndRegisterDocumentSet-
      bResponse</eb:Action>
2985                      <eb:ConversationId>E5D7CFEE-E6A9-4855-A67E-
      6C24403E35E6</eb:ConversationId>
                      </eb:CollaborationInfo>
                      <eb:PayloadInfo>
                          <eb:PartInfo />
2990                  </eb:PayloadInfo>
                  </eb:UserMessage>
              </eb:Messaging>
          </env:Header>
          <env:Body>
2995          <RegistryResponse xmlns="urn:oasis:names:tc:ebxml-regrep:xsd:rs:3.0"
                  status="urn:oasis:names:tc:ebxml-
      regrep:ResponseStatusType:Success">
              </RegistryResponse>
          </env:Body>
3000  </env:Envelope>
      --ecca3c97-ebc7-4f1b-838c-83c0d18ee40c--
```

3005 ## V.5 Added value of using AS4 for Asynchronous Web Services Exchanges

AS4 provides specifications to be implemented for reliability and security of message exchanges and in particular, for asynchronous WS exchanges. The AS4 scope covers the following functions for reliability and security:

3010
- o Reliability

Reception awareness

Duplicate detection

- o Security

Non repudiation of origin

3015 Non repudiation of receipt

Data confidentiality

The aim of this summary is to provide for the security and reliability functions, a summary of the interest and added value to use AS4. This result is based on the gap analysis between:

- AS4 and current IHE WS mechanisms

3020
- AS4 and current IHE WS behavior

V.5.1 Reliability functions: Reception awareness and duplicate detection

A receipt acknowledgement is sent from the Message Service Handler (MSH) receiver to the MSH sender.

Table V.5.1-1: Interest and Added Value to use AS4 for Reliability Functions

AS4 mechanism	AS4 behavior	Synchronous IHE WS mechanism	Synchronous IHE WS behavior and WS-Addressing based Asynchronous
** Receipt (positive): Case 1: Receiving MSH is able to parse Case 2: The delivery operation toward the message consumer is done (receiving MSH is able to parse) ** Error: An error is encountered during the parsing of the incoming message (a code list is set up for defining errors)	** Reception awareness (sending MSH)** • Mandatory: Sending MSH must support reception awareness: No receipt within a time interval. Report from MSH to Business application. Parameters: Time interval • Recommended: Message retry (same ebMS message ID and same hash value included in signature than those in the original user message). Parameters : Time interval and count ** Duplicate detection (Receiving MSH)** • Mandatory: Receiving MSH must support duplicate detection in checking that the ebMS message ID is unique • Recommended: Elimination of duplicate messages or if not, it is mandatory to notify the business application. Parameters: Time interval and maximum of logs, set-up for history of received message ID	N/A	** No duplicate detection because every sending corresponds to a new transaction, therefore a new message ** No receipt acknowledgement but a treatment acknowledgement

3025

Interest or added value of Asynchronous AS4

- Useful for Cross-Community transactions for ensuring the end-to-end reliability.

- Useful for any other IHE transaction, if the network or the receiver is not reliable (risk of message loss).

3030 ## V.5.2 Security, non repudiation of origin

- The receiver is 100% sure that the message originates from the sender and was unmodified during the exchange.

Table V.5.2-1: Interest and Added Value to use AS4 for Security - Non Repudiation of Origin

AS4 mechanism	AS4 behavior	Synchronous IHE WS mechanism	Synchronous IHE WS and WS-Addressing Asynchronous based behavior
WS-Security signing on user message (asymmetric key, public key can be included in the message as a Binary Security Token) Parts to be signed: ** ebMS Messaging Header ** SOAP body ** All SOAP attachments	**Receiving MSH checks hash value** If the hash value does not correspond, an ebMS error is sent to the sending MSH (according to agreed P-Mode)	** TLS	** Trust on mandatory TLS ** WS-Security identified by ATNA but not further profiled

3035

Interest or added value of Asynchronous AS4

- Useful for Cross-Community transactions for ensuring the end-to end non repudiation, if the gateways do not add anything in the payload.

3040
- Useful for any other IHE transaction, if the link between the business application and the message handler is not secure.

V.5.3 Security, non-repudiation of receipt

The sender is 100% sure that the receiver has received the message, without being modified during the message exchange.

Table V.5.3-1: Interest and Added Value to use AS4 for Security - Non Repudiation of Receipt
3045

AS4 mechanism	AS4 behavior	Synchronous IHE WS mechanism	Synchronous IHE WS and WS-Addressing Asynchronous based behavior
WS-Security signing on receipts The exchanged receipts are signed by the receiving MSH, which authenticates the originator of the receipt. The signature of receipts must be applied on the ebMS Messaging Header. Mandatory: In addition, non-repudiation information: Hashes of: ** User message ** SOAP body ** SOAP attachments	Sending MSH checks the non-repudiation information	N/A	** Does not exist: it is based on a mutual trust sender-receiver

Interest or added value of Asynchronous AS4

There is an interest in questioning the fact that a system of an affinity domain is trustworthy.

V.5.4 Security, data confidentiality

3050   **Table V.5.4-1: Interest and Added Value to use AS4 for Security – Data Confidentiality**

AS4 mechanism	AS4 behavior	Synchronous IHE WS mechanism	Synchronous IHE WS and WS-Addressing Asynchronous based behavior
WS-Security Encryption: (asymmetric key, public key can be included in the message as a Binary Security Token) ** SOAP Body ** SOAP attachments	Receiving MSH decrypts the message. If it is not able to decrypt, an error message is generated, according to agreed P-Mode	** TLS	** Trust on mandatory TLS ** WS-Security identified by ATNA but not further profiled

Interest or added value of Asynchronous AS4

- Useful for Cross-Community transactions for ensuring the end-to-end confidentiality, if the gateways do not add anything in the payload.

3055
- Useful for any other IHE transaction, if the link between the business application and the message handler is not secure.