IHE IT Infrastructure Technical Framework Supplement Trial Implementation and Interoperability Testing Rev. 1.0 – 2012-08-31
Trial Implementation Supplement
For Trial Implementation and Interoperability Testing
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1.54 Document Subscription for Mobile (DSUBm)

1.54.1 DSUBm Actors, Transactions, and Content Modules

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1.54.2 Actors, Transactions, and Content Modules

This section defines the actors and transactions in this transactions profile.

Figure 1.54.1-1: DSUBm Actor Diagram

Table 1.54.1-1 lists the transactions for each actor directly involved in the DSUBm Profile. To claim compliance with this profile, an actor shall support all required transactions (labeled "R") and may support the optional transactions (labeled "O").

Table 1.54.1-1: DSUBm Profile - Actors and Transactions

Actors	Transactions	Initiator or Responder	Optionality
Resource Notification Broker	Resource Subscription [ITI-110]	Responder	R
	Resource Publish [ITI-111]	Responder	R
	Resource Notify [ITI-112]	Initiator	R
	Resource Search [ITI-113]	Responder	R
	Resource SubscriptionTopic Search [ITI-114]	Responder	R
Resource Notification Subscriber	Resource Subscription [ITI-110]	Initiator	R
	Resource Search [ITI-113]	Initiator	R
	Resource SubscriptionTopic Search [ITI-114]	Initiator	R
Resource Notification Publisher	Resource Publish [ITI-111]	Initiator	R
Resource Notification Recipient	Resource Notify [ITI-112]	Responder	R

1.54.3.1 Actors

The actors in this profile are described in more details in the following sections.

1.54.3.1.1 Resource Notification Broker

The Resource Notification Broker is the manager of the Resource Notification transaction containing a subscription request or a subscription cancellation. It keeps track of all subscriptions it receives, including the time limits of subscriptions. Based on the subscription criteria, the actor sends notifications to interested subscribers who exists since. This actor also provides a Resource Search transaction, representing the physical system which the existing subscriptions are stored/kept. It support the search and retrieve of Subscription and SubscriptionTopic resource.

The following Capabilities/Statements define the actor capabilities given the service Options:

- FHIR Capability Statement for Resource Notification Broker
- FHIR Capability Statement for Resource Notification Broker that support the updates to document sharing resources option.

1.54.3.1.2 Resource Notification Subscriber

The Resource Notification Subscriber creates and terminates subscriptions on behalf of a Resource Notification Recipient. It can perform a Resource Subscription Search transaction to the Resource Notification Broker for running subscription search. It also can perform a Resource SubscriptionTopic Search transaction to the Resource Notification Broker for running topic search.

The following Capabilities/Statements define the actor capabilities given the service Options:

- FHIR Capability Statement for Resource Notification Subscriber
- FHIR Capability Statement for Resource Notification Subscriber that support the updates to document sharing resources option.

1.54.3.1.3 Resource Notification Publisher

The Resource Notification Publisher sends a Resource Publish message to the Resource Notification Broker when an event occurs for which a subscription may exist. Note that this profile does not specify how the Resource Notification Publisher becomes aware of those events.

The following Capabilities/Statements define the actor capabilities given the service Options:

- FHIR Capability Statement for Resource Notification Publisher
- FHIR Capability Statement for Resource Notification Publisher that support the updates to document sharing resources option.

1.54.3.1.4 Resource Notification Recipient

The Resource Notification Recipient receives the notification about an event when the subscription filters specified for this Document Resource Notification Recipient are satisfied.

FHIR Capability Statement for Resource Notification Recipient.

1.54.3.2 Transaction Descriptions

Transactions in this profile are summarized in the actors table.

1.54.3.2.1 Resource Subscription [ITI-110]

The transaction is used for subscribe for Documents, by using a particular set of filters, or for unsubscribe, using SubscriptionStatus resources.

For more details see the detailed ITI-110 transaction description

1.54.3.2.2 Resource Publish [ITI-111]

The transaction delivers information from the Resource Notification Publisher to the Resource Notification Broker about an event that may have a subscription.

For more details see the detailed ITI-111 transaction description

1.54.3.2.3 Resource Notify [ITI-112]

The transaction is used for sending notifications to a Resource Notification Recipient related to a subscription.

For more details see the detailed ITI-112 transaction description

1.54.3.2.4 Resource Subscription Search [ITI-113]

The transaction is used for searching existing SubscriptionStatus Resources.

For more details see the detailed ITI-113 transaction description

1.54.3.2.5 Resource SubscriptionTopic Search [ITI-114]

The transaction is used for searching existing SubscriptionTopic Resources.

For more details see the detailed ITI-114 transaction description

1.54.4 Actor Options

Options that can be selected for each actor in this implementation guide, are listed in Table 1.54.3-1 below. Dependencies between options when applicable are specified in notes.

Table 1.54.3-1: Actor Options

Actors	Option Name
Resource Notification Broker	Update to document sharing resources
Resource Notification Subscriber	Update to document sharing resources
Resource Notification Publisher	Update to document sharing resources
Resource Notification Recipient	none

1.54.4.1 Update to document sharing resources option

The Resource Notification Broker supports this option shall support the SubscriptionStatus resources and included in the subscriptions. In an XDS environment, this option includes the updating and deleting events described in Update Document Sharing Metadata [ITI-57], Remove Metadata [ITI-62], and Delete Update Document Set [ITI-63] transaction operations to Documents/Folds, Folder, and Association Objects.

The Resource Notification Broker that supports this option shall support the SubscriptionStatus defined in section Subscription with Updates to document sharing resources option.

The Resource Notification Subscriber that supports this option shall support the SubscriptionStatus defined in section Subscription with Updates to document sharing resources option.

The Resource Notification Publisher that supports this option shall support the SubscriptionStatus defined in section Subscription with Updates to document sharing resources option.

1.54.4.2 Required Actor Groupings

This profile does not mandate grouping with other actors.

1.54.4.DUBm Overview

This section states how the transactions and content modules of the profile are combined to address the use cases.

1.54.4.1 Concepts

The DSUBm profile extends the mobile subscriptions for documents. The subscription mechanism is very flexible and can be adapted to many use cases depending on the type of information and and the environment in which DSUBm is implemented.

In the following use cases different subscription types are presented such as: patient dependent subscription, multi-patient subscription, Pulse subscription, and other topics. The DSUBm profile can be used in a variety of environments such as MHDS Environment, XDS Environment, PHR Environment, or in an environment in which the main infrastructure is XCA [ITI]. These use cases present also the possibility in which DSUB and DSUBm coexist and both are available to the users.

1.54.4.2 Use Cases

1.54.4.2.1 Use Case ITI Document Subscription for mobile applications in MHDS Environment

The availability of a document is notified to hospital system, where the clean sharing infrastructure is based on MHDS.

1.54.4.2.1 Document Subscription for mobile application in MHDS Environment Use Case Description

Mr. Smith, a cardiac patient, is hospitalized in the cardiology ward at the Goodwill General Hospital. Dr. Kovac, who is the only doctor working in this ward at that moment, prescribes some blood tests to decide which medicine is suitable for the patient. The medicine will be administered by Nurse Anne Joy after the blood results are available.

In order to be notified when the laboratory report is ready, the software of Dr. Kovac submits a subscription for all the laboratory reports that will be produced for Mr. Smith during the next two weeks. The subscription is stored in the Central Infrastructure. A waiting room is used to be notified when the laboratory report is available. Dr. Kovac also asks Central Infrastructure to give to her patients a her cardiology ward.

When the laboratory has produced the report for Mr. Smith, Dr. Kovac is promptly notified and, once downloaded and examined the report, he can make an alternation for the medicine to be administered to Mr. Smith. The new medicine is then prescribed. Nurse Anne has been called in advance by Dr. Kovac to be notified when the new prescription is available. Nurse Anne can prepare the medicine for the patient.

At the end of Mr. Smith's hospitalization, the software of Dr. Kovac automatically unsubscribes for the laboratory documents.

1.54.4.2.2 Document Subscription for mobile application in MHDS Environment Use Case

1.54.4.2.3 Document Subscription for mobile application in MHDS Environment using Pulse Subscription Use Case Description

Dr. Kovac is taking care of Mr. Williams, a chronic diabetic patient. In order to monitor the blood sugar level and decide when to perform a visit every month for the next 5 years. During the first visit, Dr. Kovac uses the mobile DSM application to subscribe to the National Electronic Healthcare Record [EHR] in order to be notified of any updates regarding the blood sugar level of Mr. Williams. The subscription is stored in the Central Infrastructure. The Electronic Healthcare Record [EHR] is a system that stores all the medical information of the emergency department where some blood tests are performed and the results are stored in the Central Infrastructure. Dr. Kovac also asks the Central Infrastructure to give to her patients a her cardiology ward. Mr. Williams is admitted again into the emergency room. Other blood tests are performed and the medical record is updated in the EHR. A new notification is sent to Dr. Kovac's mobile device to inform about the new blood sugar level. Dr. Kovac can now decide if a new visit is needed. Mr. Williams is discharged from the emergency department and the medical record is updated in the EHR. A new notification is sent to Dr. Kovac's mobile device to inform about the discharge of Mr. Williams. The subscription is deleted.

1.54.4.2.4 Document Subscription for mobile application in MHDS Environment using Pulse Subscription Process Flow

1.54.4.2.5 Document Subscription for mobile application in MHDS Environment using Filter Subscription Process Flow

Figure 1.54.4.2.5-1: Document Subscription for Mobile Device in IOS on PHR Environment in DSUBm

Pre-conditions

The assumption is that systems share the information in an MHDS Environment. The national EHR at a patient has been maintained thanks to the implementation of an MHDS Environment. The patient has a Mobile Device with the Mobile Health Document Consumer (MHD Document Consumer) and the Document Subscription Mobile Device Notification Recipient (DSUBm Resource Notification Recipient). The Resource Notification Subscriber has implemented the Resource Subscription Search [ITI-113] transaction.

Main Flow:

1. During the first visit a document subscription is needed. The mobile DSM application search on the Resource Notification Broker for the supported SubscriptionTopic resource. The Resource Notification Broker answers back.
2. At the end of the first visit, the mobile DSM application performs a Filter Subscription to the EHR, and therapy A is prescribed to Mr. Williams. [ITI-110] Resource Subscription.
3. When blood sugar levels during an emergency visit take place, a blood test analysis is performed in Mr. Williams and the medical record is produced in the national EHR. [ITI-65] Provide Document Bundle.
4. A notification is sent to the EHR since the publication of the medical record generated an updated version of the folder in the EHR. [ITI-112] Resource Notify.
5. When the EHR receives the notification, the mobile application asks for a retrieve to update the document. [ITI-68] Retrieve Document Set.
6. After the EHR is updated, a notification is sent to the mobile DSM application. The mobile DSM application asks for a retrieve to update the document. [ITI-68] Retrieve Document Set.
7. Therapy B is prescribed during the second visit. Dr. Kovac can for updated clinical data to adjust the therapy from A to B.
8. After some days during an emergency room visit another blood analysis are performed in Mr. Williams and the medical record is produced on the national EHR. [ITI-65] Provide Document Bundle.
9. A notification is sent to the EHR since the publication of the medical record generated an updated version of the folder in the EHR. [ITI-112] Resource Notify.
10. When the EHR receives the notification, the mobile application asks for a retrieve to update the document. [ITI-68] Retrieve Document Set.
11. After the EHR is updated, a notification is sent to the mobile DSM application. The mobile DSM application asks for a retrieve to update the document. [ITI-68] Retrieve Document Set.
12. Third visit. Dr. Kovac can for updated clinical data to adjust the therapy from B to A.
13. The mobile DSM application performs the Resource Subscription Search [ITI-113] transaction to the global mobile device.
14. The mobile DSM application performs the Resource Subscription [ITI-110] transaction to the global mobile device.
15. The mobile DSM application performs the Resource Subscription [ITI-110] transaction to the global mobile device.
16. The mobile DSM application performs the Resource Subscription [ITI-110] transaction to the global mobile device.

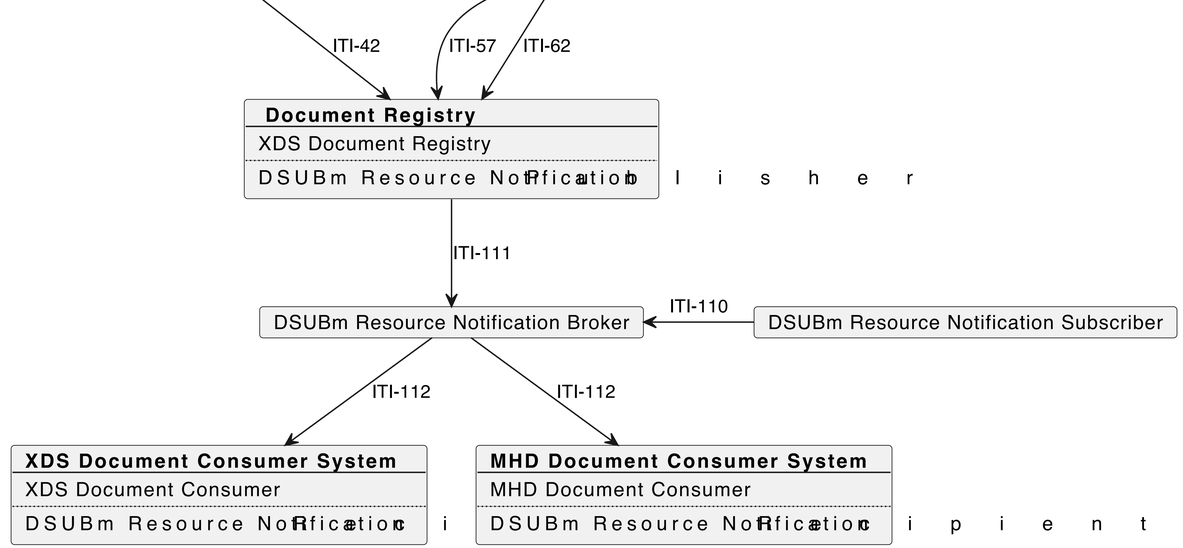

Figure 1:54.6.2-1: DSUBm actors grouped with XDS actors and MHD actors

Note that in this scenario, implementers should be aware about what events on DocumentEntry, Folder, Association, and SubmissionSet Objects could determine events on DocumentReference, Folder type List, and SubmissionSet type List resources and the supporting of Updating events option.

1:54.6.3 DSUBm as an interface for DSUB

Document Metadata Subscriber and the Document Metadata Notification Recipient will most likely be grouped with a Resource Notification Broker creating the mobile DSUB interface that translates Resource Subscription [ITI-110] into Document Metadata Subscribe [ITI-52] and Document Metadata Notify [ITI-53] into Resource Notify [ITI-112]. The existing DSUB Document Metadata Notification Broker is unaware of the presence of the functionality introduced by the DSUBm profile and therefore can maintain its already implemented logic.

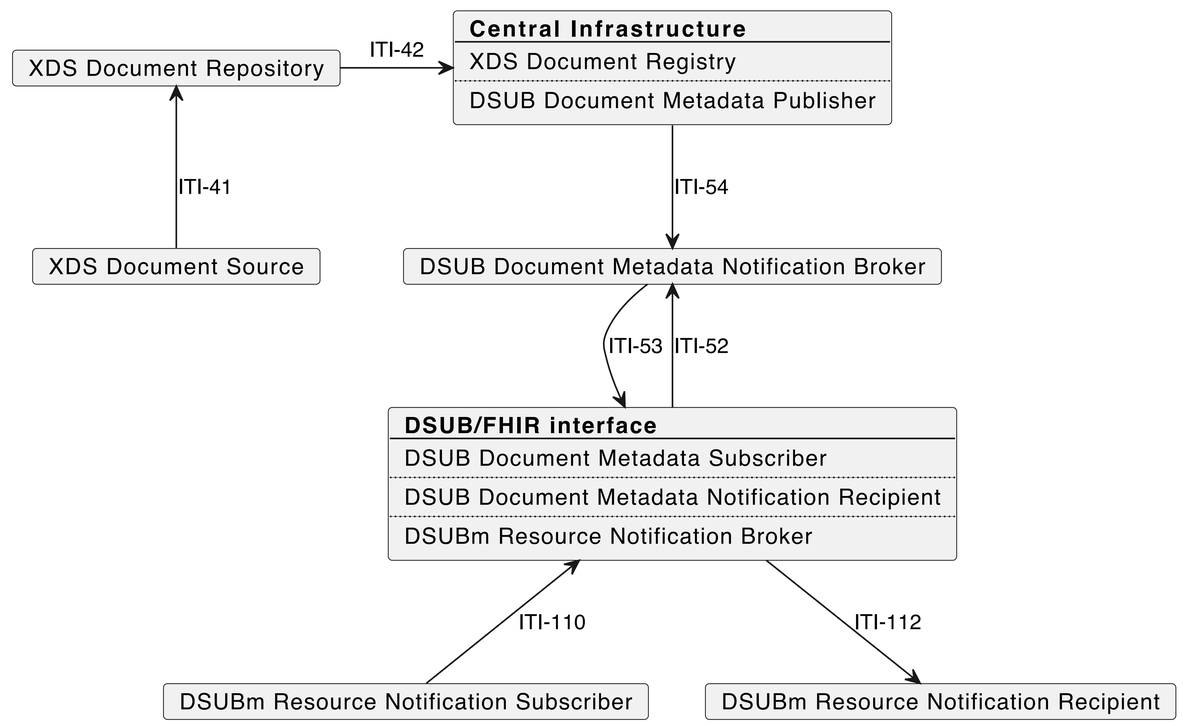

Figure 1:54.6.3-1: DSUBm actors grouped with DSUB: DSUBm as an interface for DSUB

Note that in this scenario, implementers should be aware about the usage of `status` parameter in the Subscriptions and about implementation of DSUB supplement Folder Subscription Option and Patient-Independent Subscription Option.

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