EMR Certification

eHealth_hub - Laboratory Result Distribution Interface Specification

March 31, 2020

Version 1.4

Shared health
Soins communs
Manitoba

Table of Contents

1 Introduction 4
1.1 Glossary 4
1.2 Business Objectives & Benefits Summary 5
1.3 Related Documents 5
2 Lab Result Distribution Interface Overview 5
2.1 Scope 5
2.2 HL7 Electronic Results Scope 6
3 High-level Architecture 6
3.1 Lab Result Distribution Interface Use Cases 8
4 Requirements 15
4.1 Requirement Column Definition 15
4.2 Lab Result Distribution Interface Requirements 16
4.3 Authentication Requirements 19
4.4 Processing Requirements 19
4.5 Display Requirements 21
4.6 Optional Display Requirements 28
5 Appendix A: Web Service 29
5.1 WSDL 29
5.2 SOAP Request/Response Examples 29
5.3 Request / Response Parameters 30
5.4 Error Scenarios 32
6 Appendix B: LabResultService.wsdl 37
7 Appendix C: LabResultService.xsd 39
8 Appendix D: Release Notes 40

List of Tables

Table 1: Terms and Acronyms 4
Table 2: Related Documents 5
Table 3: Test Categories 6
Table 4: Use Case – BC-RD-001 9
Table 5: Use Case – SC-RD-001 10
Table 6: Use Case – SC-RD-002 10
Table 7: Use Case – SC-RD-003 12
Table 8: Use Case – SC-RD-004 14
Table 9: Lab Result Distribution Interface Requirements 16
Table 10: Processing Requirements 19
Table 11: Display Requirements 21
Table 12: Optional Requirements 28
Table 13: GetLabResults Web Method 30
Table 14: AcknowledgeLabResults Web Method 31
Table 15: SOAP Fault Response 32
Table 16: Error Codes 36

List of Figures

Figure 1: Lab Result Distribution Interface Overview 7
Figure 2: Lab Result Distribution Interface Sequence Diagram 7
Figure 3: Business Level Use Cases 8
Figure 4: System Level Use Cases 9

1 Introduction

The purpose of this document is to provide an overview of the eHealth_hub - Laboratory Result Distribution Interface (hereafter referred to as the "Lab Result Distribution Interface"). The document will describe the high-level architecture of the data submission model, as well as the technical details and requirements regarding the web service and web service security.

1.1 Glossary

The following defines key business terms and acronyms used throughout this document.

Table 1: Terms and Acronyms

TERM OR ACRONYM	DEFINITION
eHealth_hub	A Shared Health business service that coordinates electronic delivery of information between systems to authorized health-care providers who are using a Manitoba Certified EMR.
EMR ID	A unique identifier assigned to each EMR instance by Shared Health.
Health Information Access Layer, or "HIAL"	Shared Health's core integration service which provides the environment and capabilities necessary to establish interoperability between systems. For example, HIAL is a Shared Health Service that enables Business Services such as eHealth_hub.
Manitoba Certified EMR Product (EMR)	An Electronic Medical Record product that has achieved Certification in Manitoba, and is referred to throughout this document as "EMR".
Shared EMR	An EMR instance that is used by more than one clinic. For example, in a regional shared instance, many clinics, including primary care clinics, may 'share' information. The user configurations can vary, but commonly client information is shared (accessed and/or updated) by users across the entire instance.
Simple Object Access Protocol (SOAP)	SOAP is a messaging protocol that allows programs that run on disparate operating systems (such as Windows and Linux) to communicate using Hypertext Transfer Protocol (HTTP) and its Extensible Markup Language (XML).

1.2 Business Objectives & Benefits Summary

The objective of the Lab Result Distribution Interface is to provide Manitoba Certified EMR Products (EMR) users with a secure way to receive electronic laboratory (lab) results for their patients directly into their EMR; improving the quality and timeliness of patient care.

1.3 Related Documents

This document references the following companion documents:

Table 2: Related Documents

DOCUMENT
Manitoba EMR Certification - Baseline EMR Requirements Specification
eHealth_hub - Laboratory Result Distribution Interface Message Specification
eHealth_hub - Laboratory Result Distribution Interface Assessment Guide
eHealth_hub – Authentication Specification
eHealth_hub - Laboratory Result Distribution Interface Assessment Addendum

Upon application for EMR Certification to this specification, Vendors can email EMR@sharedhealthmb.ca or contact their EMR Product Lead to request the additional assessment addendum containing additional configuration and connectivity details necessary for assessment.

2 Lab Result Distribution Interface Overview

2.1 Scope

The scope of the Lab Result Distribution Interface enables Certified EMR Products to receive lab result messages from the lab sources.

There will be no terminology translation within this version of the lab result delivery service from what the lab source provides to a canonical standard (i.e. LOINC, PCLOD, etc.). The lab source maintains responsibility for sending accurate code values and must clearly define what code value source is used, wherein the local code values will be specific for the sending lab system.

2.2 HL7 Electronic Results Scope

2.2.1 Message Type

The following table specifies the categories of test results which are disseminated by eHealth_hub. Categories that are not specified in the table will not be available for electronic delivery via eHealth_hub. However, it is anticipated that additional labs will be added over time.

Table 3: Test Categories

TEST CATEGORIES	GENERAL CATEGORIES	NOTES
Chemistry / Biochemistry	General Lab (LAB)	
Hematology	General Lab (LAB)	
Immunology	General Lab (LAB)	
Microbiology	Microbiology (MIC)	
Blood Gases	General Lab (LAB)	
Selected “Non-Clinical” Results	General Lab (LAB)	These results do not contain clinical information rather, the information pertains to a reference lab specimen sent to, etc.

3 High-level Architecture

At a high-level, the architecture of the Lab Result Distribution Interface will allow for registered labs to submit results for distribution. Once received by the service layer, the messages will be converted to a canonical format (as described within the accompanying Message Specification document) and rules for routing will facilitate the depositing of the messages into one or more queues or “mailboxes” which represent an EMR instance. Note that a provider may be associated with one or more EMR instances.

When an EMR wishes to poll its mailbox for results, the EMR will issue a query via web service to obtain messages from the mailbox. After the EMR successfully receives the messages from the mailbox and the EMR has processed these messages, the EMR will then send an acknowledgement message to the mailbox to ensure that the mailbox will purge those “received” messages. The EMR is then responsible for polling the lab result service on a periodic basis to ensure that lab results are retrieved out of the mailbox. All results will be delivered to the requesting EMR on a first-in – first-out basis.

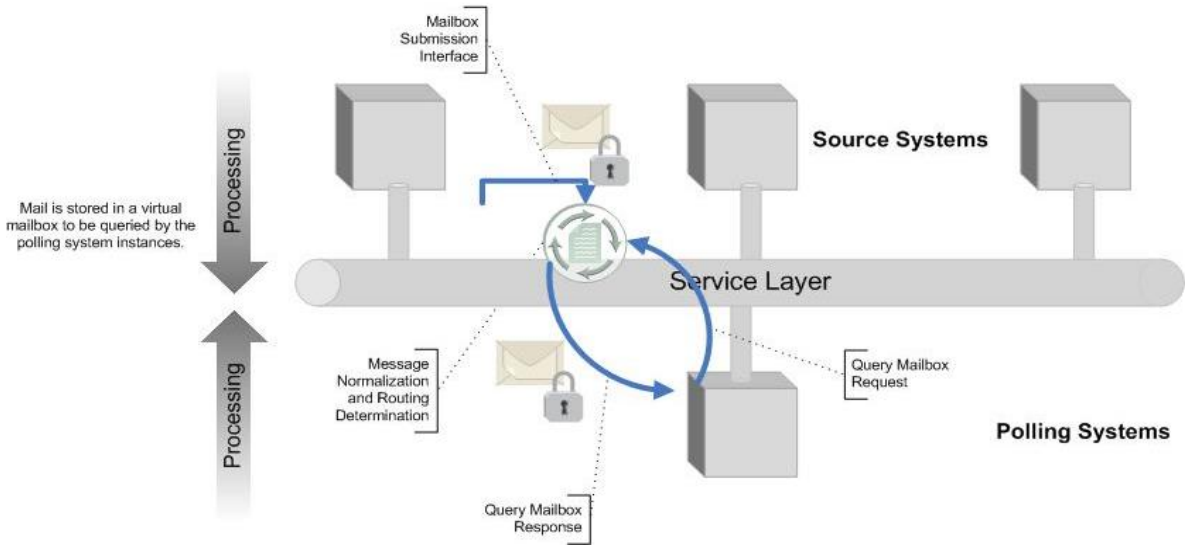

FIGURE 1: LAB RESULT DISTRIBUTION INTERFACE OVERVIEW

The following sequence diagram describes the synchronous request / response mechanism to query and retrieve lab results from the respective EMR mailbox and the subsequent acknowledgement mechanism to ensure that the EMR can establish a business-centric logical unit of work.

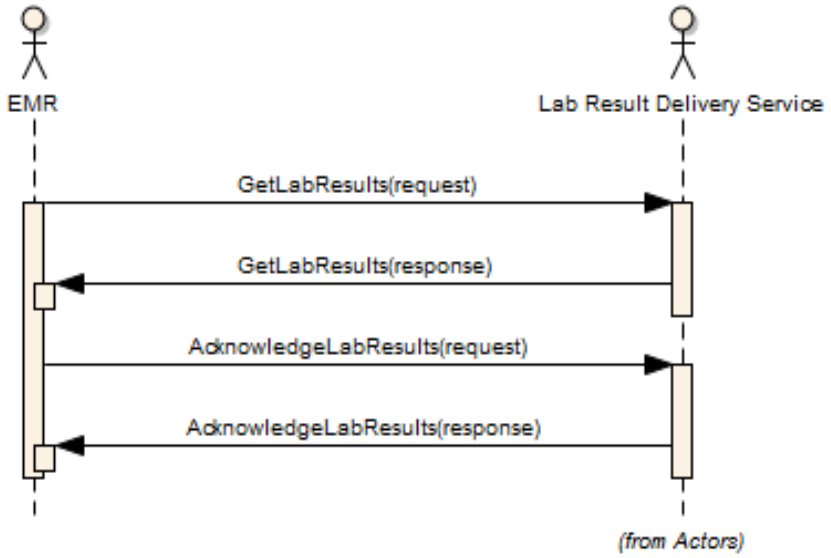

FIGURE 2: LAB RESULT DISTRIBUTION INTERFACE SEQUENCE DIAGRAM

The EMR will retrieve lab results by interfacing with a SOAP 1.1 LabResultService Web Service and utilize the following web methods: GetLabResults (request/response) and AcknowledgeLabResults (request/response). The EMR product shall be configured to retrieve and acknowledge results based on a regular interval (e.g. every 30 minutes). To ensure the security and privacy of lab result data, both interfaces will require the use of a mutual certificate authentication.

Each instance of an EMR will require a unique certificate, issued by Shared Health, which will identify the authenticity of the EMR product when attempting to exchange data with the lab result delivery service. Note that certificates, while typically issued for each EMR instance, may also be issued on a per logical instance (or per clinic basis). At this time, there is no requirement for a certificate-to-clinic association but, the solution should accommodate both associations (EMR instance or individual clinic).

3.1 Lab Result Distribution Interface Use Cases

This section provides an overview on the use cases for communicating with the lab results distribution service. The use cases include:

1. BC-RD-001 : Overall eHealth_hub use case
2. SC-RD-001 : Authenticate
3. SC-RD-002 : Request Results
4. SC-RD-003 : Acknowledge Results
5. SC-RD-004 : Verify Call

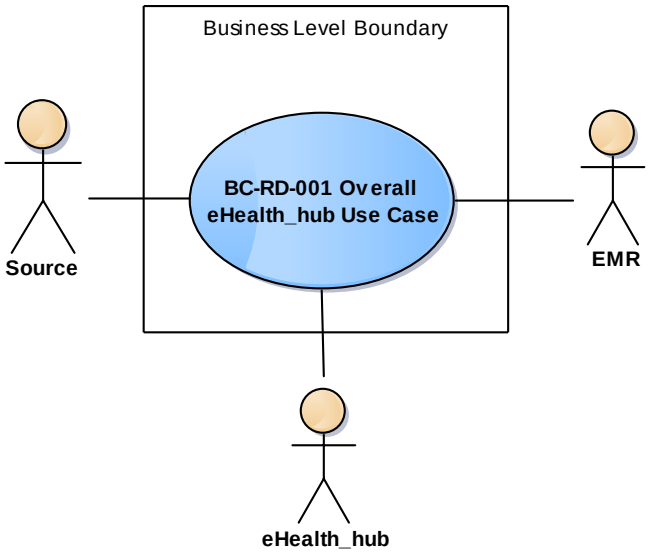

FIGURE 3: BUSINESS LEVEL USE CASES

Table 4: Use Case – BC-RD-001

Use Case ID:	**BC-RD-001**
Use Case Name:	**Overall eHealth_hub Use Case**
Actors:	EMR eHealth_hub Source
Description:	High level description of the end-to-end eHealth_hub.
Trigger:	EMR submits order to Source.
Preconditions:	1. EMR is registered for the results delivery solution. 2. Results for requested orders can be delivered through eHealth_hub.
Post conditions:	1. EMR has received results. 2. Results are matched to provider and patient. 3. Provider has reviewed results.
Normal Flow:	1. Source generates results and submits them electronically to the eHealth_hub. 2. eHealth_hub routes the results to the proper mailbox based on information in the results (i.e. ordering location, ordering provider, copied location, copied provider). 3. EMR periodically checks its corresponding mailbox and retrieves any results from it. 4. EMR attaches the results to the proper patient's chart and assigns to a provider. 5. The provider is notified that new results are available. 6. The provider reviews the new results.

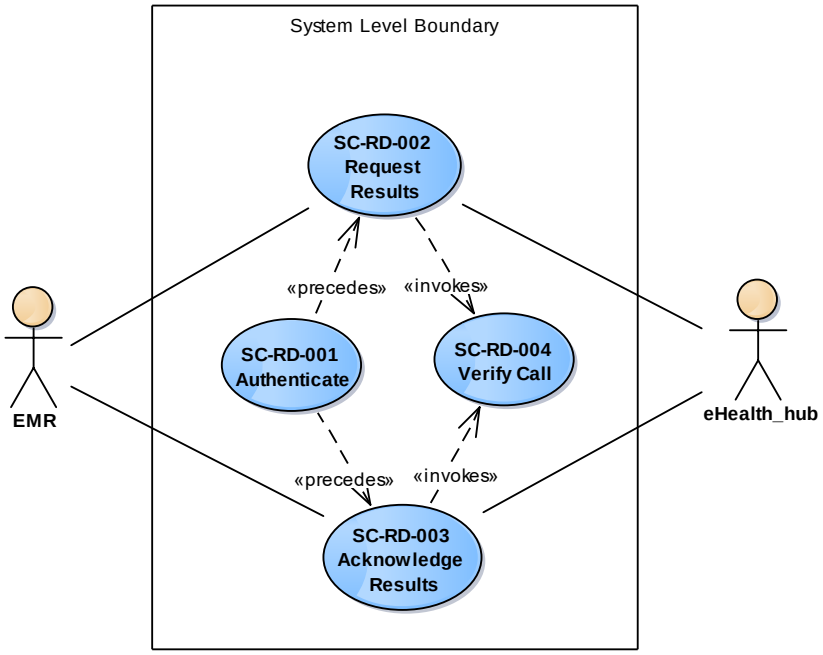

FIGURE 4: SYSTEM LEVEL USE CASES

Table 5: Use Case – SC-RD-001

Use Case ID:	**SC-RD-001**
Use Case Name:	**Authenticate**
Actors:	eHealth_hub EMR
Description:	eHealth_hub authenticates EMR to request/receive lab results (via *GetLabResults, AcknowledgeLabResults*).
Trigger:	EMR attempts to establish TLS/SSL connection with eHealth_hub.
Preconditions:	1. EMR has gone through Shared Health registration process to receive results. 2. EMR has valid security certificate.
Post conditions:	Normal Flow 1. Successful authentication, established TLS/SSL connection. 2. eHealth_hub ready to receive requests from EMR. Alternate A 1. EMR authentication fails (HTTP 500 server error).
Normal Flow:	1. EMR attempts to establish secured mutual authentication with eHealth_hub using valid security certificate.
Alternate Flow:	1. EMR attempts to establish secured mutual authentication with eHealth_hub using invalid security certificate.
Frequency of Use:	High
Assumptions:	
Notes and Issues:	EMR needs to notify an EMR administrator/appropriate user of failed authentication. The certificate that Shared Health issues to the EMR will expire after two years.

Table 6: Use Case – SC-RD-002

Use Case ID:	**SC-RD-002**
Use Case Name:	**Request Results**
Actors:	eHealth_hub EMR
Description:	eHealth_hub responds to EMR's request for lab results.
Trigger:	EMR sends request to eHealth_hub for lab results (*GetLabResults*).
Preconditions:	1. EMR has gone through Shared Health registration and enrollment process to receive requested lab results.
Post conditions:	Normal Flow 1. EMR receives response containing 0 to 25 results. Alternate A 1. EMR receives response containing error message. Alternate B 1. EMR did not acknowledge previous request for lab results. Alternate C: 1. EMR failed processing of messages received in previous request. Requests results again.

Normal Flow:	1. Invoke *SD-RD-001 Authenticate*. 2. EMR creates request, encrypts it, and signs it with certificate. 3. EMR sends request. 4. eHealth_hub receives request. 5. Invoke *SD-RC0-004 Verify Call*. 6. eHealth_hub reads the requested number of messages from the mailbox, or the number of messages in the mailbox(whichever is less). 7. eHealth_hub creates response with same transaction ID that was sent from the EMR, encrypts it, and signs it. 8. eHealth_hub sends response. 9. EMR receives response. 10. EMR verifies signature, decrypts response, decodes and processes HL7 message.
Alternative Flows:	A – Error in the request, either: - message not signed - message not encrypted - invalid clinic ID - invalid EMR ID - invalid number of messages - EMR not authorized to receive requested results 1. Invoke *SD-RD-001 Authenticate*. 2. EMR creates request, encrypts it, and signs it with certificate. 3. EMR sends request. 4. eHealth_hub receives request. 5. Invoke *SD-RD-004 Verify Call*. 6. eHealth_hub creates response with error code and message. 7. eHealth_hub sends response. 8. EMR receives response. 9. EMR notifies an EMR administrator/appropriate user of error. B – EMR has not acknowledged previous request for lab results. 1. Invoke *SD-RD-001 Authenticate*. 2. EMR creates request, encrypts it, and signs it with certificate. 3. EMR sends request. 4. eHealth_hub receives request. 5. Invoke *SD-RD-004 Verify Call*. 6. eHealth_hub re-reads previous set of lab results from the mailbox, up to the number of messages being requested. 7. eHealth_hub creates response with transaction ID that was sent with the EMR's most recent request, encrypts it and signs it. 8. eHealth_hub sends response. 9. EMR receives response. 10. EMR does not reload the messages in EMR. 11. EMR notifies EMR administrator/appropriate user of error.

	C - EMR failed processing of messages received in previous request (*GetLabResults*). Requests results again (*GetLabResults*). 1. EMR logs and resolves error. 2. Invoke *SD-RD-001 Authenticate*. 3. EMR creates request, encrypts it, and signs it with certificate. 4. EMR sends request. 5. eHealth_hub receives request. 6. Invoke *SD-RD-004 Verify Call*. 7. eHealth_hub re-reads previous set of lab results from the mailbox, up to the number of messages being requested. 8. eHealth_hub creates response with transaction ID that was sent with the EMR's most recent request, encrypts it and signs it. 9. eHealth_hub sends response. 10. EMR receives response. 11. EMR verifies signature, decrypts response, decodes and processes HL7 messages. 12. If some of the messages received in this request were processed by EMR successfully in previous request, then EMR will discard the duplicate messages.
Frequency of Use:	High
Assumptions:	
Notes and Issues:	If the EMR receives the same results twice (i.e. because of a missed acknowledge), it will have to discard the duplicates.

Table 7: Use Case – SC-RD-003

Use Case ID:	**SC-RD-003**
Use Case Name:	**Acknowledge Results**
Actors:	eHealth_hub EMR
Description:	EMR's acknowledges the successful processing of received messages.
Trigger:	EMR sends acknowledgement to eHealth_hub (*AcknowledgeLabResults*).
Preconditions:	1. EMR has gone through Shared Health registration process to receive results they are going to be requesting. 2. EMR has received and processed results from eHealth_hub. 3. The results are available in the EMR.
Post conditions:	Normal Flow 1. Positive Acknowledge response sent to the EMR. Alternate A 1. EMR receives response containing error message.
Normal Flow:	1. Invoke *SD-RD-001 Authenticate*. 2. EMR creates acknowledgement, encrypts it, and signs it with certificate. 3. EMR sends acknowledgement. 4. eHealth_hub receives acknowledgement. 5. Invoke *SD-RD-004 Verify Call*.

	6. eHealth_hub marks the results associated with that transaction ID as sent and purges the messages from mailbox. 7. eHealth_hub creates response, encrypts it, and signs it. 8. eHealth_hub sends response. 9. EMR receives response. 10. EMR verifies signature and decrypts response.
Alternative Flows:	A – Error in the request, either: - message not signed - message not encrypted - invalid clinic ID - invalid EMR ID - invalid transaction ID - EMR not authorized to receive requested results 1. Invoke *SD-RD-001 Authenticate*. 2. EMR creates acknowledgement, encrypts it, and signs it with certificate. 3. EMR sends acknowledgement. 4. eHealth_hub receives acknowledgement. 5. Invoke *SD-RD-004 Verify Call*. 6. eHealth_hub creates response with error message. 7. eHealth_hub sends response. 8. EMR receives response. 9. EMR notifies EMR administrator/appropriate user of error.
Frequency of Use:	High
Assumptions:	
Notes and Issues:	

Table 8: Use Case – SC-RD-004

Use Case ID:	**SC-RD-004**
Use Case Name:	**Verify Call**
Actors:	eHealth_hub
Description:	eHealth_hub verifies an incoming message before processing the request.
Trigger:	eHealth_hub receives a new message (via *GetLabResults, AcknowledgeLabResults*).
Preconditions:	None
Post conditions:	Normal Flow 1. Message is successfully verified. Alternate A 1. Message is not verified.
Normal Flow:	1. eHealth_hub verifies signature and decrypts message. 2. eHealth_hub verifies the clinic ID, EMR ID and transaction ID. 3. eHealth_hub verifies the clinic/EMR is authorized for the mailbox from which it is requesting or acknowledging messages.
Alternative Flows:	A – Error in the request, either: - message not signed - message not encrypted - invalid clinic ID - invalid EMR ID - invalid transaction ID - EMR not authorized to receive requested results [After step#3 of normal flow] 4. eHealth_hub could not verify the authorization for the clinic/EMR to the mailbox from which they are requesting or acknowledging messages. 5. eHealth_hub returns appropriate error code/message.
Frequency of Use:	High
Assumptions:	
Notes and Issues:	

4 Requirements

This section includes requirements and guidelines for configuring an electronic medical record (EMR) product to integrate the eHealth_hub laboratory results distribution interface and properly display the laboratory results. **All requirements listed in sections 4.2, 4.3, 4.4 and 4.5 are mandatory.**

Please note that the display requirements (provided under section 4.5) will be applicable on one or more screen presentations under the assumption that there may be a variety of screen presentations which present results. In addition, these requirements will be applicable to printed reports as well as on-screen presentations.

4.1 Requirement Column Definition

For ease of review and understanding, requirements are documented in a manner consistent with previous EMR Certification documentation. For each requirement, the following information is provided:

- **ID** – a unique identifier assigned to the requirement by Manitoba
- **Requirement** – a concise statement describing the requirement
- **Guidelines** – these additional instructions constitute part of the requirement and are relevant to implementation of the requirement in the EMR product. As such, these guidelines form part of the assessment criteria and are included in the planned product assessment.
- **Additional Notes** – relevant information or examples intended to give additional context to the requirement and to improve understanding
- **Status** – each requirement is clearly identified as:
    - New (not included in previous specifications);
    - Updated (modification to intent of the requirement from a previous version); or
    - Previous (unchanged from last issuance of core requirements).
- **Assessment** – The method of assessment is stated in the “Assessment” column for each requirement. All requirements will be assessed using the following method:
    - Assertion – Vendors will make an assertion (Yes or No) based on their self-assessment of the product’s ability to meet the requirement. Manitoba may choose to audit Vendor assertions as part of the certification process, as authorized within the Agreement.
    - Demonstration – Vendors will demonstrate key functions within their EMR product. Demonstrations may be conducted in person, by remote means (e.g. teleconference and Internet) or through recorded video.
    - System Integration Testing – this most comprehensive assessment method requires an end-to-end test of key functions such as interoperability between the EMR product and other systems (e.g. eChart Manitoba Launch or eHealth_hub)

4.2 Lab Result Distribution Interface Requirements

Table 9: Lab Result Distribution Interface Requirements

ID	Requirement	Guidelines	Additional Notes	Status	Assessment
HL.I01	Accept messages sent in HL7 v 2.3.1 ORU^R01 format.	See the Message Specifications for the message format.		Previous	System Integration Testing
HL.I02	Interface with the *LabResultService* web service.	The web service uses Web Services Description Language (WSDL) version 1.1. See Appendix B – LabResultService.wsdl.		Previous	System Integration Testing
HL.I03	Provide capability to store Clinic and EMR identifiers as configurable parameters for every EMR instance.	*Clinic ID* - a unique identifier assigned to the clinic by Shared Health. *EMR ID* - a unique identifier assigned to each EMR instance by Shared Health. A single EMR instance can have the capability to support multiple clinics. The stored parameter values must be used when invoking the web methods in the *LabResultService* web service.		Previous	System Integration Testing
HL.I04	Retrieve messages using the *GetLabResults* web method.	Required request and response parameters are listed in: Section 5.3.1 - GetLabResults Web Method. SOAP request and response examples are listed in: Section 5.2.1- GetLabResults Web Method.		Previous	System Integration Testing
HL.I05	Send an acknowledgement using the *AcknowledgeLabResults* web method.	An acknowledgement must only be sent after the EMR has successfully retrieved the messages. Retrieval will be considered successful only if the all messages within the transaction are both: • Accepted		Previous	System Integration Testing

ID	REQUIREMENT	GUIDELINES	ADDITIONAL NOTES	STATUS	ASSESSMENT
		• Verified and persisted Use of the *AckowledgeLabResults* web method will mean that the previously retrieved messages cannot be retrieved again. If acknowledgement is not successfully received by eHealth_hub, the same set of messages will be delivered again in any subsequent *GetLabResults* requests. Required request and response parameters are listed in: Section 5.3.2 - AcknowledgeLabResults Web Method. SOAP request and response examples are listed in: Section 5.2.2 - AcknowledgeLabResults Web Method.			
HL.I06	Retrieve messages which have previously failed successful retrieval.	In the event of any failure on a set of messages retrieved through the *GetLabResults* web method, an EMR must retrieve the previously failed set of messages by invoking the *GetLabResults* web method again after resolving any applicable issues. Messages that have not been successfully acknowledged or messages that have not been delivered using the *GetLabResults* operation will be available for up to 90 days in the mailbox.		Previous	Assertion
HL.I07	Poll the mailbox at a configurable periodic interval.	The recommended periodic interval for polling the mailbox is 30 minutes.		Previous	System Integration Testing

ID	Requirement	Guidelines	Additional Notes	Status	Assessment
HL.I08	Attempt to retrieve all messages from the mailbox in a single polling periodic interval.	The maximum messages that can be returned through the *GetLabResults* web method is 25. If the EMR receives a *GetLabResult* web method response stating there are remaining messages in the mailbox, the EMR must retrieve those messages prior to the next polling periodic interval.		Previous	System Integration Testing
HL.I09	Create and provide a unique transaction ID for each logical unit of work.	EMR must supply the same transaction ID during each *GetLabResults* web method request and the follow up *AcknowledgeLabResults* web method request. Use of a different transaction ID in *AcknowledgeLabResults* web method request will result in a failure; and a same set of messages will be returned in subsequent *GetLabResults* web method request.		Previous	System Integration Testing
HL.I10	Provide an error logging and handling mechanism for the error scenarios encountered in the message retrieval process.	There are two types of errors: Business and System. Error scenarios, error codes and SOAP message examples are listed in: Section 5.4 - Error Scenarios. Error messages must be notified / reported to the EMR administrator (at either the instance or the clinic or the EMR applicant), as well as be maintained in the EMR interface log. The logging/reporting must be able to identify the date and time of attempt, error ID, error type and error message.		Previous	System Integration Testing

ID	REQUIREMENT	GUIDELINES	ADDITIONAL NOTES	STATUS	ASSESSMENT
HL.I11	Provide the capability to retrieve messages on demand as well as on an automatic schedule.	The outcome of each attempted retrieval must be notified to the EMR user as well be maintained in the interface log. The logging/notification/reporting must be able to identify the date and time of attempt, result and number of messages retrieved. In the event the retrieval was manually triggered the trigger user identity will be included in the log.		Previous	System Integration Testing
HL.I12	Allow capability to enable or disable the interface for each clinic.	The interface must be disabled by default for each implementation.		Previous	System Integration Testing

4.3 Authentication Requirements

In addition to the specified requirements in this document the EMR must satisfy all requirements in the eHealth_hub – Authentication Specification.

4.4 Processing Requirements

Table 10: Processing Requirements

ID	REQUIREMENT	GUIDELINES	ADDITIONAL NOTES	STATUS	ASSESSMENT
HL.P01	**Processing Subsequent Messages** Determine if the received message is subsequent.	A message is determined subsequent if the following criteria of the lab result match with a previously retrieved lab result in the EMR: • Sending facility (MSH-4) • Order number (ORC-2 or OBR-2) • Observation request (OBR-4.1) The source laboratory may send subsequent messages at change of		Previous	System Integration Testing

ID	REQUIREMENT	GUIDELINES	ADDITIONAL NOTES	STATUS	ASSESSMENT
		observation request status.			
HL.P02	**Processing Subsequent Messages** Process subsequent messages only if the message date/time is greater than the message that was previously processed successfully.	Only those subsequent messages must be processed where message date and time (MSH-7) is greater than the message date and time of the preceding message that was previously processed successfully.		Previous	System Integration Testing
HL.P03	**Processing Subsequent Messages** Disable the overwriting of messages once received and successfully processed.	A subsequent message must not overwrite the previous message that already exists in EMR. See requirement# *HL.D08* for the related display requirement on subsequent reports.		Previous	System Integration Testing
HL.P04	**Patient Identification** Provide an automatic-match process for the messages with their respective patients.	An automatic-match can be made if a patient exists in the EMR with the same information as the message for below specified attributes: • Primary patient identifier (PID-3) • Date of birth (PID-7) • Gender (PID-8) The messages may contain more than one iteration of primary patient identifier in PID-3. EMR must perform the automatic match using the patient identifier and assigning authority of each iteration.		Previous	System Integration Testing

ID	REQUIREMENT	GUIDELINES	ADDITIONAL NOTES	STATUS	ASSESSMENT
HL.P05	**Patient Identification** Provide a manual review and matching mechanism to assign the messages that do not automatically match to a patient.	All results received via eHealth_hub service must be matched to a patient record in the EMR.		Previous	System Integration Testing
HL.P06	**Provider Identification** Provide an automatic match process to assign the retrieved messages to a provider for review.	Provider identifiers are provided by the laboratory sources. The EMR must store and maintain the provider identifiers at implementation of the service for a clinic. Assignment of messages to providers must be automatic and based on the identifiers stored within the EMR.		Previous	System Integration Testing
HL.P07	**Provider Identification** Provide a mechanism to manually assign the messages to a provider for review.	A manual assignment mechanism is required for those messages which don't automatically match to a provider.		Previous	System Integration Testing

4.5 Display Requirements

Manitoba's display requirements ensure the EMR product meets international standards as established within the College of American Pathologists (CAP's) Laboratory Accreditation Program.

Table 11: Display Requirements

ID	REQUIREMENT	GUIDELINES	ADDITIONAL NOTES	STATUS	ASSESSMENT
HL.D01	**New Laboratory Result Alert** Display an alert to healthcare professionals indicating availability of	Alerts must be displayed for new results as well as subsequent results. The alert must be removed once the report has been reviewed.		Previous	Demonstration

ID	REQUIREMENT	GUIDELINES	ADDITIONAL NOTES	STATUS	ASSESSMENT
	new results to review.				
HL.D02	**New Laboratory Result Alert** Display a secondary alert to indicate when results within an order are abnormal.	The un-reviewed results alert must also display a secondary abnormal alert, if the abnormal results indicator is available in OBX.8.		Previous	Demonstration
HL.D03	**New Laboratory Result Alert** Display the date and time of message received and processed by the EMR.	The message processing date and time must be displayed with the un-reviewed results alert. See requirement *HL.D04* for the date/time display formats.		Previous	Demonstration
HL.D04	**Date Formats** Display the date and time in consistent formats through the EMR. The format must not be ambiguous.	The preferred date formats include: • yyyy MON dd • yyyy/MM/dd The preferred date-time format is yyyy-MM-dd HH:mm:ss (24 hour clock format). The preferred time format is HH:mm:ss (24 hour clock format). If a 24 hour clock format is not feasible then a 12-hour clock format must clearly state AM or PM.		Previous	Demonstration
HL.D05	**Display of Patient Information** Display demographic information of the patient when displaying a lab order and associated test results.	Following attributes must be displayed: • Patient's Last Name • Patient's First Name • Unique Patient Identifier transmitted with the lab result HL7 message • Secondary Patient Identifier, if transmitted with the lab result HL7 message: ○ Unique and secondary patient identifiers must be displayed in full		Previous	Demonstration

ID	REQUIREMENT	GUIDELINES	ADDITIONAL NOTES	STATUS	ASSESSMENT
		○ Identifier must have no characters stripped from or added; and must include the assigning authority for the identifier • Patient's Date of Birth ○ See requirement HL.D04 for the date/time display formats • Patient's Gender • Patient Comments: ○ Full comment must be displayed. A comment indicator or a link to view comment on another screen is not acceptable			
HL.D06	**Display of Provider and Performing Lab Information** Display provider and performing lab information when displaying a lab order and associated test results.	Following attributes must be displayed: • Name of the ordering/requesting provider • Name of the Copy-to providers • Names of the admitting and attending providers • Names of the testing/performing facility including reference laboratory where patient testing was performed • Ordering Ward/Clinic Location name and/or codes		Previous	Demonstration
HL.D07	**Display of Lab Order / Accession Information** Display lab order/accession information when displaying a lab order and associated test results.	Following attributes must be displayed: • Lab accession number or order number (ORC-2 or OBR-2) • Date/time specimen collected by the lab (OBR-7) • Date/time specimen received by the lab (OBR-14) • Date/time result was reported by the		Previous	Demonstration

ID	REQUIREMENT	GUIDELINES	ADDITIONAL NOTES	STATUS	ASSESSMENT

		lab (OBR-22)
		• Date/time result received by EMR (EMR Received Date)
		• Status of the observation request (OBR-25):
		  ○ Refer to the accompanying Message Specification document for full details of status codes and definitions
		• Specimen source (OBR-15), if available
		• Name of the ordered test (OBR-4.2)
		• Order comments:
		  ○ Order comments can be found in the NTE segment(s) following the ORC and OBR segments of the message. Order comments can include specimen comments, cancellation comments, and call comments.
		  ○ A comment hyperlink that takes the user to another screen to view the order comment is not acceptable
		If the result(s) is longer than the space allotted to it on the screen display, there must be a visible indicator that there are more results available than are visible.			

HL.D08	**Display of Lab Order / Accession Information** Display the most recent lab order and associated test result based on date/time of the message.	All test results (OBXs) in the observation request (OBR) will be re-sent in a subsequent message regardless of whether they are new results or were previously transmitted. The most recent test result is identified based on the message date (MSH-7). All test results must be displayed in context to		Previous	Demonstration

ID	REQUIREMENT	GUIDELINES	ADDITIONAL NOTES	STATUS	ASSESSMENT
		the corresponding lab order/ accession number, even if results are received at different times/on different days.			
HL.D09	**Display of Lab Order / Accession Information** Display an indication that historical information for a result is available.	Historical information is generated at change of status for the result. Indications must be available when displaying the lab results.		Previous	Demonstration

HL.D10	**Display of Test Results for a Lab Order / Accession**
	Display minimum information when displaying the tests results associated with a lab order.
		Following attributes must be displayed:
		• Name of the resulted test (OBX-3.2)
		• Alpha and/or numerical result value for the resulted test:
		  ○ Numeric results must maintain the decimals provided in the message
		• A reference range or therapeutic range of values, where available (OBX-7 or NTE)
		• Units of measure for the result, where available (OBX-6)
		• Status for each result (OBX-11)
		• Alerts for abnormal test results (numeric as well as textual) (OBX-8).
		• Test Result comments (NTE):
		  ○ Test result comments can be found in the NTE segment(s) following the OBX segments of the message
		  ○ Test result comment must be displayed following the result
		  ○ A comment hyperlink that takes the user to another screen to view the order comment is not acceptable
		Formatted text and spacing must be
				Previous	Demonstration

ID	REQUIREMENT	GUIDELINES	ADDITIONAL NOTES	STATUS	ASSESSMENT
		rendered and displayed as sent in the message in the EMR. Special characters such as < or> or + must be displayed as sent with the results.			
HL.D11	**Display of Test Results for a Lab Order / Accession** Display the test results in the same sequence as received in the HL7 messages.	All test results must be displayed in same sequence as received from the sending laboratory.		Previous	Demonstration
HL.D12	**Display of Test Results for a Lab Order / Accession** Accept and display PDF files appropriately, that are received in HL7 message as encapsulated documents (ED).	If encapsulated documents are displayed in an application which is external to the EMR, the document must be properly viewable to the user. The external application must open over the EMR window; and must allow user to go back to the EMR.		Previous	System Integration Testing
HL.D13	**Trending View** Display minimum test result information in trending **graphical** view.	Availability of the trending view is optional, however the requirement is mandatory if the view is available. Following attributes must be displayed: • Collected date and time for the test • Lab tests ordered • Test result values • Alerts for abnormal numeric test result values		Previous	Demonstration
HL.D14	**Trending View** Display minimum test information in trending	Availability of the trending view is optional, however the requirement is mandatory if the view is available.		Previous	Demonstration

ID	REQUIREMENT	GUIDELINES	ADDITIONAL NOTES	STATUS	ASSESSMENT
	tabular view.	Following attributes must be displayed: • Collected date and time for the test • Lab tests ordered • Test result values • Alerts for abnormal numeric test result values • Units of measure associated with each test results: ○ Units of measure must be prominently displayed in the default presentation of trending. User must not be required to take another step (or click or hover) to view the units of measure • Comment indicator for the accession/order level (OBR) as well as test result level (OBX)			
HL.D15	**Trending View** Provide a drill-down to the results detail view from the trending view (from both graphical and tabular views). Display minimum test information in the drill-down results detail view.	Availability of the trending view is optional, however the requirement is mandatory if the view is available. Following attributes must be displayed: • Lab tests ordered • Test result values • Alerts for abnormal numeric test result values • Lab result reference range: ○ Upper and lower reference range limits must be displayed for each test result that is plotted. For example, the LIS will deliver several results for bilirubin levels of a baby over a period of two weeks. The reference		Previous	Demonstration

ID	REQUIREMENT	GUIDELINES	ADDITIONAL NOTES	STATUS	ASSESSMENT
		range associated with each result will be different, within the same test. • Units of measure associated with each test results: ○ Units of measure must be prominently displayed in the default presentation of trending. User must not be required to take another step (or click or hover) to view the units of measure. • Comments - at minimum for the specific test result; and preferable from the order as well • Reported date • Performing facility information			

4.6 Optional Display Requirements

This section lists some optional attributes for the above listed display requirements. These attributes provide additional information which is useful for EMR user in patient care. EMR will not be assessed for these optional display requirements.

Table 12: Optional Requirements

ID	REQUIREMENT	GUIDELINES	ADDITIONAL NOTES	STATUS	ASSESSMENT
HL.O01	Display of Patient Information.	EMR may also optionally display: • Patient's Middle Name or initial • Patient's Age		Previous	Not Assessed
HL.O02	Display of Provider and Performing Lab Information.	EMR may also optionally display: • Order Priority		Previous	Not Assessed
HL.O03	Display of Test Results for a Lab Order / Accession.	The EMR may also optionally display: • Code of the resulted test (OBX-3.1)		Previous	Not Assessed

5 Appendix A: Web Service

5.1 WSDL

The LabResultService service has been exposed to the EMR community as a Web Service. The Web Service interaction is defined within an individual WSDL (Web Services Definition Language). The WSDL will be exposed on an HTTPS listener where authentication will occur based on prior certificate exchange. Once the EMR passes authentication their conformance profiles are checked based on the EMR ID contained within the message body.

Please refer to Appendix B for complete descriptions of the WSDLs (entitled LabResultService.wsdl). The Request format for the WSDLs is defined by a LabResultService schema file (XSD). This schema defines the parameters that must be provided to invoke the service. The schema is referenced within the context of the WSDL. Section 5.3 defines these parameters in more detail. Refer to Appendix C for complete descriptions of the XSD (entitled LabResultService.xsd).

5.2 SOAP Request/Response Examples

5.2.1 GetLabResults Web Method

5.2.1.1 SOAP Request

The following is a sample SOAP request (shown without WS-Security):

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:ns1="http://www.examplewebservice.com/LabResultService">
   <soapenv:Header/>
   <soapenv:Body>
      <ns1:GetLabResultsRequest>
         <EmrID>EMR_4567</ EmrID>
         <ClinicID>ClinicXYZ</ ClinicID>
         <NumberOfMessages>2</NumberOfMessages>
         <TransactionID>1234</TransactionID>
      </ns1:GetLabResultsRequest>
   </soapenv:Body>
</soapenv:Envelope>
```

5.2.1.2 SOAP Response

The following is a sample SOAP response (shown without WS-Security):

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:ns1="http://www.examplewebservice.com/LabResultService">
   <soapenv:Header/>
   <soapenv:Body>
      <ns1:GetLabResultsResponse>
         <SuccessStatus>true</SuccessStatus>
         <NumberOfMessages>2</NumberOfMessages>
         <MessagesRemaining>0</MessagesRemaining>
         <Messages>
            <ns1:Message>HL7 v.2.3.1 message placed in base 64 encoding </ns1:Message>
         </Messages>
```

```
         <Messages>
           <ns1:Message>HL7 v.2.3.1 message placed in base 64 encoding
</ns1:Message>
         </Messages>
      </ns1:GetLabResultsResponse>
   </soapenv:Body>
</soapenv:Envelope>
```

5.2.2 AcknowledgeLabResults Web Method

5.2.2.1 SOAP Request

The following is a sample SOAP request (shown without WS-Security):

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:ns1="http://www.examplewebservice.com/LabResultService">
   <soapenv:Header/>
   <soapenv:Body>
      <ns1:AcknowledgeLabResultsRequest>
         <EmrID>EMR_4567</EmrID>
         <ClinicID>ClinicXYZ</ClinicID>
         <TransactionID>1234</TransactionID>
      </ns1:AcknowledgeLabResultsRequest>
   </soapenv:Body>
</soapenv:Envelope>
```

5.2.2.2 SOAP Response

The following is a sample SOAP response (shown without WS-Security):

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:ns1="http://www.examplewebservice.com/LabResultService">
   <soapenv:Header/>
   <soapenv:Body>
      <ns1:AcknowledgeLabResultsResponse>
         <SuccessStatus>true</SuccessStatus>
      </ns1:AcknowledgeLabResultsResponse>
   </soapenv:Body>
</soapenv:Envelope>
```

5.3 Request / Response Parameters

5.3.1 GetLabResults Web Method

Table 13: GetLabResults Web Method

DIRECTION	PARAMETER	DESCRIPTION
Request	EMRID (mandatory)	The unique identifier assigned to the EMR instance by Shared Health.
	ClinicID (mandatory)	The unique identifier assigned to the clinic by Shared Health.
	NumberOfMessages (optional)	EMR indicates the number of messages they want returned.

DIRECTION	PARAMETER	DESCRIPTION
		The maximum that will be returned by lab result delivery service is 25. If the EMR requests 50 messages, only 25 will be returned - the EMR would need to submit another request in this scenario. If this parameter is not supplied, the lab result delivery service will default to returning 10 messages.
	TransactionID (mandatory)	EMR supplied reference ID. It is important that the EMR supply a unique identifier for each web service call to ensure transactional uniqueness. TransactionID is implemented as a string and so, the EMR may supply a unique numeric value or a UUID.
Response	SuccessStatus (mandatory)	A Boolean indicating success (true) or failure (false).
	NumberOfMessages (mandatory)	Number of messages contained in the response.
	MessagesRemaining (mandatory)	Number of messages remaining in current mailbox/queue.
	Messages (conditional)	The collection of base64 encoded messages. The messages returned will follow the sequence that the messages were placed on the discrete EMR queue (FIFO). The EMR must process the messages in the order received. Amount of messages provided will be equal to the number of messages provided within the NumberOfMessages attribute.

5.3.2 AcknowledgeLabResults Web Method

Table 14: AcknowledgeLabResults Web Method

DIRECTION	PARAMETER	DESCRIPTION
Request	EMRID (mandatory)	The unique identifier assigned to the EMR instance by Shared Health.
	ClinicID (mandatory)	The unique identifier assigned to the clinic by Shared Health.
	TransactionID (mandatory)	EMR supplied reference ID. It is important that the EMR supply a unique identifier for each web service call to ensure transactional uniqueness. TransactionID is implemented as a string and so, the EMR may supply a unique numeric value or a UUID. Note that this should be the same value as within the GetLabRequest transaction to complete the logical unit of work.
Response	SuccessStatus (mandatory)	A Boolean indicating success (true) or failure (false).

5.3.3 SOAP Fault Response

The SOAP Fault response is produced in the case of an error scenario as opposed to inclusion within the business context response.

Table 15: SOAP Fault Response

DIRECTION	PARAMETER	DESCRIPTION
Response	ErrorID	The identifier corresponding to a specific error.
	ErrorType	The category code for a given error. Possible categories are CLIENT and SERVER to designate different error classification.
	ErrorMessage	Description of the given error.

5.4 Error Scenarios

There are two types of error scenarios pertaining to the LabResultService transaction:

1. Business Errors – Characterized as errors encountered by EMR while communicating with the interface web services. These can be trapped by the application and translated to application-specific language to provide context to the requestor as to the nature of the error.
2. System Errors – Characterized as communication or transport-level errors. These may also include errors which address malformed messaging errors.

Note that the error messages are not encrypted.

5.4.1 Business Errors

Note that this is not a complete list of error scenarios; however, this should represent the majority of possible scenarios.

5.4.1.1 Scenario 1 – There is an XML schema validation error

In this scenario the XML format used of the client's message is invalid:

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:ns1="http://www.examplewebservice.com/LabResultService">
   <soapenv:Header/>
   <soapenv:Body>
      <soapenv:Fault>
            <faultcode>soapenv:Server</faultcode>
            <faultstring>Error</faultstring>
            <detail>
                  <ns1:ErrorDetailResponse>
                        <ErrorID>5100</ErrorID>
                        <ErrorType>SERVER</ErrorType>
                        <ErrorMessage>XML Schema Validation Error.</ErrorMessage>
                  </ns1:ErrorDetailResponse>
            </detail>
      </soapenv:Fault>
   </soapenv:Body>
</soapenv:Envelope>
```

5.4.1.2 Scenario 2 – There is an Error Retrieving the Lab Results

In this scenario an error occurred while the server is attempting to retrieve the lab results:

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:ns1="http://www.examplewebservice.com/LabResultService">
   <soapenv:Header/>
   <soapenv:Body>
      <soapenv:Fault>
            <faultcode>soapenv:Server</faultcode>
            <faultstring>Error</faultstring>
            <detail>
                  <ns1:ErrorDetailResponse>
                        <ErrorID>5101</ErrorID>
                        <ErrorType>SERVER</ErrorType>
                        <ErrorMessage>Get lab results error </ErrorMessage>
                    </ns1:ErrorDetailResponse>
            </detail>
      </soapenv:Fault>
   </soapenv:Body>
</soapenv:Envelope>
```

5.4.1.3 Scenario 3 – A Timeout Occurs

In this scenario, the server timed out while trying to process the client's request:

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:ns1="http://www.examplewebservice.com/LabResultService">
   <soapenv:Header/>
   <soapenv:Body>
      <soapenv:Fault>
            <faultcode>soapenv:Server</faultcode>
            <faultstring>Error</faultstring>
            <detail>
                  <ns1:ErrorDetailResponse>
                        <ErrorID>5200</ErrorID>
                        <ErrorType>SERVER</ErrorType>
                         <ErrorMessage>A timeout occurred during processing.
                           </ErrorMessage>
                  </ns1:ErrorDetailResponse>
            </detail>
      </soapenv:Fault>
   </soapenv:Body>
</soapenv:Envelope>
```

5.4.1.4 Scenario 4 – The Requesting Clinic is Not Authorized

In this scenario a clinic attempts to retrieve messages from a mailbox without authorization to the service:

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:ns1="http://www.examplewebservice.com/LabResultService">
   <soapenv:Header/>
   <soapenv:Body>
```

```
      <soapenv:Fault>
            <faultcode>soapenv:Server</faultcode>
            <faultstring>Error</faultstring>
            <detail>
                  <ns1:ErrorDetailResponse>
                        <ErrorID>5401</ErrorID>
                        <ErrorType>SERVER</ErrorType>
                        <ErrorMessage>The Clinic is not authorized to use this
            service</ErrorMessage>
                  </ns1:ErrorDetailResponse>
            </detail>
      </soapenv:Fault>
   </soapenv:Body>
</soapenv:Envelope>
```

5.4.1.5 Scenario 5 – The EMR Fails Authentication

In this scenario an EMR attempts to retrieve messages from a mailbox and fails authentication:

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:ns1="http://www.examplewebservice.com/LabResultService">
   <soapenv:Header/>
   <soapenv:Body>
      <soapenv:Fault>
            <faultcode>soapenv:Server</faultcode>
            <faultstring>Error</faultstring>
            <detail>
                  <ns1:ErrorDetailResponse>
                        <ErrorID>5403</ErrorID>
                        <ErrorType>SERVER</ErrorType>
                        <ErrorMessage>EMR Authentication Error</ErrorMessage>
                  </ns1:ErrorDetailResponse>
            </detail>
      </soapenv:Fault>
   </soapenv:Body>
</soapenv:Envelope>
```

5.4.2 System Errors

5.4.2.1 Scenario 1 – EMR cannot be authenticated

In this scenario, the x.509 certificate presented by the EMR fails authentication. This fails at the transport level and the lab result delivery service would not have access to the error message. This would provide a HTTP 500 server error.

5.4.2.2 Scenario 2 – The Client did not Sign Message

In this scenario the client has not included a digital signature in their message:

```
<env:Envelope xmlns:env="http://schemas.xmlsoap.org/soap/envelope/">
   <env:Body>
      <env:Fault>
```

```
         <faultcode>env:Client</faultcode>
         <faultstring>No signature in the WS-Security message for the configured
soap actor/role ""! (from client)</faultstring>
      </env:Fault>
   </env:Body>
</env:Envelope>
```

5.4.2.3 Scenario 3 – The Client Experienced an Internal Error

In this scenario, an unknown error has occurred while processing the client's request, such as message that does not conform to WSDL or SOAP specification:

```
<env:Envelope xmlns:env="http://schemas.xmlsoap.org/soap/envelope/">
   <env:Body>
      <env:Fault>
         <faultcode>env:Client</faultcode>
         <faultstring>Internal Error (from client)</faultstring>
      </env:Fault>
   </env:Body>
</env:Envelope>
```

5.4.2.4 Scenario 4 – Certificate mismatch

In this scenario the client certificate used for SSL authentication does not match certificate used for request signing:

```
<env:Envelope xmlns:env="http://schemas.xmlsoap.org/soap/envelope/">
   <env:Body>
      <env:Fault>
         <faultcode>env:Client</faultcode>
         <faultstring>Certificate mismatch.  SSL and signing certificates must
match. (from client)</faultstring>
      </env:Fault>
   </env:Body>
</env:Envelope>
```

5.4.2.5 Scenario 5 – There is a Breach of Policy

In this scenario the client has not encrypted their message:

```
<env:Envelope xmlns:env="http://schemas.xmlsoap.org/soap/envelope/">
   <env:Body>
      <env:Fault>
         <faultcode>env:Client</faultcode>
         <faultstring>Rejected by policy. (from client)</faultstring>
      </env:Fault>
   </env:Body>
</env:Envelope>
```

5.4.3 Error Codes

The following table contains examples of errors that the EMR might receive when attempting to access eHealth_hub. Note that these are only some of the errors that may be received:

Table 16: Error Codes

Error Code	Error Message	Description
5000	No signature in message! (from client)	This error is returned when the message is not signed. ("client" is EMR).
5001	Internal Error	Generic error indicating something went wrong within the connection between client EMR and eHealth_hub interface service.
5002	Rejected By Policy (from client)	This error is returned when the message is not encrypted.
5100	XML Schema Validation Error	An error was found in the XML of the request.
5101	Get lab results error. - <DATABASE error message>	There was an error when eHealth_hub was processing a GetLabResults request.
5102	Acknowledge Lab Results Error	There was an error when eHealth_hub was processing the AcknowledgeLabResults request.
5200	A timeout occurred during processing	A timeout occurred during processing.
5401	The EMR is not authorized to use this service	EMR / Clinic does not have the correct authorization for the requested service.
5403	EMR Authentication Error	This error is generated if the passed in EMR ID and/or Clinic ID do not match what is configured within eHealth_hub.

6 Appendix B: LabResultService.wsdl

```
<?xml version="1.0" encoding="UTF-8"?>
<wsdl:definitions name="LabResultService"
targetNamespace="http://www.examplewebservice.com/LabResultService"
        xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/"
        xmlns:tns="http://www.examplewebservice.com/LabResultService"
        xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
        xmlns:xsd="http://www.w3.org/2001/XMLSchema" >

        <wsdl:types>
                <xsd:schema targetNamespace="http://www.examplewebservice.com/LabResultService"
                        xmlns:mrm="http://www.examplewebservice.com/LabResultService">
                        <xsd:include schemaLocation="www.examplewebservice.com/LabResultService.xsd"/>
                </xsd:schema>
        </wsdl:types>

        <wsdl:message name="GetLabResultsOperation_in">
                <wsdl:part element="tns:GetLabResultsRequest" name="GetLabResultsRequest"/>
        </wsdl:message>
        <wsdl:message name="GetLabResultsOperation_out">
                <wsdl:part element="tns:GetLabResultsResponse" name="GetLabResultsResponse"/>
        </wsdl:message>
        <wsdl:message name="AcknowledgeLabResultsOperation_in">
                <wsdl:part element="tns:AcknowledgeLabResultsRequest"
name="AcknowledgeLabResultsRequest" />
        </wsdl:message>
        <wsdl:message name="AcknowledgeLabResultsOperation_out">
                <wsdl:part element="tns:AcknowledgeLabResultsResponse"
name="AcknowledgeLabResultsResponse"/>
        </wsdl:message>
        <wsdl:message name="ErrorDetailResponse">
                <wsdl:part element="tns:ErrorDetailResponse" name="ErrorDetailResponse" />
        </wsdl:message>

        <wsdl:portType name="LabResultsPortType">
                <wsdl:operation name="GetLabResultsOperation">
                        <wsdl:input message="tns:GetLabResultsOperation_in"
name="GetLabResultsOperation_Input"/>
                        <wsdl:output message="tns:GetLabResultsOperation_out"
name="GetLabResultsOperation_Output"/>
                        <wsdl:fault message="tns:ErrorDetailResponse" name="ErrorDetailResponse" />
                </wsdl:operation>
                <wsdl:operation name="AcknowledgeLabResultsOperation">
                        <wsdl:input message="tns:AcknowledgeLabResultsOperation_in"
name="AcknowledgeLabResultsOperation_Input"/>
                        <wsdl:output message="tns:AcknowledgeLabResultsOperation_out"
name="AcknowledgeLabResultsOperation_Output"/>
                        <wsdl:fault message="tns:ErrorDetailResponse" name="ErrorDetailResponse" />
                </wsdl:operation>
        </wsdl:portType>

        <wsdl:binding name="LabResultsBinding" type="tns:LabResultsPortType">
                <soap:binding style="document" transport="http://schemas.xmlsoap.org/soap/http"/>
                <wsdl:operation name="GetLabResultsOperation">
                        <soap:operation soapAction="" />
                        <wsdl:input name="GetLabResultsOperation_Input">
                                <soap:body parts="GetLabResultsRequest" use="literal"/>
                        </wsdl:input>
                        <wsdl:output name="GetLabResultsOperation_Output">
                                <soap:body parts="GetLabResultsResponse" use="literal"/>
```

```
                        </wsdl:output>
                        <wsdl:fault name="ErrorDetailResponse" >
                                <soap:fault name="ErrorDetailResponse" use="literal"/>
                        </wsdl:fault>
                </wsdl:operation>
                <wsdl:operation name="AcknowledgeLabResultsOperation">
                        <soap:operation soapAction=""/>
                        <wsdl:input name="AcknowledgeLabResultsOperation_Input">
                                <soap:body parts="AcknowledgeLabResultsRequest" use="literal"/>
                        </wsdl:input>
                        <wsdl:output name="AcknowledgeLabResultsOperation_Output">
                                <soap:body parts="AcknowledgeLabResultsResponse" use="literal"/>
                        </wsdl:output>
                        <wsdl:fault name="ErrorDetailResponse" >
                                <soap:fault name="ErrorDetailResponse" use="literal"/>
                        </wsdl:fault>
                </wsdl:operation>
        </wsdl:binding>

        <wsdl:service name="LabResultsService">
                <wsdl:port binding="tns:LabResultsBinding" name="LabResultsPort">
                        <soap:address location="https://www.examplewebservice.com/LabResultsService"/>
                </wsdl:port>
        </wsdl:service>
</wsdl:definitions>
```

7 Appendix C: LabResultService.xsd

```
<?xml version="1.0" encoding="UTF-8"?>
<xsd:schema
    xmlns:tns="http://www.examplewebservice.com/LabResultService"
    xmlns:xsd="http://www.w3.org/2001/XMLSchema">
    <xsd:complexType name="RequestType">
        <xsd:sequence>
            <xsd:element name="EmrID" type="xsd:string" minOccurs="1" maxOccurs="1" />
            <xsd:element name="ClinicID" type="xsd:string"   minOccurs="1" maxOccurs="1" />
            <xsd:element name="NumberOfMessages"    type="xsd:int"      minOccurs="0" maxOccurs="1" />
            <xsd:element name="TransactionID"       type="xsd:string"   minOccurs="1" maxOccurs="1" />
        </xsd:sequence>
    </xsd:complexType>
    <xsd:complexType name="ResponseType">
        <xsd:sequence>
            <xsd:element name="SuccessStatus"       type="xsd:boolean"  minOccurs="1" maxOccurs="1" />
            <xsd:element name="NumberOfMessages"    type="xsd:int"      minOccurs="1" maxOccurs="1" />
            <xsd:element name="MessagesRemaining"   type="xsd:int"      minOccurs="1" maxOccurs="1" />
            <xsd:element name="Messages"            type="MessagesType" minOccurs="0" maxOccurs="25" />
        </xsd:sequence>
    </xsd:complexType>
    <xsd:complexType name="MessagesType">
        <xsd:sequence>
            <xsd:element name="Message"     type="xsd:base64Binary"     minOccurs="0" maxOccurs="1"
form="qualified" />
        </xsd:sequence>
    </xsd:complexType>
    <xsd:complexType name="ErrorDetailType">
        <xsd:sequence>
            <xsd:element name="ErrorID"             type="xsd:int"      minOccurs="1" maxOccurs="1" />
            <xsd:element name="ErrorCodeErrorType"  type="xsd:string"   minOccurs="1" maxOccurs="1" />
            <xsd:element name="ErrorMessage"        type="xsd:string"   minOccurs="1" maxOccurs="1" />
        </xsd:sequence>
    </xsd:complexType>
    <xsd:complexType name="AcknowledgeRequestType">
        <xsd:sequence>
            <xsd:element name="EmrID"               type="xsd:string"   minOccurs="1" maxOccurs="1" />
            <xsd:element name="ClinicID"            type="xsd:string"   minOccurs="1" maxOccurs="1" />
            <xsd:element name="TransactionID"       type="xsd:string"   minOccurs="1" maxOccurs="1" />
        </xsd:sequence>
    </xsd:complexType>
    <xsd:complexType name="AcknowledgeResponseType">
        <xsd:sequence>
            <xsd:element name="SuccessStatus"       type="xsd:boolean"  minOccurs="1" maxOccurs="1" />
        </xsd:sequence>
    </xsd:complexType>
    <xsd:element name="GetLabResultsRequest"                type="RequestType"/>
    <xsd:element name="GetLabResultsResponse"               type="ResponseType"/>
    <xsd:element name="AcknowledgeLabResultsRequest"        type="AcknowledgeRequestType"/>
    <xsd:element name="AcknowledgeLabResultsResponse"       type="AcknowledgeResponseType"/>
    <xsd:element name="ErrorDetailResponse"                 type="ErrorDetailType"/>
</xsd:schema>
```

8 Appendix D: Release Notes

Version 1.0 December 1, 2015

- Updated name of service from earlier “DDS” or “CID” or “Health_Hub” to “eHealth_hub”
- Added use-cases under section 3.2 from the Assessment Guide
- Added requirements in tabular format; under new section 4
- Removed redundant sections and repeated information (erstwhile sections 2.3, 2.4, 6, and sequence diagram flow in section 3)
- Updated requirements:
    - Updated requirement# HL.I05: The “AcknowledgeLabResults” must be invoked only after successful retrieval of messages. Also added clarification that processing is identified as successful only if all messages are accepted, verified and persisted.
    - Updated requirement# HL.S02 and section 6.2.2 Algorithms: The preferred message digest hash is updated to SHA-256 and key size to 2048 bit
    - Updated requirement# HL.P01: Use OBR-4.1 not “OBR-4.1 and OBR-4.3” when processing subsequent results. OBR-4.3 is defined as “not used” in the message specification.
    - Updated requirement# HL.P04: Added clarification that message may have more than iterations of PID-3. Patient identifier + assigning authority of each iteration must be used for patient matching.
    - Updated requirement# HL.D06:
        - Displaying the testing/performing facility is a mandatory requirement
        - Displaying the name of copy-to provider is a mandatory requirement. Code of copy-to provider is now optional
    - Updated requirement# HL.D12: Added clarification on display of PDF reports
    - Updated requirement# HL.D13:
        - Displaying reference ranges on graphical trending views is not a mandatory requirement
        - Added clarification that the module is optional for EMRs but the requirements are mandatory if the module is available
    - Updated requirement# HL.D14:
        - Added the attributes to be displayed for tabular trending view
        - Added requirement to display units of measure alongside the test result values
    - Updated requirement# HL.D15:
        - Added the attributes to be displayed on the trending drill-down view
        - Added requirement to display units of measure alongside the test result values

        - Added clarification that units of measure must be prominently displayed and user must not be required to take another step (like click or hover) to view the units of measure
    - Other minor updates to various requirements:
        - Added clarification to display complete comments in lab order information, test result and tending displays
        - Added HL7 message segments for display requirements for more clarification, where applicable
- Converted Web Service and Web Service Security details to appendix. Updated the appendix numbers for remaining sections with no change to their content; and updated their references in the document.
- Section 5:
    - Corrected the sample XSDs
    - Added error codes and descriptions from eHealth_hub Lab Results Distribution Assessment Guide

Version 1.2 February 15, 2016

- Changed requirements with an assessment status of verification to demonstration
- Corrected statement in section 4 so that display requirements are explicitly mentioned under the multiple presentation assumption

Version 1.3 September 29, 2016

- Added clarification on interface requirements: HL.I05 and HL.I06
- Added clarification on processing requirement: HL.P03
- Updated message segment for order number in display requirement HL.D07

Version 1.4 March 31, 2020

- Updated document theme to new organizational visual identity
- Updated Manitoba eHealth to Shared Health to align with new organizational structure, including changes to the EMR Certification contact email address
- Added Glossary
- Updated References (now known as Related Documents):
    - Removed Document IDs throughout document
    - Added Manitoba EMR Certification - Baseline EMR Requirements Specification
    - Added eHealth_hub – Authentication Specification
- Updated all requirements with a status of previous
- Removed statement “These requirements are assessed as defined in the eHealth_hub Laboratory Result Distribution Interface Assessment Guide” from the introduction

- Added table references to all tables
- Updated Use Cases to remove enrolment references
- Created a dependency to the eHealth_hub – Authentication Specification
    - The eHealth_hub – Authentication Specification contains the previous security requirements and appendices
    - Deleted previous security requirements and appendices
    - Renamed Security Requirements to Authentication Requirements