**Integrating the Healthcare Enterprise**

# IHE IT Infrastructure
# Technical Framework Supplement

# Mobile access to Health Documents (MHD) With XDS on FHIR

HL7® FHIR® Release 4

Using FHIR Resources at FMM Levels 1-3 and Normative

# Rev. 3.2 – Trial Implementation


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## Foreword

This is a supplement to the IHE IT Infrastructure Technical Framework V17.0. Each supplement undergoes a process of public comment and trial implementation before being incorporated into the volumes of the Technical Frameworks.

This supplement is published on August 28, 2020 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 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.

| |
|---|
| *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.

General information about IHE can be found at http://ihe.net.

Information about the IHE IT Infrastructure domain can be found at http://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.

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


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# Introduction to this Supplement

Whenever possible, IHE profiles are based on established and stable underlying standards. However, if an IHE domain determines that an emerging standard has high likelihood of industry adoption, and the standard offers significant benefits for the use cases it is attempting to address, the domain may develop IHE profiles based on such a standard. During Trial Implementation, the IHE domain will update and republish the IHE profile as the underlying standard evolves.

Product implementations and site deployments may need to be updated in order for them to remain interoperable and conformant with an updated IHE profile.

This MHD Profile incorporates content from Release 4 of the emerging HL7®[1] FHIR®[2] specification. HL7 describes FHIR Change Management and Versioning at https://www.hl7.org/fhir/versions.html.

HL7 provides a rating of the maturity of FHIR content based on the FHIR Maturity Model (FMM): level 0 (draft) through N (Normative). See http://hl7.org/fhir/versions.html#maturity.

The FMM levels for FHIR content used in this profile are:

| FHIR Content | FMM Level |
|---|---|
| Binary | N |
| Bundle | N |
| DocumentManifest | 2 |
| DocumentReference | 3 |
| List | 1 |
| OperationOutcome | N |
| Patient | N |
| Practitioner | 3 |
| PractitionerRole | 2 |

The Mobile access to Health Documents (MHD) Profile defines one standardized interface to health documents (a.k.a. an Application Programming Interface (API)) for use by mobile devices so that deployment of mobile applications is more consistent and reusable. The transactions

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[2] FHIR is the registered trademark of Health Level Seven International.

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defined here leverage the document content- and format-agnostic metadata concepts from XDS but simplify them for access in constrained environments including mobile devices. The MHD Profile does not replace XDS. Mobile devices, and other resource-constrained systems, can use MHD to access to an XDS Repository. The following figure shows one possible way to implement MHD within a document sharing environment (that may be, but is not necessarily, XDS-based). This implementation choice is not mandatory, and we recognize other architectures will be implemented.

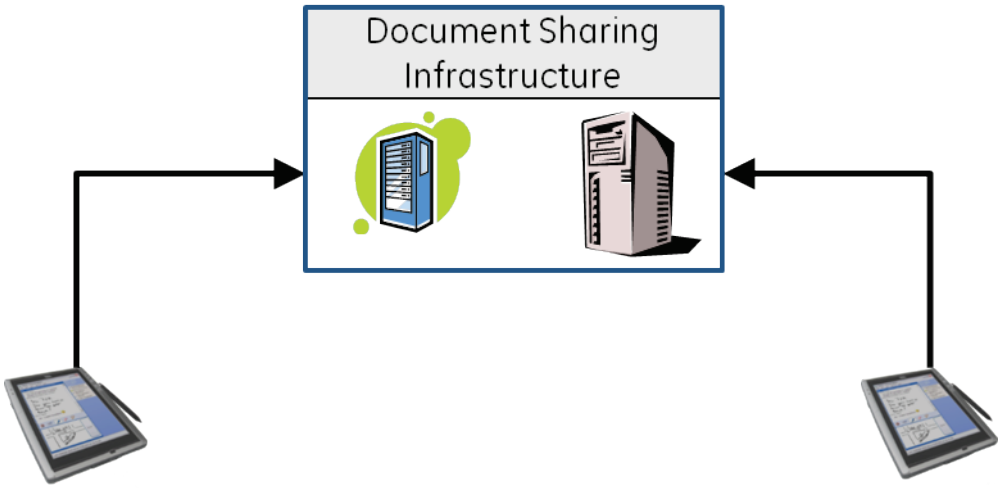


**Figure 1: Mobile access to a Document Sharing environment.**

The XDS Profile has separated Document Registry and Document Repository to support the needs of Cross-Enterprise deployment architectures and enable robustness, security, privacy, and interoperability. The MHD Profile has simplified the interactions in ways that are more consistent with use within a single policy domain. MHD transactions are not specifically tied to XDS; some of the system implementations envisioned may interface directly to an organizational EHR, or a multi-national PHR.

The MHD Profile supports a broad set of XDS use cases and functionality while keeping the technology as simple as possible. MHD focuses on a useful subset of the XDS use cases and does not try to reproduce the full scalability, flexibility, privacy, or security supported by the more robust XDS infrastructure. The following are examples of environments which may choose the MHD Profile over the XDS Profile:

- Medical devices including those targeted by the IHE Patient Care Devices (PCD) domain or PCHA/Continua organization, submitting data in the form of documents.
- Kiosks used by patients in hospital registration departments.
- PHR publishing into a staging area for later import into an EHR or HIE.

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- Patient or provider applications that are configured to securely connect to a PHR to submit a medical history document (e.g., BlueButton+).
- Electronic measurement devices participating in an XDW workflow and pulling medical history documents from an HIE.
- A General Practitioner physician's office with minimal IT capabilities using a mobile application to connect to an HIE or EHR.

## Open Issues and Questions

- MHD_039: How important are Folders? We could support Document Source → Document Recipient ability to create and update Folders. To support Document Consumer → Document Responder support of folders would require adding another Transaction for Find Folders, or some other method that the Document Consumer obtains knowledge of the Folder (such as through _include). Are folders really important today, or have they been replaced by the ReferenceIdList?
- MHD_044: There is more detail in an XDS error on Provide and Register Document Set-b that is not obvious how to translate into the FHIR response [ITI-65]. Suggestions welcome.
- MHD_051: More of the [ITI-18] queries could be utilized with the addition of the identifier FHIR parameter, however this would then present combinations of query parameters at the MHD (FHIR) API that are not simple transforms to [ITI-18] queries. For example, a Document Consumer provides both identifier query parameter, and another query parameter. At this time, MHD is focused on the most likely queries that a 'mobile' client would need, and these are satisfied with FindDocuments and FindSubmissionSets alone. Trial Implementation experience should be provided to IHE ITI Technical Committee in view of the need for other query parameters. Additional query parameters are allowed by MHD, they are simply not required of servers to do anything other than ignore the additional query parameters.
- MHD_052: Need an element in List to hold contentCodeList element from XDS. Previous versions of MHD put this into the .code element. However, the .code element is 0..1, and intended to identify the kind of List. See GF#19822 requested for R5.
- CP-ITI-1100: Need a way to find DocumentReference that hold attachments with a specified creation date/time. For the time during FHIR R4, we have guided the implementer to use the .date element to hold the created date/time. This solution requires careful duplication of the date value in both date and the attachment. This duplication enables use of the elements and query against date. The .date element in FHIR is defined as when the DocumentReference was created, which might be later than the document creation date/time. GF#19823 requested query parameter for the attachment created date/time for R5

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- MHD_053: Note that there is an emerging issue that FHIR has not addressed and that is how distributed systems behave, and how Patient links affect recorded data. Thus, it is difficult to determine today that the response Bundle content all will be pointing at the exact same Patient, although they should all be referring to the same human.
- CP-ITI-1116: Dissonance between FHIR concept of Transaction, and XDS Provide and Register transaction. This is partially addressed in CP-ITI-1095 regarding PartialFolderContentNotProcessed. In that a Document Responder is allowed to fail the full transaction according to FHIR transaction rules but is also allowed to soft warn. The soft warn would most likely be needed when implementing XDS-on-FHIR, as the XDS actors will have returned warnings. Thus, the Document Recipient must be allowed to return these soft warnings. In this case the MHD Document Recipient can't undo the XDS transaction, so it must be allowed to return success with warnings.

## Closed Issues

- Resolved in MHD Revision 3.0
  - MHD_054: Request to add the identifier query parameter to DocumentReference and DocumentManifest.
  - MHD_043: We neither mandate nor forbid the [ITI-68] from acting as a FHIR Binary endpoint. It would return a FHIR Binary resource with the content contained if the Accept headers ask for FHIR types, depending on the server capability.
  - MHD_042: MHD does not declare options for the various associations (replaces, transforms, appends), but rather provides the capability to all. However, the Document Responder in XDS-on-FHIR Option must support all of these association types. It may still get a failure from the Registry that it must pass back to the Document Source.
  - MHD_047: The tag used to indicate the Provide transaction must change. The encoding rules don't allow for "-" character. We could just change ITI-65 into ITI_65, but a breaking change is a breaking change. So, we have replaced with an actual structure definition based in the same URI space as our other Structure definitions. This means that we would no-longer use http://ihe.net/fhir/tag/iti-65, but rather we would use http://ihe.net/fhir/StructureDefinition/IHE_MHD_Provide_Comprehensive_DocumentBundle, or http://ihe.net/fhir/StructureDefinition/IHE_MHD_Provide_Minimal_DocumentBundle"
    MHD_048: We have chosen to define some secondary resources as 'contained', which in FHIR means that they would not standalone, and thus would not be revisable. We chose this characteristic as the closest to XDS metadata principle. However, this means that these secondary resources would not be searchable.
  - CP-ITI-1119: Made clear that Document Source must not populate any entryUUID.

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- CP-ITI-1115: Added requirement for location on the Bundle response and indicate etag is required if the server supports versioning (which the profile does not require). Also added GF#19824 to request this be clarified in FHIR in R5.
- CP-ITI-1126: added clarification that the transaction status is 200, and that each entry is 201 with location must be populated.
- CP-ITI-1114: clarify that in a Provide transaction all of the DocumentReference, DocumentManifest, and List resources must point at the same Patient resource. Added clarity to query transactions that when Patient parameter is used that both actors must have access to that Patient resource. Also added cautions to the security considerations.
- CP-ITI-1113: Added additional clarification of Reference url compliance vs .attachment.url compliance. Where attachment.url is a datatype "URL" it can carry a value that is compliant with Reference but can also carry any valid URL.
- CP-ITI-1102: Addressed bugs in the volume 3 table.
- CP-ITI-1101: This CP requests specifics on what is expected of a Document Responder implementing the Comprehensive Option. This is already handled in the more correct location in Volume 2 on the expected actions for the Document Responder. See Section 3.65.4.1.3.
- CP-ITI-1095: It is observed that in FHIR a transaction must succeed or fail. Thus, the inclusion of a Folder that the Document Recipient can't process should result in failure of the whole transaction. The text of MHD has aligned with the text of XDS ITI TF-2b:3.41.4.1.3.1 that allows a soft failure on Folders that are not supported. Should MHD take this softer position or stick with normal FHIR transaction behavior. For those systems based on a FHIR system they would likely prefer sticking with the FHIR definition, but those are likely also to easily support Folder (List Resource). Those that are a frontend to an XDS (XDS-on-FHIR) are more likely to prefer the softer approach, as they are going to need to pass through PartialFolderContentNotProcessed. Thus, the MHD Profile has been updated to indicate that either a full transaction failure or soft failure shall happen.
- CP-ITI-1089: Added emphasis on the response to the query transactions are compliant resources to the FHIR specification and will likely be compliant with MHD. There was already emphasis for the Document Consumer to be robust when processing the Bundle. There were questions of needing to address an operational environment with mismatched minimal vs comprehensive, this seems well enough explained and unclear what further wording would help with this clarity.
- MHD_049: ProviderRole has been added to FHIR STU3, and now added to DocumentReference and DocumentManifest. A FHIR CR 13266 resolved this.
- MHD_050: Using FHIR List as a Folder is minimally supported. Have defined a constant List.code that identifies those List resources that are Document Sharing Folders.

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- MHD_036: There is a missing capability to fully represent XDS author in FHIR. This because FHIR DocumentReference and DocumentManifest only support 'author', not the other roles that could be supported in XDS. This author element precoordinates that the value is only the author. GF#13266: DocumentReference and DocumentManifest author element needs to be more like Provenance.agent → Current FHIR core uses PractitionerRole and has wider support for author types.
- MHD_038: Issue with how to carry CDA®[3] root plus extension. We have documented current solution in Appendix Z– How to represent root+extension in a FHIR Identifier. However, FHIR should be more normative, so we have opened a CR http://gforge.hl7.org/gf/project/fhir/tracker/?action=TrackerItemEdit&tracker_item_id=13223→ FHIR core has decided upon the root, and root+extension as we have defined it in Appendix Z.

- Resolved in MHD revision 2.4
  - MHD_040: Find Document References does not support the GetRelatedDocuments stored query in the same way, but the queries provided can provide the same functionality.
  - MHD_041: There is now a declared option to indicate a system that requires minimal metadata support. Therefore, a Document Source that uses minimal metadata may receive an error from a Document Recipient that does not support minimal metadata.
  - MHD_037: STU3 now the Reference datatype can carry a URL to a Resource, or an Identifier of what could be a resource. We chose to specify use of URI and are silent on identifier until a compelling use case or issue appears.
  - MHD_045: MHD scope is as a front API. Thus, it intends to be standalone, or as a front API to XDS/XCA/XDR. It therefore does not intend to support where XDS is the frontend API with MHD as the backend. The result is that MHD query model is a subset of XDS.
  - MHD_046: MHD is an Interoperability Profile and does not include systems design that would be necessary to efficiently implement. There is considerable room for creative systems design.
  - MHD_001: Standards selection is now FHIR DSTU2. The profile restricts FHIR use to that which can be supported by an underlying XDS environment. The broad expectation is to use DocumentReference for DocumentEntry, DocumentManifest for SubmissionSet, and List for Folders. The inclusion of other FHIR resources as needed. The Provide Document Bundle is a bundle of the various resources necessary to be equivalent to the XDS Provide And Register Document Set-b [ITI-41]. The Find Document References

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will query on DocumentReference resources. The Find Document Manifests will query on DocumentManifest resources.

- MHD_002: Use of the IUA Profile is recommended, but not mandated as there are plenty of HTTP-based security models that layer in between the low-level transport (TCP) and the HTTP encoding. These security models can be layered in without modifying the characteristics of this profile. Use of TLS is encouraged, specifically as profiled in ATNA, but is not mandated. The IUA Profile includes guidance on the use of the current common implementations of OpenID Connect and OAuth 2.
- MHD_027: The Provide Document Bundle transaction allows for referencing the document content or including the document content. This is a capability not included in XDS for a Document Source but is reasonable for a Document Recipient to implement. Does IHE need to define a Create Document type transaction so that the Document Source could publish before using references in the Provide Document Bundle Transaction? Resolution: there is expectation of supporting this in the future.
- MHD_031: This version of MHD supports Replace operations.
- MHD_032: This version of MHD supports other Association types.
- MHD_033: This version of MHD provides only minimal support for Folders. A Document Source can create Folders, and update Folders. A Document Responder can return Folders related to other queries. However, there is no defined method to search for Folders. Searching for Folders, as FHIR List resources, should be obvious.
- MHD_025: This version of MHD is based on HL7 FHIR DSTU2. Lessons learned were folded into HL7 FHIR for DSTU2 under a joint effort of IHE and HL7. Revisions of MHD are not expected to be backward compatible, until FHIR goes normative and MHD goes Final Text.
- MHD_026: DSTU2 has aligned the use of typeCode as DocumentReference.type, and classCode as DocumentReference.class.
- MHD_030: Include support for ReferenceIdList
- MHD_034: MHD updated in 2020 includes an “UnContained References Option” to enable use-cases where known references are managed over their lifecycle and thus contained is not helpful. This option identifies sourcePatientInfo, Authenticator, and Author resources within the DocumentReference, and DocumentManifest.
- MHD_035: FHIR does not provide an ad-hoc metadata extension mechanism like custom slots in XDS.

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# Volume 1 – Profiles

*Add Section 33*

## 33 Mobile access to Health Documents (MHD) Profile

Applications specific to resource-constrained and mobile devices are an emerging platform for healthcare-enhancing software. The MHD Profile is not limited to mobile devices, using the term "mobile" only as a grouping for mobile applications, mobile devices or any other systems that are resource and platform-constrained. These constraints may drive the implementer to use simpler network interface technology. There are numerous deployed implementations of Document Sharing that need a simpler network interface technology, for example those hosted by a Health Information Exchange (HIE), large health provider electronic health record (EHR), or personal health record (PHR).

The Mobile access to Health Documents (MHD) Profile defines one standardized interface to health documents (a.k.a. an Application Programming Interface (API)) for use by mobile devices so that deployment of mobile applications is more consistent and reusable. In this context, mobile devices include tablets, smartphones, and embedded devices including home-health devices. This profile is also applicable to more capable systems where needs are simple, such as pulling the latest summary for display. The critical aspects of the 'mobile device' are that it is resource-constrained, has a simple programming environment (e.g., JSON, JavaScript), simple protocol stack (e.g., HTTP), and simple display functionality (e.g., HTML browser). The goal is, in part, to avoid burdening the client with additional libraries such as those that are necessary to process SOAP, WSSE, MIME-Multipart, MTOM/XOP, ebRIM, and multi-depth XML.

The Mobile access to Health Documents (MHD) Profile defines one pair of actors and a transaction to submit or push new "document entries" from the mobile device to a receiving system. Another set of actors and transactions is used to query a list of "document entries" having specific metadata, and to retrieve a document.

This profile leverages the metadata concepts from XDS but simplifies the transaction requirements for access by mobile devices.

The MHD Profile does not replace XDS. Rather, it enables simplified access by mobile devices to an XDS (or a similar) document management environment containing health information.

The Mobile Cross-Enterprise Document Data Element Extraction (mXDE) Profile combines MHD with the PCC Query for Existing Data for Mobile (QEDm) Profile to provide element level access to the medical information available in a Document Sharing exchange.

### 33.1 MHD Actors, Transactions, and Content Modules

Figure 33.1-1 shows the actors directly involved in the MHD Profile and the relevant transactions between them.

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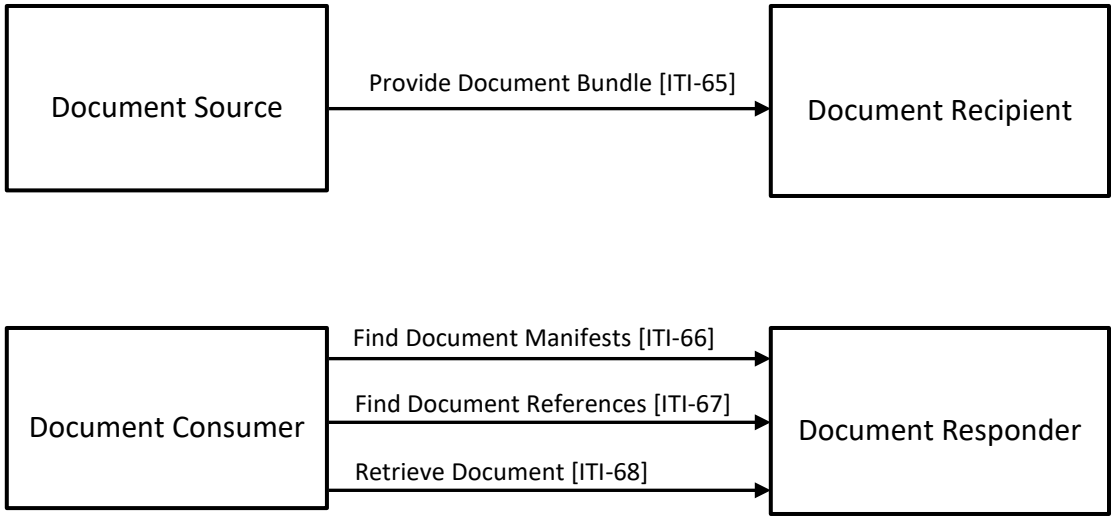


**Figure 33.1-1: MHD Actor Diagram**

Table 33.1-1 lists the transactions for each actor directly involved in the MHD Profile. To claim support of this Profile, an implementation of an actor must perform the required transactions (labeled "R") and may support the optional transactions (labeled "O"). Actor groupings are further described in Section 33.3.

**Table 33.1-1: MHD - Actors and Transactions**

| Actors | Transactions | Optionality | Section in Vol. 2 |
|---|---|---|---|
| Document Source | Provide Document Bundle [ITI-65] | R | ITI TF-2c: 3.65 |
| Document Recipient | Provide Document Bundle [ITI-65] | R | ITI TF-2c: 3.65 |
| Document Consumer | Find Document Manifests [ITI-66] | O (Note 1) | ITI TF-2c: 3.66 |
| | Find Document References [ITI-67] | O (Note 1) | ITI TF-2c: 3.67 |
| | Retrieve Document [ITI-68] | O (Note 1) | ITI TF-2c: 3.68 |
| Document Responder | Find Document Manifests [ITI-66] | R | ITI TF-2c: 3.66 |
| | Find Document References [ITI-67] | R | ITI TF-2c: 3.67 |
| | Retrieve Document [ITI-68] | R | ITI TF-2c: 3.68 |

Note 1: Document Consumer shall implement at least one transaction: Find Document Manifests, Find Document References, or Retrieve Document.

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### 33.1.1 Actor Descriptions and Actor Profile Requirements

Most requirements are documented in Transactions (Volume 2) and Content Modules (Volume 3). This section documents any additional requirements on profile's actors.

The Document Source and Document Consumer Actors are designed so that they can be implemented on a mobile device, and yet have sufficient functionality to support a wide range of applications and use cases.

The Document Recipient and Document Responder Actors are expected to be implemented without the constraints of a mobile device.

The transactions used by the MHD Profile correspond to the following approximately equivalent transactions used by XDS.

| MHD | XDS |
|---|---|
| Provide Document Bundle [ITI-65] | Provide and Register Document Set-b [ITI-41] |
| Find Document References [ITI-67] | Registry Stored Query – FindDocuments or FindDocumentsByReferenceId [ITI-18] |
| Find Document Manifests [ITI-66] | Registry Stored Query – FindSubmissionSets [ITI-18] |
| Retrieve Document [ITI-68] | Retrieve Document Set [ITI-43] |

Note: The transaction names are pluralized, but the corresponding endpoints follow the FHIR convention of singular naming.

In the IHE XDS Profile, the Document Registry and Document Repository Actors are independent to enable the widest possible deployment architectures. For finding and retrieving documents, the MHD Document Responder is a single actor that supports both the Document Registry and Document Repository functionality. This eases configuration needs for mobile health applications and mobile health application deployment and reduces the overall solution complexity. The MHD Document Recipient and the MHD Document Responder Actors are separate actors because there are use cases where the functionality of only one is needed, such as supporting a mobile medical measuring device that simply creates and submits new documents. General-purpose systems may implement both actors to offer a complete service definition for the hosting organization.

## 33.2 MHD Actor Options

Options that may be selected for this Profile are listed in the Table 33.2-1 along with the actors to which they apply. Dependencies between options when applicable are specified in notes.

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**Table 33.2-1: MHD - Actors and Options**

| Actor | Options | Reference |
|---|---|---|
| Document Source | Comprehensive Metadata | Section 33.2.1 |
| | UnContained Reference | Section 33.2.3 |
| Document Recipient | Comprehensive Metadata | Section 33.2.1 |
| | XDS on FHIR | Section 33.2.2 |
| | UnContained Reference | Section 33.2.3 |
| Document Consumer | UnContained Reference | Section 33.2.3 |
| Document Responder | XDS on FHIR | Section 33.2.2 |
| | UnContained Reference | Section 33.2.3 |

### 33.2.1 Comprehensive Metadata Option

Support of this option assures that the Document Source will provide comprehensive metadata. Comprehensive metadata fulfill the cardinality requirements of XDS.

A Document Source that supports this option will provide metadata consistent with the additional document sharing requirements for an XDS Document Source described in ITI TF-3: 4.3.1- Submission Metadata Attribute Optionality and ITI TF-3: 4.5.1 Metadata Object Types mapped to FHIR.

A Document Recipient that supports this option will require that any metadata provided is consistent with the additional document sharing requirements for an XDS Document Source described in ITI TF-3: 4.3.1- Submission Metadata Attribute Optionality.

### 33.2.2 XDS on FHIR Option

The Document Recipient that supports this option shall be able to be grouped with an XDS Document Source so that any publication request is passed on to that XDS environment. See ITI TF-2c: 3.65.4.1.3 “Expected Actions” and ITI TF-2c: 3.65.4.1.3.1. The grouped XDS Document Source shall implement the Document Replacement, Option, Document Addendum Option, Document Transformation Option, and Folder Management Option to ensure that these functionalities can be transferred from the MHD Document Source through to the XDS Document Registry.

The Document Responder that supports this option shall be able to be grouped with an XDS Document Consumer so that any query or retrieve requests can be passed on to, and responded to, by an XDS environment. See ITI TF-2c: 3.66.4.1.3.1 and ITI TF-2c: 3.67.4.1.3.1.

The XDS on FHIR Option is not compatible with the UnContained Reference Option. A system may be able to support both options, but only one will be able to be used at a given deployment.

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### 33.2.3 UnContained Reference Option

The UnContained Reference Option recognizes that a Community may choose to longitudinally maintain their provider and patient directories, for example, an mCSD Care Services Selective Supplier and PMIR Patient Identity Manager. When this longitudinal consistency is managed, then the author, authenticator, sourcePatientInfo, and author entries do not need to be a contained copy of the information known at the time of publication (ITI-65) since a Reference to the information in these directories will be valid over the full lifecycle of the entries.

The actors that support the UnContained References Option shall be able to create and consume full URL values in the `DocumentReference.author`, the `DocumentReference.authenticator`, the `DocumentReference.context.sourcePatientInfo`, and the `DocumentManifest.author`. This requirement encourages the persisting of the information at the time the document is published.

The UnContained Reference Option is not compatible with the XDS on FHIR Option. A system may be able to support both options, but only one will be able to be used at a given deployment.

## 33.3 MHD Actor Required Groupings

Actor(s) which are required to be grouped with other actor(s) are listed in this section. The grouped actor may be from this profile or a different domain/profile.

An actor from this profile (Column 1) must implement all the required transactions in this profile in addition to all of the required transactions for the grouped profile/actor listed (Column 3).

**Table 33.3-1: MHD - Actors Required Grouping**

| MHD Actor | Grouping Condition | Actor(s) to be grouped with | Reference |
|---|---|---|---|
| Document Source | -- | None | -- |
| Document Recipient | XDS on FHR Option | XDS.b / Document Source / Document Replacement, Document Addendum, Document Transformation, and Folder Management Options | Section 33.2.2 |
| Document Consumer | | None | -- |
| Document Responder | XDS on FHIR Option | XDS.b / Document Consumer | Section 33.2.2 |

## 33.4 MHD Overview

The MHD Profile enables sharing of patient documents to, or from, mobile or constrained devices. Other IHE profiles, chiefly Cross-Enterprise Document Sharing (XDS), describe sharing of patient document in less constrained environments, and many of the concepts from those profiles are applicable to the MHD environment. For more information on IHE Document

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Sharing, see "Health Information Exchange: Enabling Document Sharing Using IHE Profiles" whitepaper.

### 33.4.1 Concepts

The MHD Profile supports a broad set of the XDS use cases and functionality while keeping the implementation as simple as possible. The MHD Profile is focused on a subset of the use cases that XDS supports and does not try to reproduce the full scalability, flexibility, privacy, or security supported by a more robust XDS infrastructure. Example use cases are:

- Medical devices such as those targeted by the IHE Patient Care Devices (PCD) domain, submitting data in the form of documents.
- Kiosks used by patients in hospital registration departments.
- PHR publishing into a staging area for later import into an EHR or HIE.
- Patient or provider applications that are configured to securely connect to a PHR in order to submit healthcare history document (e.g., BlueButton+).
- Electronic measurement devices participating in XDW workflows and pulling medical history documents from an HIE.
- A General Practitioner physician's office with minimal IT capabilities using a mobile application to connect to an HIE or EHR.

These specific use cases can be generalized into two broad use cases. The first is the general use case of publishing new document(s) from the mobile device. The second general use case is where the mobile device needs to discover available documents and retrieve documents of interest. There are clearly complex use cases that combine these two general use cases; however, they are not specifically described in this profile. When more complex use cases are encountered, use of one of the more robust Document Sharing profiles is more appropriate.

### 33.4.2 Use Case #1: Publication of new documents

#### 33.4.2.1 Publication of new documents Use Case description

In this use case, a new document or set of documents is published from the mobile device. For example, a mobile device is a medical device that is submitting new health measurements, or a mobile device has a user-interface used to capture user input such as a Patient Consent. This device-created content is formed by the application, implementing the MHD Document Source, into a Document and submitted with the metadata.

This use case presumes that the mobile device knows or discovers the patient identity. The patient identity might be obtained through some IHE transactional method such as the Patient Demographics Query for Mobile (PDQm) or Patient Identifier Cross-Reference for Mobile (PIXm) Profile. The patient id might simply be entered via some device interface (RFID, Bar-Code), a user interface, or be specified in a configuration setting (e.g., mobile PHR application).

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The use case also allows for identity cross-referencing to be implemented by the Document Recipient.

This use case presumes that the sending mobile device knows the location of the receiving URL endpoints, likely through a configuration setting, or through a workflow driven by a web interface.

#### 33.4.2.2 Publication of new documents Process Flow

The publication of a new document(s) is done using the Provide Document Bundle [ITI-65] transaction, which carries both the document and its metadata. This transaction is analogous to an XDS Provide and Register Document Set-b [ITI-41] transaction.

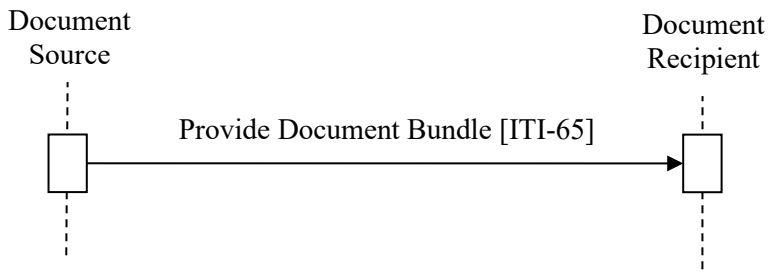


**Figure 33.4.2.2-1: Basic Process Flow in Provide Document Bundle Transaction**

### 33.4.3 Use Case #2: Discovery and Retrieval of existing documents

#### 33.4.3.1 Discovery and Retrieval of existing documents Use Case Description

In this use case, the mobile device needs access to existing documents. For example, a mobile device involved in a workflow needs to determine the current state of the workflow, or the mobile device needs to discover the most current medical summary.

#### 33.4.3.2 Discovery and Retrieval of existing documents Process Flow

The Find Document References [ITI-67] transaction is used to issue parameterized queries that result in a list of DocumentReference Resources, where a DocumentReference Resource carries the XDS DocumentEntry metadata, which is metadata about a document.

Alternatively, the Find Document Manifest [ITI-66] transaction is used to issue parameterized queries that result in a set of DocumentManifest Resources, where a DocumentManifest Resource carries the XDS SubmissionSet metadata, which is a container for a set of DocumentEntry objects that were published as a set.

The Retrieve Document [ITI-68] transaction is used to get the document itself.

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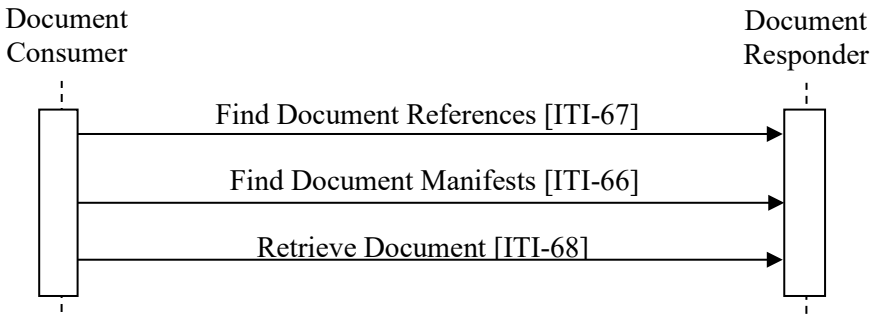


**Figure 33.4.3.2-1: Basic Process Flow in MHD Profile**

### 33.4.4 Mapping to RESTful operators

The MHD Profile defines a set of transactions against FHIR Resources. These are summarized in Table 33.4.4-1. MHD does not use any additional extended or custom methods.

**Table 33.4.4-1: Methods and Resources**

| HTTP Method | Transactions on DocumentReference | Transactions on DocumentManifest | Transactions on Binary (document) |
|---|---|---|---|
| GET | Find Document References [ITI-67] | Find Document Manifests [ITI-66] | Retrieve Document [ITI-68] |
| PUT | Not Specified | Not Specified | Not Specified |
| POST | Provide Document Bundle [ITI-65] | | |
| DELETE | Not Specified | Not Specified | Not Specified |
| UPDATE | Not Specified | Not Specified | Not Specified |
| HEAD | Not Specified | Not Specified | Not Specified |
| OPTIONS | Not Specified | Not Specified | Not Specified |
| TRACE | Not Specified | Not Specified | Not Specified |

Note: Items are marked Not Specified because the MHD Profile is focused on core Document Sharing (XDS, XDR, etc.) capability and is not trying to address the larger use-cases of metadata update.

## 33.5 MHD Security Considerations

See ITI TF-2x: Appendix Z.8 “Mobile Security Considerations”

## 33.6 MHD Cross Profile Considerations

### 33.6.1 MHD Actor grouped with XDS infrastructure

When the MHD Document Recipient is acting as a proxy for an XDS environment, it could be grouped with an XDS Document Source as the “XDS on FHIR” Option defines. In this way, a

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received Provide Document Bundle [ITI-65] transaction would be converted by the grouped system into an XDS Provide and Register Document Set-b [ITI-41] transaction. The MHD Document Recipient, acting as a proxy, could be configured to support only a designated set of mobile devices authorized by the hosting organization and use the security model defined by that hosting organization. The proxy might convert user authentication credentials, and fully implement the ATNA Secure Node or Secure Application Actors.

Other proxy architectures to XDS are possible such as grouped with an XDS Integrated Document Source/Repository.

When the MHD Document Responder is acting as a proxy for an XDS environment, it could be grouped with an XDS Document Consumer. In this way, the MHD Find Document Manifests [ITI-66], Find Document References [ITI-67], and Retrieve Document [ITI-68] transactions will be supported in the system using the appropriate XDS Registry Stored Query [ITI-18] and Retrieve Document Set-b [ITI-43] transactions. This proxy would be configured to support a designated set of mobile devices and the security model defined by the hosting organization. The proxy might fill in missing metadata information, convert user authentication credentials, and fully implement the IHE ATNA Secure Node or Secure Application Actors.

Not diagramed here is how PDQm and/or PIXm could similarly be used and implemented.

These two environments are illustrated in Figure 3.66.1-1.

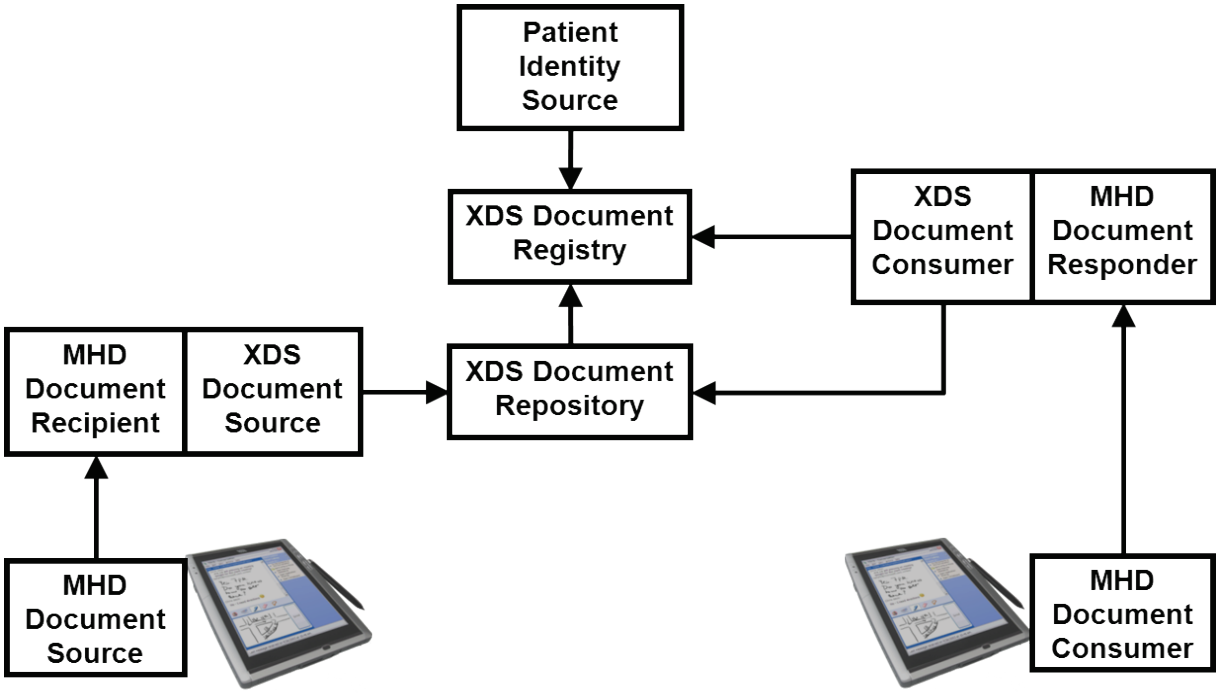


**Figure 33.6.1-1: MHD Actors grouped with XDS Document Sharing**


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### 33.6.2 MHD Actors grouped with XCA infrastructure

When an MHD Document Responder acts as a proxy into an XCA environment, it could be grouped with an Initiating Gateway. This type of MHD Document Responder will support the Find Document Manifests [ITI-66], Find Document References [ITI-67], and Retrieve Document [ITI-68] transactions by utilizing the XCA Cross Gateway Query [ITI-38] and Cross Gateway Retrieve [ITI-39] transactions as necessary. This type of proxy would be configured to support a designated set of mobile devices and enable a security model as defined by the hosting organization. The proxy might fill in missing metadata information, convert user authentication credentials, and fully implement the ATNA Secure Node or Secure Application requirements.

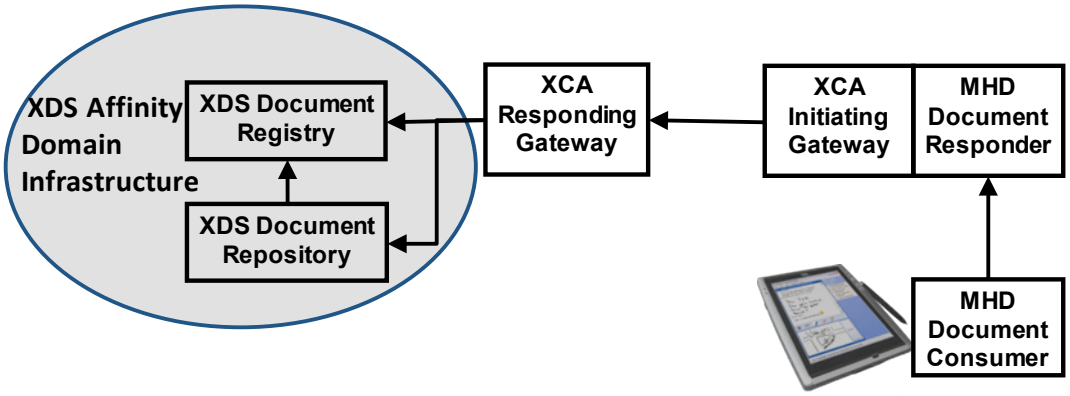


**Figure 33.6.2-1: MHD Actors grouped with XCA**

### 33.6.3 MHD Actor grouped with Retrieve Information for Display (RID) Profile

The Retrieve Information for Display (RID) Profile includes a similar set of transactions to those defined in the MHD Profile for Document Consumer. The RID Profile is focused more on delivering display-ready health information that may or may not be document based, whereas the MHD Profile focuses on providing access to Documents and the metadata about the document. Grouping the RID Information Source with an MHD Document Responder will provide both access to the metadata and document content, and also access to display-ready information.


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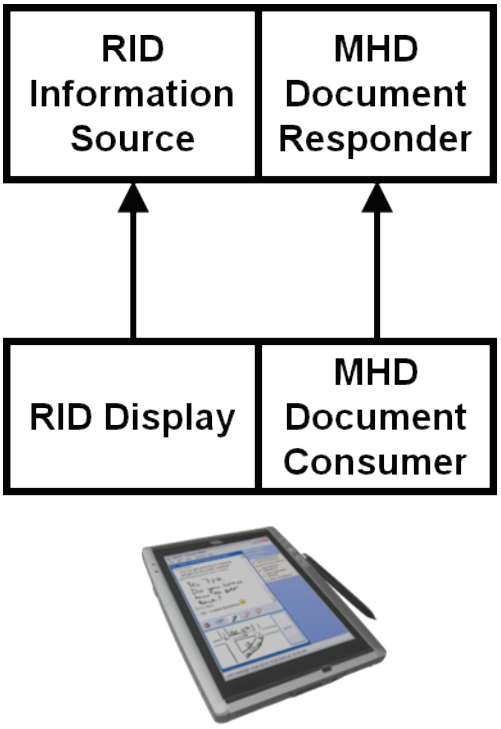


**Figure 33.6.3-1: MHD Actors grouped with RID**


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# Appendices

## Appendix A – Actor Summary Definitions

*Update (and add) the following terms to the IHE TF General Introduction list of actors:*

**Document Source** - The Document Source is the producer and publisher of documents **and metadata**~~**. It is responsible for sending documents to a Document Repository Actor. It also supplies metadata to the Document Repository Actor for subsequent registration of the documents with the Document Registry Actor.**~~

**Document Consumer** - The Document Consumer queries for document metadata meeting certain criteria and may retrieve selected documents.

**Document Recipient:** ~~**This**~~ **The Document Recipient** receives ~~**a set of**~~ documents **and metadata** sent by another actor. ~~**Typically, this document set will be made available to the intended recipient who will choose to either view it or integrate it into a Health Record.**~~

**Document Responder – The Document Responder sends documents and/or metadata in response to a request from another actor.**

## Appendix B – Transaction Summary Definitions

*Add the following terms to the IHE TF General Introduction Namespace list of Transactions:*

**Provide Document Bundle [ITI-65]** - This transaction is used to transfer documents and metadata and is analogous to a Provide and Register Document Set-b transaction.

**Find Document Manifests [ITI-66]** – This transaction is used to issue parameterized queries that result in a list of Document Manifest resources.

**Find Document References [ITI-67] –** This transaction is used to issue parameterized queries that result in a list of Document Reference resources.

**Retrieve Document [ITI-68]** – This transaction is used to get documents.


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# Volume 2c – Transactions

*Add Sections 3.65, 3.66, 3.67 and 3.68*

## 3.65 Provide Document Bundle [ITI-65]

This section corresponds to transaction [ITI-65] of the IHE Technical Framework. Transaction [ITI-65] is used by the Document Source and Document Recipient Actors. The Provide Document Bundle [ITI-65] transaction is used to transmit a set of documents and associated metadata.

### 3.65.1 Scope

The Provide Document Bundle [ITI-65] transaction passes a Provide Document Bundle Request from a Document Source to a Document Recipient.

### 3.65.2 Use Case Roles

**Actor:** Document Source

**Role:** Sends documents and metadata to the Document Recipient

**Actor:** Document Recipient

**Role:** Accepts the document and metadata sent from the Document Source.


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### 3.65.3 Referenced Standard

| | |
|---|---|
| HL7 FHIR | HL7 FHIR standard Release 4 http://hl7.org/fhir/R4/index.html |
| RFC2616 | Hypertext Transfer Protocol – HTTP/1.1 |
| RFC7540 | Hypertext Transfer Protocol – HTTP/2 |
| RFC3986 | Uniform Resource Identifier (URI): Generic Syntax |
| RFC4627 | The application/json Media Type for JavaScript Object Notation (JSON) |
| RFC6585 | Additional HTTP Status Codes |

### 3.65.4 Messages

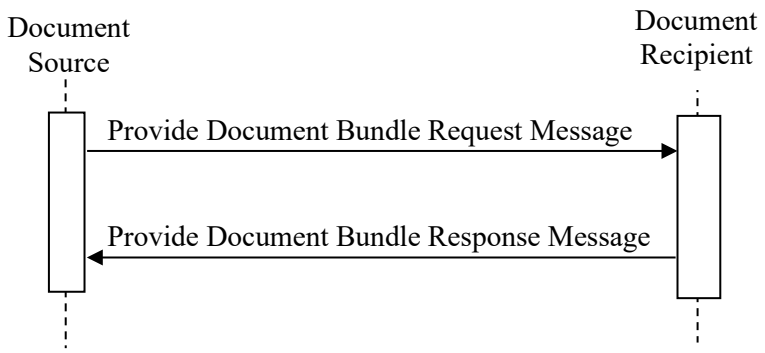


**Figure 3.65.4-1: Interaction Diagram**

#### 3.65.4.1 Provide Document Bundle Request Message

This message uses the HTTP POST method on the target Provide Document Bundle endpoint to convey the metadata and the document(s) as a FHIR transaction.

##### 3.65.4.1.1 Trigger Events

This method is invoked when the Document Source needs to submit one or more documents to a Document Recipient.

##### 3.65.4.1.2 Message Semantics

The Document Source shall initiate a FHIR “transaction” using a “create” action by sending an HTTP POST request method composed of a FHIR Bundle Resource containing the DocumentManifest Resource, one or more DocumentReference Resources, zero or more List Resources, and zero or more Binary Resources to the Document Recipient. Refer to ITI TF-3:


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4.5.1 for details on the FHIR Resources and how Document Sharing metadata attributes are mapped.

The media type of the HTTP body shall be either `application/fhir+json` or `application/fhir+xml`.

See http://hl7.org/fhir/R4/http.html#transaction for complete requirements of a transaction. See http://hl7.org/fhir/R4/bundle-transaction.html for example of a transaction bundle.

The Provide Document Bundle message is sent to the base URL as defined in FHIR. See http://hl7.org/fhir/R4/http.html for the definition of "HTTP" access methods and "base".

The Document Source shall assure all FHIR resource elements are consistent with the Document Sharing metadata requirements as specified for attributes ITI TF-3: Table 4.3.1-3 "Sending Actor Metadata Attribute Optionality". The Document Source that supports the "Comprehensive Metadata" or the "XDS on FHIR" Options shall assure consistency with column "XDS DS"; otherwise, the Document Source shall assure consistency with column "XDR MS". The Document Source shall not provide any `entryUUID` values.

#### 3.65.4.1.2.1 Bundle Resources

For complete information on constructing a FHIR Bundle Resource, see http://hl7.org/fhir/R4/bundle.html

The FHIR `Bundle.meta.profile` shall have the following value depending on the use of Comprehensive metadata or Minimal metadata:.

- Comprehensive Metadata: `http://ihe.net/fhir/StructureDefinition/IHE_MHD_Provide_Comprehensive_DocumentBundle`
- Minimal Metadata: `http://ihe.net/fhir/StructureDefinition/IHE_MHD_Provide_Minimal_DocumentBundle`

When resources are 'contained' (see ITI TF-3: 4.5.1), they shall be contained using the FHIR contained method (see http://hl7.org/fhir/R4/references.html#contained).

When the `DocumentReference.content.attachment.url` points at a Binary Resource, the Binary Resource shall be in the Bundle. See FHIR Resolving references in Bundles at http://hl7.org/fhir/R4/bundle.html#references.

#### 3.65.4.1.2.2 Patient Identity

All `DocumentReference.subject`, `List.subject`, and `DocumentManifest.subject` values shall be References to a FHIR Patient Resource identified by an absolute external reference (URL). This value may be obtained through use of PDQm or PIXm, or by some other means. The Patient Resource needs to be accessible to both the Document Source and the Document Recipient.

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When the UnContained Reference Option is used, there is no need to populate the sourcePatientInfo element. Otherwise, when sourcePatientInfo is provided, the `DocumentReference.context.sourcePatientInfo` shall be a reference to a "contained" Patient Resource. That is, the source patient info is encoded in a Patient Resource within the `DocumentReference.contained` element (see http://hl7.org/fhir/R4/references.html#contained).

#### 3.65.4.1.2.3 Replace, Transform, Signs, and Append Associations

The `DocumentReference.relatesTo` element indicates an association between `DocumentReference` resources. The `relatesTo.target` element in the provided `DocumentReference` points at the pre-existing `DocumentReference` that is being replaced, transformed, signed, or appended. The `relatesTo.code` element in the provided `DocumentReference` shall be the appropriate relationship type code defined in http://hl7.org/fhir/R4/valueset-document-relationship-type.html.

#### 3.65.4.1.3 Expected Actions

The Document Recipient shall accept both media types `application/fhir+json` and `application/fhir+xml`.

On receipt of the submission, the Document Recipient shall validate the resources and respond with one of the HTTP codes defined in Section 3.65.4.2.2 Message Semantics.

The Document Recipient shall process the bundle atomically, analogous to both the Provide and Register Document Set-b [ITI-41] transaction and FHIR "transaction" as specified in http://hl7.org/fhir/R4/http.html#transaction .

The Document Recipient shall validate the bundle first against the FHIR specification. Guidance on what FHIR considers a valid Resource can be found at http://hl7.org/fhir/R4/validation.html.

The Document Recipient shall verify the FHIR resource elements for consistency with the Document Sharing metadata requirements as specified for attributes ITI TF-3: Table 4.3.1-3: "Sending Actor Metadata Attribute Optionality". The Document Recipient that supports the "Comprehensive Metadata" or the "XDS on FHIR" Option shall validate against column "XDS DS"; otherwise the Document Recipient shall validate against column "XDR MS".

If necessary for processing, the Document Recipient shall retrieve Resources referenced by absolute URLs in the FHIR Bundle Resource.

If the Document Recipient encounters any errors or if any validation fails, the Document Recipient shall return an error, as documented in Section 3.65.4.2.2. If appropriate, it shall use error codes from ITI TF-3: Table 4.2.4.1-2.

If the Provide Document Bundle Message contains a DocumentReference Resource with a `relatesTo` element and the Document Recipient does not support the `relatesTo.code` value, it shall return a warning message, as indicated in Table 3.65.4.1.3-1.

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**Table 3.65.4.1.3-1: Warning message when relatesTo code is not supported**

| relatesTo.code | Warning |
|---|---|
| replaces | PartialReplaceContentNotProcessed |
| transforms | PartialTransformContentNotProcessed |
| appends | PartialAppendContentNotProcessed |

If the Provide Document Bundle Message contains a List Resource and the Document Recipient does not support the List Resource (aka, Folders), the Document Recipient shall either fail the whole transaction or may ignore the List, continuing processing of the transaction, and return a "PartialFolderContentNotProcessed" warning.

#### 3.65.4.1.3.1 XDS on FHIR Option

The MHD Document Recipient is grouped with an XDS Document Source when it supports the "XDS on FHIR" Option. The Document Recipient shall transform the Bundle content into a proper message for the Provide and Register Document Set-b [ITI-41] transaction. The Document Recipient shall create appropriate metadata from Resources in the FHIR Bundle Resource, including SubmissionSet, DocumentEntry, and Associations.

If the Provide Document Bundle Message contains a DocumentReference with a `relatesTo` element that has a code equal to "`replaces`" (as defined in http://hl7.org/fhir/R4/valueset-document-relationship-type.html), the XDS Document Source shall include a corresponding `RPLC` Association in the Submission Set for the Provide and Register Document Set-b [ITI-41] transaction.

If the Provide Document Bundle Message contains a DocumentReference with a `relatesTo` element that has a code equal to "`transforms`", the XDS Document Source shall include a corresponding `XFRM` Association in the Submission Set for the Provide and Register Document Set-b [ITI-41] transaction.

If the Provide Document Bundle Message contains a DocumentReference with a `relatesTo` element that has a code equal to "`appends`", the XDS Document Source shall include a corresponding `APND` Association in the Submission Set for the Provide and Register Document Set-b [ITI-41] transaction.

The Document Recipient shall map List Resources in the Bundle Resource to XDS Folders, as specified in ITI TF-3: Table 4.5.1.1-1.

Some FHIR elements do not translate to XDS concepts; the handling of these elements is left to the implementer of the Document Recipient.

Upon successful conversion of the FHIR Bundle to XDS Document Sharing metadata, the grouped Document Source shall execute the Provide and Register Document Set-b [ITI-41] transaction. The transaction result, and any error or warning messages, shall be reported to the MHD Document Source. The Document Recipient is responsible for translating the XDS

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response to the appropriate HTTP Status Code and FHIR OperationOutcome Resource in the Provide Document Bundle Response Message.

#### 3.65.4.2 Provide Document Bundle Response Message

The Document Recipient returns a HTTP Status code appropriate to the processing outcome, conforming to the transaction specification requirements as specified in http://hl7.org/fhir/R4/http.html#transaction

##### 3.65.4.2.1 Trigger Events

This message shall be sent when a success or error condition needs to be communicated. Success is only indicated once the document(s) is/are received and completely processed and persisted as appropriate to the Document Recipient Actor configuration.

##### 3.65.4.2.2 Message Semantics

To enable the Document Source to know the outcome of processing the transaction, and the identities assigned to the resources by the Document Recipient, the Document Recipient shall return a Bundle, with `type` set to `transaction-response`, that contains one entry for each entry in the request, in the same order as received, with the `Bundle.entry.response` indicating the results of processing the entry. Warnings, such as PartialFolderContentNotProcessed, shall be reported in `Bundle.entry.response.outcome`. The Document Recipient shall comply with FHIR http://hl7.org/fhir/R4/bundle.html#transaction-response and http://hl7.org/fhir/R4/http.html#transaction-response.

To indicate success the overall http `200` response is used. The `Bundle.entry.response.status` shall be `"201"` to indicate the Resource has been created; the `.location` element shall be populated, and the `.etag` element may be populated when the Document Recipient supports FHIR resource versioning.

##### 3.65.4.2.3 Expected Actions

If the Document Recipient returns an HTTP redirect response (HTTP status codes 301, 302, 303, or 307), the Document Source shall follow the redirect, but may stop processing if it detects a loop. See RFC7231 Section 6.4 Redirection 3xx.

The Document Source processes the results according to application-defined rules.

#### 3.65.4.3 CapabilityStatement Resource

Document Recipient implementing this transaction shall provide a CapabilityStatement Resource as described in ITI TF-2x: Appendix Z.3 indicating the transaction has been implemented.

### 3.65.5 Security Considerations

See MHD Security Considerations in ITI TF-1: 33.5.


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#### 3.65.5.1 Security Audit Considerations

The security audit criteria are similar to those for the Provide and Register Document Set-b [ITI-41] transaction as this transaction does export a document. Grouping a Document Source or Document Recipient with an ATNA Secure Node or Secure Application is recommended, but not mandated. The Document Source may be considered overburdened to fully implement the requirements of Secure Node or Secure Application. The Document Recipient implementation is expected to be less constrained and should be grouped with a Secure Node or Secure Application which would generate the equivalent to the audit event defined in ITI TF-2b: 3.41.5.1 Audit Record Considerations.

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## 3.66 Find Document Manifests

This section corresponds to transaction [ITI-66] of the IHE Technical Framework. Transaction [ITI-66] is used by the Document Consumer and Document Responder Actors. This transaction is used to locate and return metadata for previously stored document submissions.

### 3.66.1 Scope

The Find Document Manifests [ITI-66] transaction is used to find DocumentManifest Resources that satisfy a set of parameters. It is equivalent to the FindSubmissionSets query in the Registry Stored Query [ITI-18] transaction, as documented in ITI TF-2a: 3.18.4.1.2.3.7.1. The result of the query is a Bundle containing DocumentManifest Resources that match the query parameters.

### 3.66.2 Actor Roles

**Actor:** Document Consumer

**Role:** Requests a list of DocumentManifest Resources, matching the supplied set of criteria, from the Document Responder.

**Actor:** Document Responder

**Role:** Returns DocumentManifest Resources that match the search criteria provided by the Document Consumer.

### 3.66.3 Referenced Standards

| | |
|---|---|
| HL7 FHIR | HL7 FHIR standard Release 4 http://hl7.org/fhir/R4/index.html |
| RFC2616 | Hypertext Transfer Protocol – HTTP/1.1 |
| RFC7540 | Hypertext Transfer Protocol – HTTP/2 |
| RFC3986 | Uniform Resource Identifier (URI): Generic Syntax |
| RFC4627 | The application/json Media Type for JavaScript Object Notation (JSON) |
| RFC6585 | Additional HTTP Status Codes |


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### 3.66.4 Messages

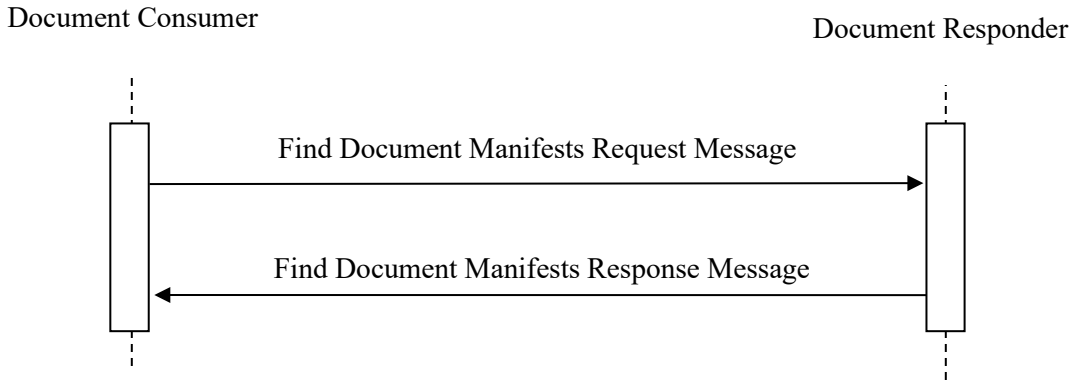


**Figure 3.66.4-1: Interaction Diagram**

#### 3.66.4.1 Find Document Manifests Request message

This message uses the HTTP GET method parameterized query to obtain DocumentManifest Resources from the Document Responder.

##### 3.66.4.1.1 Trigger Events

When the Document Consumer needs to discover DocumentManifest Resources matching various metadata parameters it issues a Find Document Manifests message.

##### 3.66.4.1.2 Message Semantics

The Document Consumer executes an HTTP GET against the Document Responder's DocumentManifest endpoint. The search target follows the FHIR HTTP specification, addressing the DocumentManifest Resource http://hl7.org/fhir/R4/http.html:

```
[base]/DocumentManifest?<query>
```

This URL is configurable by the Document Responder and is subject to the following constraints:

> The `<query>` represents a series of encoded name-value pairs representing the filter for the query, as specified in Section 3.66.4.1.2.1, as well as control parameters to modify the behavior of the Document Responder such as response format, or pagination.

###### 3.66.4.1.2.1 Query Search Parameters

The Document Consumer may supply, and the Document Responder shall be capable of processing all query parameters listed below. All query parameter values shall be appropriately encoded per RFC3986 "percent" encoding rules. Note that percent encoding does restrict the

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character set to a subset of ASCII characters which is used for encoding all other characters used in the URL.

The Document Consumer shall include search parameter `patient` or `patient.identifier`, and `status`. The other parameters described below are optional. The Document Responder shall implement the parameters described below. The Document Responder may choose to support additional query parameters beyond the subset listed below. Any additional query parameters supported shall be supported according to the core FHIR specification. Such additional parameters are considered out of scope for this transaction. Any additional parameters not supported should be ignored. See http://hl7.org/fhir/R4/search.html#errors.

`patient`

This parameter is of type `Reference(Patient)`. The Document Consumer may get this reference through the use of the PDQm or PIXm Profiles, or by some other method. When the patient parameter is used, the Patient reference would need to be accessible to both the Document Consumer and the Document Responder.

`patient.identifier`

This parameter, of type `token`, specifies an identifier associated with the patient to which the DocumentManifest Resource is assigned. See ITI TF-2x: Appendix Z.2.2 for use of the `token` data type for identifiers.

`created`

This parameter, of type `date`, specifies the time when the DocumentManifest was created. See FHIR http://hl7.org/fhir/R4/search.html#date for use of the date search type.

`author.given` and `author.family`

These parameters, of type `string`, specify the name parts of the author person which is associated with the DocumentManifest. See ITI TF-2x: Appendix Z.2.3 for use of the `string` data type.

`identifier`

This parameter, of type `token`, specifies an identifier for this DocumentManifest. The search results represent the results of a search on `DocumentManifest.masterIdentifier` and `DocumentManifest.identifier`. See ITI TF-2x: Appendix Z.2.2 for additional constraints on the use of the token search parameter type.

`type`

This parameter, of type `token`, specifies the `type.coding` value supplied in the DocumentManifest Resource. See ITI TF-2x: Appendix Z.2.2 for additional constraints on the use of the `token` search parameter type.

`source`

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This parameter, of type `uri`, specifies the `source` value supplied in the DocumentManifest Resource. See FHIR http://hl7.org/fhir/R4/search.html#uri for use of the uri search type.

`status`

This parameter, of type `token`, specifies the status of the DocumentManifest. If included in the query, the Document Consumer shall populate the `code` portion of the token with one of the codes in Table 3.66.4.1.2.1-1. The system portion of the token shall not be populated.

**Table 3.66.4.1.2.1-1: Values for code for status of DocumentManifest**

| Code | ebRIM Code |
|---|---|
| current | urn:oasis:names:tc:ebxml-regrep:StatusType:Approved |
| superseded | urn:oasis:names:tc:ebxml-regrep:StatusType:Deprecated |

#### 3.66.4.1.2.2. Populating Expected Response Format

The FHIR standard provides encodings for responses as either XML or JSON. The Document Responder shall support both message encodings, whilst the Document Consumer shall support one and may support both.

See ITI TF-2x: Appendix Z.6 for details.

### 3.66.4.1.3 Expected Actions

The Document Responder shall process the query to discover the DocumentManifest entries that match the search parameters given.

#### 3.66.4.1.3.1 XDS on FHIR Option

The Document Responder is grouped with an XDS Document Consumer when it supports the "XDS on FHIR" Option. The Document Responder shall map the query parameters as listed in Table 3.66.4.1.3-1 and shall execute a Registry Stored Query [ITI-18] for FindSubmissionSets. No additional query parameters as defined in FHIR are required of the Document Responder.

**Table 3.66.4.1.3-1: FindSubmissionSets Query Parameter Mapping**

| ITI-66 Parameter Name | ITI-18 Parameter Name |
|---|---|
| patient or patient.identifier | $XDSSubmissionSetPatientId |
| created [Note 1] | $XDSSubmissionSetSubmissionTimeFrom |
| created [Note 2] | $XDSSubmissionSetSubmissionTimeTo |
| author.given / author.family | $XDSSubmissionSetAuthorPerson |


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| ITI-66 Parameter Name | ITI-18 Parameter Name |
|---|---|
| type | $XDSSubmissionSetContentType |
| source | $XDSSubmissionSetSourceId |
| status | $XDSSubmissionSetStatus |

Note 1: This FindSubmissionSets parameter is used when the greater than parameter modifier is used on the created parameter.

Note 2: This FindSubmissionSets parameter is used when the less than parameter modifier is used on the created parameter.

#### 3.66.4.1.3.1.1 Translation of Token Parameter

Query parameters of type `token` are used to represent codes and identifiers. See https://www.hl7.org/fhir/R4/search.html#token.

The manner in which the Document Responder translates these parameters to ebXML to support the Registry Stored Query [ITI-18] transaction will depend on the type of the corresponding parameter within the FindSubmissionSets stored query (see ITI TF-2a: 3.18.4.1.2.3.7.2).

- If the token parameter translates to a codified stored query parameter, then the Document Responder shall represent the token parameter in the stored query as: `<Value>('code^^system')</Value>`
- If the token parameter translates to a patient identifier in the FindSubmissionSets stored query, then the Document Responder shall represent the token parameter in the stored query as: `<Value>code^^^&system&ISO</Value>`
- If the token parameter translates to a simple string, then the code shall be used for the parameter and the system shall be ignored.

#### 3.66.4.1.3.1.2 Translation of Name Components

Query parameters representing a name, for example "`author.given`" and "`author.family`" shall be translated to an appropriate XCN instance in the ebXML query. For example:

```
…&author.given=Marcus&author.family=Welby
```

would translate to:

```
<Value>^Welby^Marcus^^^</Value>
```

### 3.66.4.2 Find Document Manifests Response message

The Document Responder returns a HTTP Status code appropriate to the processing as well as a list of the matching document manifest resources.

#### 3.66.4.2.1 Trigger Events

The Document Responder completed processing of the Find Document Manifests message.


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#### 3.66.4.2.2 Message Semantics

Based on the query results, the Document Responder will either return an error or success. Guidance on handling Access Denied related to use of 200, 403 and 404 can be found in ITI TF-2x: Appendix Z.7.

When the Document Responder needs to report an error, it shall use HTTP error response codes and should include a FHIR OperationOutcome with more details on the failure. See FHIR http://hl7.org/fhir/R4/http.html and http://hl7.org/fhir/R4/operationoutcome.html.

If the Find Document Manifests message is processed successfully, whether or not any DocumentManifest Resources are found, the HTTP status code shall be 200. The Find Document Manifests Response message shall be a Bundle Resource containing zero or more DocumentManifest Resources. If the Document Responder is sending warnings, the Bundle Resource shall also contain an OperationOutcome Resource that contains those warnings.

The response shall adhere to the FHIR Bundle constraints specified in ITI TF-2x: Appendix Z.1.

##### 3.66.4.2.2.2.1 DocumentManifest Resource Contents

The DocumentManifest Resources returned shall be compliant with the FHIR specification http://hl7.org/fhir/R4/documentmanifest.html

The DocumentManifest Resources returned will be compliant with ITI TF-3: 4.5.1.2 for IHE restrictions on the DocumentManifest Resource and for a mapping of ebXML attributes to DocumentManifest elements. Document Consumers should be robust to receiving DocumentManifest Resources that are not IHE compliant.

#### 3.66.4.2.3 Expected Actions

If the Document Responder returns an HTTP redirect response (HTTP status codes 301, 302, 303, or 307), the Document Consumer shall follow the redirect, but may stop processing if it detects a loop. See RFC7231 Section 6.4 Redirection 3xx.

The Document Consumer shall process the results according to application-defined rules. The Document Consumer should be robust as the response may contain DocumentManifest Resources that match the query parameters but are not compliant with the DocumentManifest constraints defined in ITI TF-3: 4.5.

### 3.66.4.3 CapabilityStatement Resource

Document Responders implementing this transaction shall provide a CapabilityStatement Resource as described in ITI TF-2x: Appendix Z.3 indicating the query operation for the DocumentManifest Resource has been implemented and shall include all query parameters implemented for the DocumentManifest Resource.

## 3.66.5 Security Considerations

See MHD Security Considerations in ITI TF-1: 33.5.


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This transaction should not return information that the Document Consumer is not authorized to access. Where authorization here is inclusive of system, app, and user according to local policy, patient consents, and security layering. However, the transaction may return DocumentManifest resources that have Reference elements that the Document Consumer may not have access to. This is to say that the authorization need only be to the content returned in the Bundle. There may be references (URLs) for which the content is not authorized. This is considered proper as the Document Consumer would need to retrieve the content pointed to by those references, and at that time the proper authorization decision would be made on that context and content. In this way it is possible for a Document Consumer to get DocumentManifest Resources that are pointing at data that the Document Consumer is not authorized to retrieve. Thus, the URLs used must be carefully crafted so as to not expose sensitive data in the URL value.

#### 3.66.5.1 Security Audit Considerations

The security audit criteria are similar to those for the Registry Stored Query [ITI-18] transaction. Grouping a Document Consumer or Document Responder with an ATNA Secure Node or Secure Application is recommended, but not mandated. The Document Consumer may be considered overburdened to fully implement the requirements of Secure Node or Secure Application. The Document Responder implementation is expected to be less constrained and should be grouped with a Secure Node or Secure Application which would generate the equivalent of the audit event defined in ITI TF-2a: 3.18.5.1.2 Document Registry audit message.

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## 3.67 Find Document References

This section corresponds to transaction [ITI-67] of the IHE Technical Framework. Transaction [ITI-67] is used by the Document Consumer and Document Responder Actors.

### 3.67.1 Scope

The Find Document References transaction is used to find DocumentReference Resources that satisfy a set of parameters. It is equivalent to the FindDocuments and FindDocumentsByReferenceId queries from the Registry Stored Query [ITI-18] transaction. The result of the query is a FHIR Bundle containing DocumentReference Resources that match the query parameters.

### 3.67.2 Actor Roles

**Actor:** Document Consumer

**Role:** Requests a list of DocumentReference Resources, matching the supplied set of criteria, from the Document Responder.

**Actor:** Document Responder

**Role:** Returns DocumentReference Resources that match the search criteria provided by the Document Consumer.

### 3.67.3 Referenced Standards

| | |
|---|---|
| HL7 FHIR | HL7 FHIR standard Release 4 http://hl7.org/fhir/R4/index.html |
| RFC2616 | Hypertext Transfer Protocol – HTTP/1.1 |
| RFC7540 | Hypertext Transfer Protocol – HTTP/2 |
| RFC3986 | Uniform Resource Identifier (URI): Generic Syntax |
| RFC4627 | The application/json Media Type for JavaScript Object Notation (JSON) |
| RFC6585 | Additional HTTP Status Codes |


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### 3.67.4 Messages

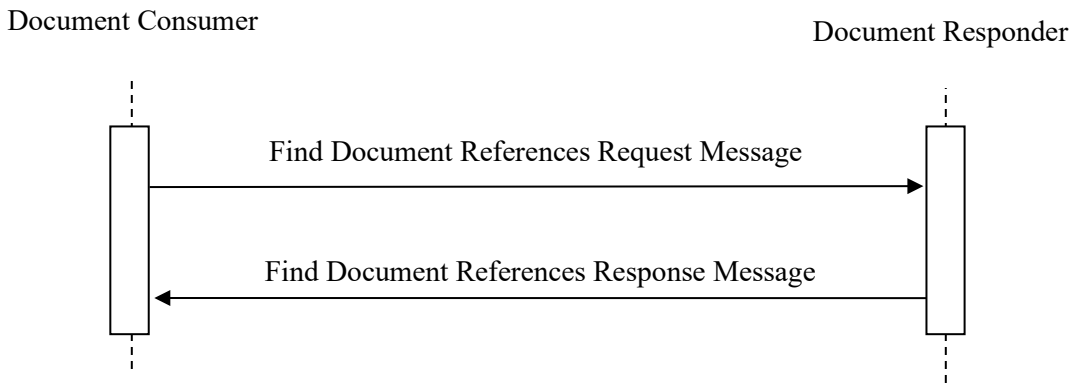


**Figure 3.67.4-1: Interaction Diagram**

#### 3.67.4.1 Find Document References Request message

This message uses the HTTP GET method parameterized query to obtain DocumentReference Resources from the Document Responder.

##### 3.67.4.1.1 Trigger Events

When the Document Consumer needs to discover DocumentReference Resources matching various metadata parameters, it issues a Find Document References message.

##### 3.67.4.1.2 Message Semantics

The Document Consumer executes an HTTP GET against the Document Responder's DocumentReference URL. The search target follows the FHIR HTTP specification, addressing the DocumentReference Resource http://hl7.org/fhir/R4/http.html:

```
[base]/DocumentReference?<query>
```

This URL is configurable by the Document Responder and is subject to the following constraints:

> The `<query>` represents a series of encoded name-value pairs representing the filter for the query, as specified in Section 3.67.4.1.2.1, as well as control parameters to modify the behavior of the Document Responder such as response format, or pagination.

###### 3.67.4.1.2.1 Query Search Parameters

The Document Consumer may supply, and the Document Responder shall be capable of processing, all query parameters listed below. All query parameter values shall be appropriately encoded per RFC3986 "percent" encoding rules. Note that percent encoding does restrict the

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character set to a subset of ASCII characters which is used for encoding all other characters used in the URL.

The Document Consumer shall include search parameter `patient` or `patient.identifier`, and `status`. The other parameters described below are optional. The Document Responder must implement the parameters described below. The Document Responder may choose to support additional query parameters beyond the subset listed below. Any additional query parameters supported shall be supported according to the core FHIR specification. Such additional parameters are considered out of scope for this transaction. Any additional parameters not supported should be ignored. See http://hl7.org/fhir/R4/search.html#errors.

`patient`

This parameter is of type `Reference(Patient)`. The Document Consumer may get this reference using the PDQm or PIXm Profile. When the patient parameter is used, the Patient reference would need to be accessible to both the Document Consumer and the Document Responder.

`patient.identifier`

This parameter, of type `token`, specifies an identifier associated with the patient to which the DocumentReference Resource is assigned. See ITI TF-2x: Appendix Z.2.2 for additional constraints on the use of the token search parameter type.

`status`

This parameter, of type `token`, specifies the status of the DocumentReference Resource, or in Document Sharing nomenclature, the availabilityStatus of the Document Entry. The Document Consumer shall populate the identifier portion of the token using one of the short codes in Table 3.67.4.1.2.1-1. The system portion of the token shall not be populated.

**Table 3.67.4.1.2.1-1: Values for code for status of DocumentReference**

| FHIR Code | ebRIM Code |
|---|---|
| current | urn:oasis:names:tc:ebxml-regrep:StatusType:Approved |
| superseded | urn:oasis:names:tc:ebxml-regrep:StatusType:Deprecated |

`identifier`

This parameter, of type `token`, specifies an identifier for this DocumentReference and/or the contained document. The search results represent the results of a search on `DocumentReference.masterIdentifier` and `DocumentReference.identifier`. See ITI TF-2x: Appendix Z.2.2 for additional constraints on the use of the token search parameter type.


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`date`

This parameter, of type `date`, specifies the time when the document was created. Note: The DocumentReference Resource does not yet have a query parameter for creationTime of the document; it has only a `date` element which is the creation date/time of the DocumentReference. For FHIR R4 we align these two elements so that query will function. See FHIR http://hl7.org/fhir/R4/search.html#date for use of the date search type.

`author.given` and `author.family`

These parameters, of type `string`, specify the name parts of the author person, which is associated with the DocumentReference Resource, or in Document Sharing nomenclature, the author of the Document Entry. See ITI TF-2x: Appendix Z.2.3 for use of the `string` data type.

`category`

This parameter, of type `token`, specifies the general classification of the DocumentReference Resource, or in Document Sharing nomenclature, the classCode of the Document Entry. See ITI TF-2x: Appendix Z.2.2 for additional constraints on the use of the `token` search parameter type.

`type`

This parameter, of type `token`, specifies the specific type of the DocumentReference resource or in Document Sharing nomenclature, the typeCode of the Document Entry. See ITI TF-2x: Appendix Z.2 for additional constraints on the use of the `token` search parameter type.

`setting`

This parameter, of type `token`, specifies the specific practice setting of the DocumentReference Resource, or in Document Sharing nomenclature, the practiceSettingCode of the Document Entry. See ITI TF-2x: Appendix Z.2 for additional constraints on the use of the `token` search parameter type.

`period`

This parameter, of type `date`, represents the time of service that is being documented by the DocumentReference. The period search parameter specifies an interval which the time of service overlaps. In Document Sharing nomenclature, this query parameter represents from/to parameters for the serviceStartTime and serviceStopTime of the Document Entry. See FHIR http://hl7.org/fhir/R4/search.html#date for use of the date search type.

`facility`

This parameter, of type `token`, specifies the kind of facility found in `DocumentReference.context.facilityType`, or in Document Sharing nomenclature,

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the healthcareFacilityTypeCode of the Document Entry. See ITI TF-2x: Appendix Z.2.2 for additional constraints on the use of the `token` search parameter type.

`event`

This parameter, of type `token`, specifies the main clinical acts documented by the DocumentReference Resource, or in Document Sharing nomenclature, the eventCodeList of the Document Entry. See ITI TF-2x: Appendix Z.2.2 for additional constraints on the use of the `token` search parameter type.

`security-label`

This parameter, of type `token`, specifies the security labels of the document referenced by DocumentReference Resource, or in Document Sharing nomenclature, the confidentialityCode of the Document Entry. See ITI TF-2x: Appendix Z.2.2 for additional constraints on the use of the `token` search parameter type.

`format`

This parameter, of type `token`, specifies the format of the DocumentReference Resource, or in Document Sharing nomenclature, the formatCode of the Document Entry. See ITI TF-2x: Appendix Z.2.2 for additional constraints on the use of the `token` search parameter type.

`related`

This parameter, of type `reference`, represents other identifiers associated with the DocumentReference Resource, or in Document Sharing nomenclature, the referenceIdList of the Document Entry.

#### 3.67.4.1.2.2 Populating Expected Response Format

The FHIR standard provides encodings for responses as either XML or JSON. The Document Responder shall support both message encodings, whilst the Document Consumer shall support one and may support both.

See ITI TF-2x: Appendix Z.6 for details.

### 3.67.4.1.3 Expected Actions

The Document Responder shall process the query to discover the DocumentReference entries that match the search parameters given.

#### 3.67.4.1.3.1 XDS on FHIR Option

The Document Responder is grouped with an XDS Document Consumer when it supports the "XDS on FHIR" Option. The Document Responder shall map the query parameters as listed in Table 3.67.4.1.3-1 and shall execute a Registry Stored Query [ITI-18] for FindDocuments or FindDocumentsByReferenceIdList (see ITI TF-2a: 3.18.4.1.2.3.7.1 and 3.18.4.1.2.3.7.14). All of the query parameters in Table 3.67.4.1.3-1 shall be supported by the Document Responder. No

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additional query parameters as defined in FHIR are required of the Document Responder, but they may be offered.

**Table 3.67.4.1.3-1: ITI-18 FindDocuments Query Parameter Mapping**

| ITI-67 Parameter Name | ITI-18 Parameter Name |
|---|---|
| patient or patient.identifier | $XDSDocumentEntryPatientId |
| date [Note 1 Note 5] | $XDSDocumentEntryCreationTimeFrom |
| date [Note 2 Note 5] | $XDSDocumentEntryCreationTimeTo |
| author.given / author.family | $XDSDocumentEntryAuthorPerson |
| status | $XDSDocumentEntryStatus |
| (Not supported) [Note 3] | $XDSDocumentEntryType |
| category | $XDSDocumentEntryClassCode |
| type | $XDSDocumentEntryTypeCode |
| setting | $XDSDocumentEntryPracticeSettingCode |
| period [Note 1] | $XDSDocumentEntryServiceStartTimeFrom |
| period [Note 2] | $XDSDocumentEntryServiceStartTimeTo |
| period [Note 1] | $XDSDocumentEntryServiceStopTimeFrom |
| period [Note 2] | $XDSDocumentEntryServiceStopTimeTo |
| facility | $XDSDocumentEntryHealthcareFacilityTypeCode |
| event | $XDSDocumentEntryEventCodeList |
| security-label | $XDSDocumentEntryConfidentialityCode |
| format | $XDSDocumentEntryFormatCode |
| related [Note 4] | $XDSDocumentEntryReferenceIdList |

Note 1: This FindDocuments parameter is used when the greater than parameter modifier is used on the indexed parameter.

Note 2: This FindDocuments parameter is used when the less than parameter modifier is used on the indexed parameter.

Note 3: The $XDSDocumentEntryType is not a supported query parameter in HL7 FHIR.

Note 4: The $XDSDocumentEntryReferenceIdList can only be mapped when using the XDS FindDocumentsByReferenceId query.

Note 5: The FHIR DocumentReference does not yet have a query parameter for creationTime of the document, it has only a date element which is the creation date/time of the DocumentReference. For FHIR R4 we align these two elements so that query will function.

### 3.67.4.2 Find Document References Response message

The Document Responder returns a HTTP Status code appropriate to the processing as well as a Bundle of the matching DocumentReference Resources.

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#### 3.67.4.2.1 Trigger Events

The Document Responder completed processing of the Find Document Reference Request message.

#### 3.67.4.2.2 Message Semantics

Based on the query results, the Document Responder will either return an error or success. Guidance on handling Access Denied related to use of 200, 403 and 404 can be found in ITI TF-2x: Appendix Z.7.

When the Document Responder needs to report an error, it shall use HTTP error response codes and should include a FHIR OperationOutcome with more details on the failure. See FHIR http://hl7.org/fhir/R4/http.html and http://hl7.org/fhir/R4/operationoutcome.html.

If the Find Document References message is processed successfully, whether or not any DocumentReference Resources are found, the HTTP status code shall be 200. The Find Document References Response message shall be a Bundle Resource containing zero or more DocumentReference Resources. If the Document Responder is sending warnings, the Bundle Resource shall also contain an OperationOutcome Resource that contains those warnings.

The response shall adhere to the FHIR Bundle constraints specified in ITI TF-2x: Appendix Z.1.

##### 3.67.4.2.2.1 DocumentReference Resource Contents

The DocumentReference Resources returned shall be compliant with the FHIR specification http://hl7.org/fhir/R4/documentreference.html

The DocumentReference Resources returned will be compliant with ITI TF-3: 4.5.1.1 for the IHE restrictions on DocumentReference Resource and for a mapping from IHE Document Sharing profiles (e.g., XDS) to FHIR. Document Consumers should be robust to receiving DocumentReference Resources that are not IHE compliant.

##### 3.67.4.2.2.2 Resource Bundling

Resource Bundling shall comply with the guidelines in ITI TF-2x: Appendix Z.1.

###### 3.67.4.2.2.2.1 Document location

The Document Responder shall place into the `DocumentReference.content.attachment.url` element a full URL that can be used by the Document Consumer to retrieve the document using the Retrieve Document [ITI-68] transaction. IHE does not specify the format of the URL. There are many ways to encode this URL that allow for easy processing on a Retrieve Document transaction. Some examples are to encode homeCommunityId, repositoryUniqueId, uniqueId, and patientId into the URL. This could be done in many ways including using character separators or directory separators. In this way, the Document Responder can support many communities, and/or many repositories.

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#### 3.67.4.2.3 Expected Actions

If the Document Responder returns an HTTP redirect response (HTTP status codes 301, 302, 303, or 307), the Document Consumer shall follow the redirect, but may stop processing if it detects a loop. See RFC7231 Section 6.4 Redirection 3xx.

The Document Consumer shall process the results according to application-defined rules. The Document Consumer should be robust as the response may contain DocumentReference Resources that match the query parameters but are not compliant with the DocumentReference constraints defined in ITI TF-3: 4.5.

### 3.67.4.3 CapabilityStatement Resource

Document Responders implementing this transaction shall provide a CapabilityStatement Resource as described in ITI TF-2x: Appendix Z.3 indicating the query operation for the DocumentReference Resource has been implemented and shall include all query parameters implemented for the DocumentReference Resource.

## 3.67.5 Security Considerations

See MHD Security Considerations in ITI TF-1: 33.5.

This transaction should not return information that the Document Consumer is not authorized to access. Where authorization here is inclusive of system, app, and user according to local policy, patient consents, and security layering. However, the transaction may return DocumentReference resources that have Reference elements that the Document Consumer may not have access to. This is to say that the authorization need only be to the content returned in the Bundle. There may be references (URLs) for which the content is not authorized. This is considered proper as the Document Consumer would need to retrieve the content pointed to by those references, and at that time the proper authorization decision would be made on that context and content. In this way it is possible for a Document Consumer to get DocumentManifest resources that are pointing at data that the Document Consumer is not authorized to retrieve. Thus, the URLs used must be carefully crafted so as to not expose sensitive data in the URL value.

Given that the Document Responder is responsible for the URL placed into `DocumentReference.content.attachment.url`, care must be taken to assure that manipulation of this URL prior to a Retrieve Document transaction does not expose resources the Document Consumer should not have access to.

### 3.67.5.1 Security Audit Considerations

The security audit criteria are similar to those for the Registry Stored Query [ITI-18] transaction. Grouping the Document Consumer or Document Responder with an ATNA Secure Node or Secure Application is recommended, but not mandated. The Document Consumer may be considered overburdened to fully implement the requirements of Secure Node or Secure Application. The Document Responder implementation is expected to be less constrained and should be grouped with a Secure Node or Secure Application which would generate an

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equivalent event to the audit event defined in ITI TF-2a: 3.18.5.1.2 Document Registry audit message.

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## 3.68 Retrieve Document

This section corresponds to transaction [ITI-68] of the IHE Technical Framework. Transaction [ITI-68] is used by the Document Consumer and Document Responder Actors.

### 3.68.1 Scope

The Retrieve Document [ITI-68] transaction is used by the Document Consumer to retrieve a document from the Document Responder.

### 3.68.2 Use Case Roles

**Actor:** Document Consumer

**Role:** Requests a document from the Document Responder

**Actor:** Document Responder

**Role:** Serves the document to the Document Consumer

### 3.68.3 Referenced Standard

| | |
|---|---|
| HL7 FHIR | HL7 FHIR standard Release 4 http://hl7.org/fhir/R4/index.html |
| RFC2616 | Hypertext Transfer Protocol – HTTP/1.1 |
| RFC7540 | Hypertext Transfer Protocol – HTTP/2 |
| RFC3986 | Uniform Resource Identifier (URI): Generic Syntax |
| RFC6585 | Additional HTTP Status Codes |

### 3.68.4 Messages

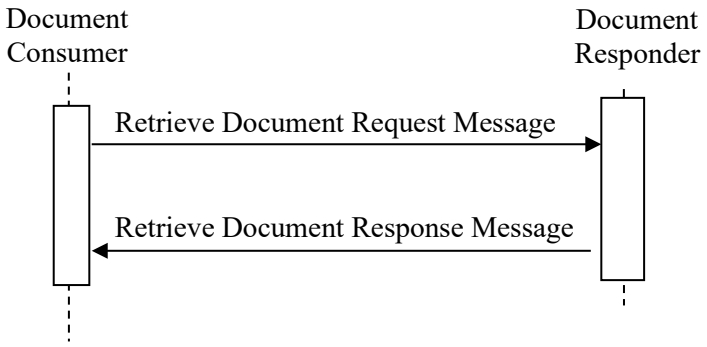


**Figure 3.68.4-1: Interaction Diagram**


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#### 3.68.4.1 Retrieve Document Request Message

This message is an HTTP GET request to retrieve the document.

##### 3.68.4.1.1 Trigger Events

1245 The Document Consumer wants to obtain a document.

##### 3.68.4.1.2 Message Semantics

The Document Consumer sends a HTTP GET request to the server. The Document Consumer request may be to retrieve the document content referenced by a `DocumentReference.content.attachment.url`.

1250 The Document Consumer may provide a HTTP Accept header, according to the semantics of the HTTP protocols (see RFC2616, Section 14.1). The only MIME type assured to be returned is the MIME type indicated in the `DocumentReference.content.attachment.contentType`.

The HTTP If-Unmodified-Since header shall not be included in the GET request.

##### 3.68.4.1.3 Expected Actions

1255 The Document Responder shall provide the document in the requested MIME type or reply with an HTTP status code indicating the error condition. The Document Responder is not required to transform the document.

#### 3.68.4.2 Retrieve Document Response Message

This is the return message sent by the Document Responder.

1260 ##### 3.68.4.2.1 Trigger Events

The HTTP Response message is sent upon completion of the Retrieve Document Request.

##### 3.68.4.2.2 Message Semantics

This message shall be an HTTP Response, as specified by RFC2616. When the requested document is returned, the Document Responder shall respond with HTTP Status Code 200. The
1265 HTTP message-body shall be the content of the requested document.

Table 3.68.4.2.2-1 contains error situations and the HTTP Response.

**Table 3.68.4.2.2-1: HTTP Error Response Codes and Suggested Text**

| Situation | HTTP Response |
|---|---|
| URI not known | 404 Document Not Found |
| Document is Deprecated or not available | 410 Gone (or 404 when 410 is unacceptable due to security/privacy policy) |
| Document Responder unable to format document in content types listed the 'Accept' field | 406 Not Acceptable |

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| Situation | HTTP Response |
|---|---|
| HTTP request specified is otherwise not a legal value | 403 Forbidden/Request Type Not Supported |

The Document Responder may return other HTTP Status Codes. Guidance on handling Access Denied related to use of 200, 403 and 404 can be found in ITI TF-2x: Appendix Z.7.

The Document Responder should complement the returned error code with a human readable description of the error condition.

The Document Responder may return HTTP redirect responses (responses with HTTP Status Codes 301, 302, 303 or 307) in response to a request. See RFC7231 Section 6.4 Redirection 3xx.

#### 3.68.4.2.3 Expected Actions

If the Document Responder returns an HTTP redirect response (HTTP status codes 301, 302, 303, or 307), the Document Consumer shall follow the redirect, but may stop processing if it detects a loop. See RFC7231 Section 6.4 Redirection 3xx.

The Document Consumer processes the results according to application-defined rules.

### 3.68.5 Security Considerations

See MHD Security Considerations in ITI TF-1: 33.5.

#### 3.68.5.1 Security Audit Considerations

The security audit criteria are similar to those for the Retrieve Document Set-b [ITI-43] transaction as this transaction does retrieve the content of a document. Grouping the Document Consumer or Document Responder with an ATNA Secure Node or Secure Application is recommended, but not mandated. The Document Consumer may be considered overburdened to fully implement the requirements of Secure Node or Secure Application. The Document Responder implementation is expected to be less constrained and should be grouped with a Secure Node or Secure Application which would generate an equivalent event to the audit event defined in ITI TF-2b: 3.43.6.1.2 Document Repository audit message.


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# Volume 3 – Content Modules

*Add Section 4.5*

## 4.5 FHIR Representation

This section documents the mapping between IHE Document Sharing Metadata and the FHIR Resources.

### 4.5.1 Metadata Object Types mapped to FHIR

For details on FHIR resources and data types see HL7 FHIR http://hl7.org/fhir/R4/index.html.

Some Document Sharing Metadata attributes must be treated as 'contained' FHIR Resources. These are indicated in Table 4.5.1.1.1-1 using "Note 1" and the word 'contained'. The details of the FHIR 'contained' mechanism is found at http://hl7.org/fhir/R4/references.html#contained.

When encoding XDS identifiers into FHIR Resource data elements of type Identifier, the FHIR notation of OIDs and UUIDs uses the system identifier of "`urn:ietf:rfc:3986`". For more details and examples, see ITI TF-2x: Appendix E.3 "FHIR Identifier Type".

#### 4.5.1.1 DocumentEntry Metadata Attributes

Table 4.5.1.1-1 provides a mapping of Document Sharing DocumentEntry attributes to FHIR DocumentReference Resource elements. The full DocumentEntry metadata attribute definition is in ITI TF-3: 4.2.3.2. The optionality of elements is transaction-specific and is found in ITI TF-3: 4.3.1-3.

Note: FHIR contains an informative mapping that is intended to be equivalent to Table 4.5.1.1-1. The informative FHIR mapping can be found at http://hl7.org/fhir/R4/documentreference-mappings.html#xds.

**Table 4.5.1.1-1: FHIR DocumentReference mapping to DocumentEntry**

| FHIR DocumentReference Resource Definition | IHE constraint | Document Sharing Metadata | Notes |
|---|---|---|---|
| id<br>id [0..1] | | | Logical id of this artifact |
| meta<br>Meta [0..1] | | | |
| meta.versionId<br>id [0..1] | | | Allowed but not defined Note 3 |
| meta.lastUpdated<br>instant [0..1] | | | Allowed but not defined Note 3 |


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| FHIR DocumentReference Resource Definition | IHE constraint | Document Sharing Metadata | Notes |
|---|---|---|---|
| meta.source<br>uri [0..1] | | | Allowed but not defined Note 3 |
| meta.profile<br>canonical [0..*] | | limitedMetadata | See Section 4.5.1.1.1. |
| meta.security<br>Coding [0..*] | | | Allowed but not defined Note 3 |
| meta.tag<br>Coding [0..*] | | | Allowed but not defined Note 3 |
| implicitRules<br>uri [0..1] | | | Allowed but not defined Note 3 |
| language<br>code [0..1] | | | Allowed but not defined Note 3 |
| text<br>Narrative [0..1] | | | Allowed but not defined Note 3 |
| contained<br>Resource [0..*] | | | Allowed but not defined Note 3 |
| extension<br>[0..*] | | | Allowed but not defined Note 3 |
| modifierExtension<br>Extension [0..*] | | | Allowed but not defined Note 3 |
| masterIdentifier<br>Identifier [0..1] | [1..1] | uniqueId | See ITI TF-2x: Z.9.1.1 Identifier and CDA root plus extension |
| identifier<br>Identifier [0..*] | | entryUUID | When the DocumentReference.identifier carries the entryUUID then the DocumentReference.identifier. use shall be 'official' |
| status<br>code<br>{DocumentReferenceStatus}<br>[1..1] | | availabilityStatus | approved → status=current<br>deprecated → status=superseded<br>Other status values are allowed but are not defined in this mapping to XDS. |
| docStatus<br>code [0..1] | | | Allowed but not defined Note 3 |
| type<br>CodeableConcept [0..1] | | typeCode | |
| category<br>CodeableConcept [0..*] | [0..1] | classCode | |
| subject<br>Resource(Patient\| Practitioner\| Group\| Device) [0..1] | Reference(Patient) | patientId | Not a contained resource. URL Points to an existing Patient Resource representing the XDS Affinity Domain Patient. |

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| FHIR DocumentReference Resource Definition | IHE constraint | Document Sharing Metadata | Notes |
|---|---|---|---|
| date<br>instant [0..1] | | | Allowed but not defined Note 3 |
| author<br>Reference(Practitioner\|PractitionerRole\|Organization\|Device\| Patient\| RelatedPerson) [0..*] | Note 1 | authorPerson, authorInstitution, authorRole, authorSpeciality, authorTelecommunication | |
| authenticator<br>Reference(Practitioner\|PractitionerRole\|Organization [0..1] | Note 1 | legalAuthenticator | |
| custodian<br>Reference(Organization) [0..1] | | | Allowed but not defined Note 3 |
| relatesTo<br>[0..*] | | Relationship Association | See ITI TF-2c: 3.65.4.1.2.3 |
| relatesTo.code<br>code [1..1] | | Relationship type | |
| relatesTo.target<br>Reference(DocumentReference) [1..1] | | relationship reference | |
| description<br>string [0..1] | | comments | |
| securityLabel<br>CodeableConcept [0..*] | | confidentialityCode | Note: This is NOT the DocumentReference.meta, as that holds the meta tags for the DocumentReference itself. |
| content<br>[1..*] | [1..1] | | |
| content.attachment | | | |
| content.attachment.contentType<br>code [0..1] | [1..1] | mimeType | |
| content.attachment.language<br>code [0..1] | | languageCode | |
| content.attachment.data<br>base64Binary [0..1] | [0..0] | | Not Used Note 3 |
| content.attachment.url<br>uri [0..1] | [1..1] | retrievable location of the document | |
| content.attachment.size<br>integer [0..1] | | size | The size is calculated on the data prior to base64 encoding, if the data is base64 encoded. |

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| FHIR DocumentReference Resource Definition | IHE constraint | Document Sharing Metadata | Notes |
|---|---|---|---|
| content.attachment.hash<br>string [0..1] | | hash | The IHE Document Sharing metadata element hash holds the SHA1 hash of the document. The hash is encoded in FHIR in base64Binary, whereas in XDS hexbinary is used.<br>The hash is calculated on the data prior to base64 encoding, if the data is base64 encoded. |
| content.attachment.title<br>string [0..1] | | title | |
| content.attachment.creation<br>dateTime [0..1] | | creationTime | Note 4 |
| content.format<br>Coding [0..1] | | formatCode | |
| context<br>[0..1] | | | |
| context.encounter<br>Reference(Encounter) [0..*] | | referenceIdList | When referenceIdList contains an encounter, and a FHIR Encounter is available, it may be referenced. |
| context.event<br>CodeableConcept [0..*] | | eventCodeList | |
| context.period<br>Period [0..1] | | serviceStartTime<br>serviceStopTime | |
| context.facilityType<br>CodeableConcept [0..1] | | healthcareFacilityTypeCode | |
| context.practiceSetting<br>CodeableConcept [0..1] | | practiceSettingCode | |
| context.sourcePatientInfo<br>Reference(Patient) [0..1] | Note 1 | sourcePatientId and sourcePatientInfo | |
| context.related<br>Reference(Any) [0..*] | | referenceIdList | Use .identifier element to hold referenceIdList identifier(s). (See ITI TF-2x: Z.9.1.2 XDS CXi mapping to FHIR Identifier Type.)<br><br>May use .reference element when the identifier has a known FHIR resource id. |
| | | homeCommunityId | Not Applicable Note 2 |
| | | objectType | Not Applicable Note 2 |
| | | repositoryUniqueId | Not Applicable Note 2 |

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Note 1: Indicates that the data shall be represented as a contained resource, unless the UnContained References Option is used. See Section 4.5.4.4.7 and ITI TF-1: 33.2.3.

Note 2: Not Applicable - The Document Sharing metadata element has no equivalent element in HL7 FHIR; therefore, a Document Source is not able to set these elements, and Document Consumers will not have access to these elements.

Note 3: These HL7 FHIR elements are not used in XDS; therefore, they are not expected to be present. Document Consumers should be robust to these elements holding values.

Note 4: The FHIR DocumentReference does not yet have a query parameter for creationTime of the document, it has only a date element which is the creation date/time of the DocumentReference. For FHIR R4, we align these two elements so that query will function.

#### 4.5.1.1.1 DocumentReference StructureDefinition

The conformance requirements are different between a Provide Document Bundle [ITI-65] transaction and a Find Document References [ITI-67] transaction, and between Minimal Metadata and Comprehensive Metadata.

The values for canonical profile URI for DocumentReference are:

- In Provide Document Bundle [ITI-65]:
  - Comprehensive Metadata: `http://ihe.net/fhir/StructureDefinition/IHE_MHD_Provide_Comprehensive_DocumentReference`
  - Minimal Metadata: `http://ihe.net/fhir/StructureDefinition/IHE_MHD_Provide_Minimal_DocumentReference`
- In Find Document References [ITI-67]:
  - Comprehensive Metadata: `http://ihe.net/fhir/StructureDefinition/IHE_MHD_Query_Comprehensive_DocumentReference`
  - Minimal Metadata: `http://ihe.net/fhir/StructureDefinition/IHE_MHD_Query_Minimal_DocumentReference`

Resources are not required to carry the `meta.profile` element and may only carry the `profile` element defined for the Provide Document Bundle [ITI-65] transaction, as the Receiver is not required to add the `profile` tags. The value of the `meta.profile` is a soft indicator of conformance expectation. Receivers may choose to validate actual conformance and fail transactions due to non-conformance.

### 4.5.1.2 SubmissionSet Metadata Attributes

Table 4.5.1.2-1 provides a mapping of the metadata attributes associated with a Document Sharing SubmissionSet object to FHIR DocumentManifest Resource. The full SubmissionSet metadata attribute definition is in Section 4.2.3.3.

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Note: FHIR contains an informative mapping that is intended to be equivalent to Table 4.5.1.2-1 found at http://hl7.org/fhir/R4/documentmanifest-mappings.html#xds.

1355 **Table 4.5.1.2-1: FHIR DocumentManifest mapping to SubmissionSet**

| FHIR DocumentManifest Resource Definition | IHE constraint | Document Sharing metadata | Notes |
|---|---|---|---|
| id<br>id [0..1] | | | Logical id of this artifact |
| meta.Meta<br>[0..1] | | | |
| meta.versionId<br>id [0..1] | | | Allowed but not defined Note 3 |
| meta.lastUpdated<br>instant [0..1] | | | Allowed but not defined Note 3 |
| meta.source<br>uri [0..1] | | | Allowed but not defined Note 3 |
| meta.profile<br>canonical [0..*] | | limitedMetadata | See Section 4.5.1.2.1 |
| meta.security<br>Coding [0..*] | | | Allowed but not defined Note 3 |
| meta.tag<br>Coding [0..*] | | | Allowed but not defined Note 3 |
| implicitRules<br>uri [0..1] | | | Allowed but not defined Note 3 |
| language<br>code [0..1] | | | Allowed but not defined Note 3 |
| text<br>Narrative [0..1] | string | comment | |
| contained<br>Resource [0..*] | | | Allowed but not defined Note 3 |
| extension<br>Extension [0..*] | | | Allowed but not defined Note 3 |
| modifierExtension<br>Extension [0..*] | | | Allowed but not defined Note 3 |
| masterIdentifier<br>Identifier [0..1] | [1..1] | uniqueId | |
| identifier<br>Identifier [0..*] | | entryUUID | |
| status<br>code {DocumentReferenceStatus}<br>[1..1] | | availabilityStatus | approved → status=current<br>Other status values are allowed but are not defined in this mapping to XDS. |


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| FHIR DocumentManifest Resource Definition | IHE constraint | Document Sharing metadata | Notes |
|---|---|---|---|
| type<br>CodeableConcept [0..1] | | contentTypeCode | |
| subject<br>Reference(Patient\| Practitioner\| Group\| Device) [0..1] | Reference(Patient) | patientId, | Not a contained resource. URL Points to an existing Patient Resource representing Affinity Domain Patient. |
| created<br>dateTime [0..1] | [1..1] | submissionTime | |
| author<br>Reference(Practitioner\| PractitionerRole\| Organization\| Device\| Patient\| RelatedPerson) [0..*] | Note 1 | authorInstitution, authorPerson, authorRole, authorSpeciality, authorTelecommunication | |
| recipient<br>Reference(Patient\| Practitioner\| PractitionerRole\| RelatedPerson\| Organization) [0..*] | | intendedRecipient | |
| source<br>uri [0..1] | [1..1] | sourceId | |
| description<br>string [0..1] | | title | |
| content<br>Reference(Any) [1..*] | Reference( DocumentReference\| List) | | References to DocumentReference Resources representing DocumentEntry objects in the SubmissionSet or List Resources representing Folder objects in the SubmissionSet. |
| related [0..*] | | | Allowed but not defined Note 3 |
| related.identifier<br>Identifier [0..1] | | | Allowed but not defined Note 3 |
| related.ref<br>Reference(Any) [0..1] | | | Allowed but not defined Note 3 |
| | | homeCommunityId | Not Applicable Note 2 |

Note 1: Indicates that the data shall be represented as a contained resource, unless the UnContained Reference Option is used. See Section 4.5.4.4.7, and ITI TF-1: 33.2.3.

Note 2: Not Applicable - The Document Sharing metadata element has no equivalent element in the HL7 FHIR; therefore, a Document Source is not able to set these elements, and Document Consumers will not have access to these elements.

Note 3: These HL7 FHIR elements are not used in XDS; therefore, they would not be present. Document Consumers should be robust to these elements holding values.

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#### 4.5.1.2.1 DocumentManifest StructureDefinition

The conformance requirements are different between Comprehensive and Minimal metadata and are identified by the following canonical URI values:

- Comprehensive Metadata
  `http://ihe.net/fhir/StructureDefinition/IHE_MHD_Comprehensive_DocumentManifest`
- Minimal Metadata:
  `http://ihe.net/fhir/StructureDefinition/IHE_MHD_Minimal_DocumentManifest`

Resources are not required to carry the `meta.profile` element and may only carry the `profile` element defined for the Provide Document Bundle [ITI-65] transaction, as the Receiver is not required to add the `profile` tags. The value of the `meta.profile` is a soft indicator of conformance expectation. Receivers may choose to validate actual conformance and fail transactions due to non-conformance.

### 4.5.1.3 Folder Metadata Attributes

Table 4.5.1.3-1 provides a mapping of the metadata attributes associated with a Document Sharing Folder object to a FHIR List Resource. The full Folder metadata attribute definition is in Section 4.2.3.4.

Note that FHIR List Resource in the FHIR specification does not include a Mapping to XDS.

**Table 4.5.1.3-1: FHIR List mapping to Folder metadata**

| FHIR List Resource Definition | IHE constraint | Document Sharing Metadata | Notes |
|---|---|---|---|
| id<br>id [0..1] | | | Logical id of this artifact |
| meta.Meta<br>[0..1] | | | |
| meta.versionId<br>id [0..1] | | | Allowed but not defined Note 3 |
| meta.lastUpdated<br>instant [0..1] | | | Allowed but not defined Note 3 |
| meta.source<br>uri [0..1] | | | Allowed but not defined Note 3 |
| meta.profile<br>canonical [0..*] | | limitedMetadata | See Section 4.5.1.3.1 |
| meta.security<br>Coding [0..*] | | | Allowed but not defined Note 3 |
| meta.tag<br>Coding [0..*] | | | Allowed but not defined Note 3 |

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| FHIR List<br>Resource Definition | IHE constraint | Document Sharing Metadata | Notes |
|---|---|---|---|
| implicitRules<br>uri [0..1] | | | Allowed but not defined Note 3 |
| language<br>code [0..1] | | | Allowed but not defined Note 3 |
| text<br>Narrative [0..1] | | | Allowed but not defined Note 3 |
| contained<br>Resource [0..*] | | | Allowed but not defined Note 3 |
| extension<br>Extension [0..*] | | | Allowed but not defined Note 3 |
| modifierExtension<br>Extension [0..*] | | | Allowed but not defined Note 3 |
| identifier<br>Identifier [0..*] | [2..2] | uniqueId, entryUUID | When the List.identifier carries the entryUUID, then the List.identifier.use shall be 'official'.<br>When the List.identifier carries the uniqueId, then the List.identifier.use shall be 'usual'. |
| status<br>code [1..1] | | availabilityStatus | approved → status=current<br><br>Other status values are allowed but are not defined in this mapping to XDS. |
| mode<br>code [1..1] | shall be 'working' | | |
| title<br>string [0..1] | | title | |
| code<br>CodeableConcept [0..1] | | codeList | code.coding is [0..*] so may contain many. |
| subject<br>Reference(Patient\| Group\| Device\| Location) [0..1] | Reference(Patient) | patientId, | URL Points to an existing Patient Resource representing Affinity Domain Patient |
| encounter<br>Reference(Encounter) [0..1] | | | Allowed but not defined Note 3 |
| date<br>dateTime [0..1] | | lastUpdateTime | |
| source<br>Reference(Practitioner\| PractitionerRole\| Patient\| Device) [0..1] | | | Allowed but not defined Note 3 |
| orderedBy<br>CodeableConcept [0..1] | | | Allowed but not defined Note 3 |

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| FHIR List<br>Resource Definition | IHE constraint | Document Sharing Metadata | Notes |
|---|---|---|---|
| note<br>Annotation [0..*] | | comments | |
| entry<br>[0..*] | | | References to DocumentReference Resources found in the Folder |
| entry.flag<br>CodeableConcept [0..1] | | | Allowed but not defined Note 3 |
| entry.deleted<br>Boolean [0..1] | | | Allowed but not defined Note 3 |
| entry.date<br>dateTime [0..1] | | | Allowed but not defined Note 3 |
| entry.item<br>Reference(Any) [1..1] | Reference( DocumentReference) | | |
| emptyReason<br>CodeableConcept [0..1] | | | Allowed but not defined Note 3 |
| | | homeCommunityId | Not Applicable Note 2 |

Note 1: Indicates that the data shall be represented as a contained resource, unless the UnContained Reference Option is used. See Section 4.5.4.4.7, and ITI TF-1: 33.2.3.

Note 2: Not Applicable - The Document Sharing metadata element has no equivalent element in the HL7 FHIR; therefore, a Document Source is not able to set these elements, and Document Consumers will not have access to these elements.

Note 3: These HL7 FHIR elements are not used in XDS; therefore, they would not be present. Document Consumers should be robust to these elements holding values.

#### 4.5.1.3.1 Folder StructureDefinition

The conformance requirements are different between Comprehensive and Minimal metadata and are identified by the following canonical URI values:

- Comprehensive Metadata:
  `http://ihe.net/fhir/StructureDefinition/IHE_MHD_Comprehensive_List`
- Minimal Metadata:
  `http://ihe.net/fhir/StructureDefinition/IHE_MHD_Minimal_List`

Resources are not required to carry the `meta.profile` element and may only carry the `profile` element defined for the Provide Document Bundle [ITI-65] transaction, as the Receiver is not required to add the `profile` tags. The value of the `meta.profile` is a soft indicator of conformance expectation. Receivers may choose to validate actual conformance and fail transactions due to non-conformance.

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