Technical Conformance Testing Guidance

National Record Locator

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Contents

Revision History

Version	Date	Summary of Changes
V0.1	17.09.2019	Initial draft
V0.2	23.09.2019	Clarifications following review
V0.3	24.09.2019	Add screenshots of SCAL and Test Cases and update retrieval testing guidance
V0.4	26.09.2019	Update retrieval testing guidance
V0.5	01.10.2019	Embed triggers replaced with link to GitHub location
V0.6	30.10.2019	Update testing provider retrieval instructions for v0.7 of the retrieval app Added limitations of TKW validation Change GitHub locations
V0.7	01.03.2021	Added consumer retrieval testing guidance Minor restructure of provider retrieval testing guidance Updates to include test portal
V0.8	20.07.2021	Updated document to include OpenTest access to test portal

Glossary of Terms

Term / Abbreviation	What it stands for
API	Application Programming Interface
Client	Consumer or Provider software supplier
HTTP	HyperText Transfer Protocol
INT	NHS Digital Integration Test Environment. This is one of the PTL environments
NRL	National Record Locator
PTL	Path to Live
SCAL	Supplier Conformance Assessment List
SSP	Spine Secure Proxy
TKW	Toolkit Workbench

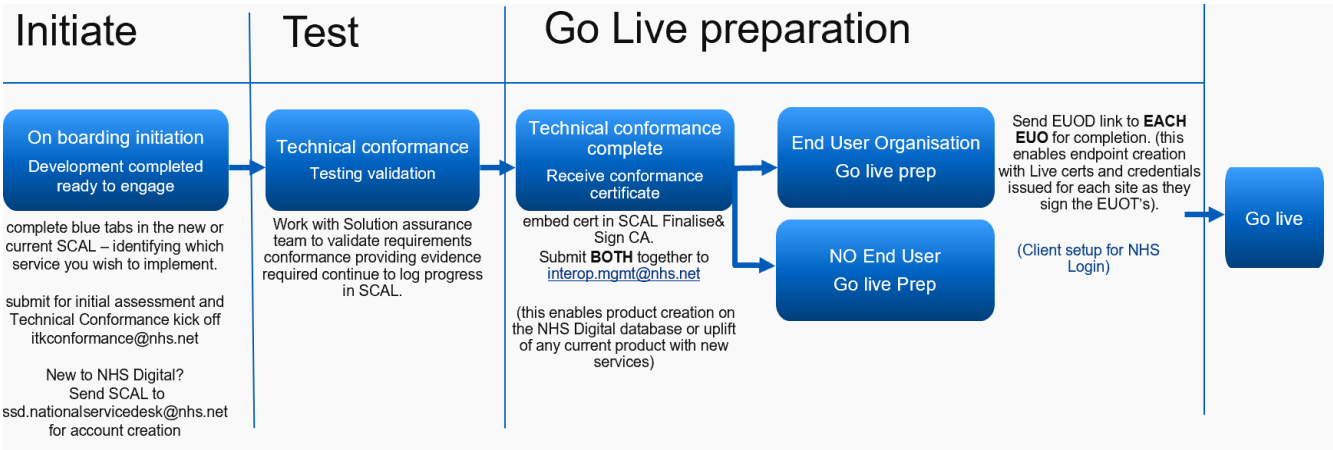
Overview

The National Record Locator (NRL) enables an authorised clinician, care worker and/or administrator, in any health and care setting, to access a patient's information to support that patient's direct care. Further details can be found on the NRL specification.

This document is a guide to conformance testing for solutions integrating with the NRL API.

End to End Process

The end-to-end process for testing and technical conformance is described in the diagram below:



Test Stages

The test stages for completing technical conformance are as follows:

1. Local testing of NRL API interactions using the Toolkit Workbench (TKW)
2. Testing NRL API interactions in NHS Digital hosted PTL test environments
3. Testing Information Retrieval via SSP in NHS Digital hosted PTL test environments (if in scope)

Further detail and instructions for each testing stage can be found in the sections below.

Note that to test solutions in the NHS Digital hosted PTL test environments, suppliers must have first completed local testing. Instructions for endpoint registration can be found in the NRL Onboarding Guide for Direct API Integration.

Conformance Testing Evidence

SCAL

The supplier conformance assessment list (SCAL) maps all the requirements needed to interface with a specific service to the evidence required during the technical conformance process. SCAL evidence consists of both test evidence (see **Test Cases**) and statements.

Category / Requirement	Item	Detail	How requirement will be assessed	Type	Compliant Yes/No (please select) If 'No' please provide detail of mitigating actions or exceptions in the box to the right	Statements Additional Notes / References
Standard Requirement Data Set	Data Set	Below is a list of the data items within the data set for this NHS Digital Service **Do you confirm** that the data to be used by your Product / system is comprised from the items listed / embedded below and that your Product / system will not access other data items using this NHS Digital Service? Dataset for Service: PDS Clinical	Statement	MUST	Please Select.....	
NRL-PR-CP	Provider Requirement	As an NRL Provider, I want to create pointers in NRL, so that authorised users can access information regarding my patients	Please carry out the following tests, and provide evidence in the corresponding folder: TKW TC01 TC02 INT environment TC13 (Logical ID) TC14 (Master ID) TC24 TC25 TC26 Please provide a statement in column G in answer to the following questions: 1. Explain how your system checks the Patient's NHS number is correct 2. Please confirm that your system will only create pointers for the organisation's own ODS code 3. Please confirm that your system will only create pointers for the most recent version of a document or record 4. If Master ID is used, describe how your system ensures that it is unique 5. If a pointer enables content retrieval, explain how your system ensures that the NHS number on the pointer matches that on the	Must	Please Select.....	

Figure 1 SCAL Requirement Example

Test Cases

Clients will be provided with a Test Cases document which details the tests for assessing technical conformance. Each test case details the individual test steps, with expected outcomes and required evidence (see **Evidence Files** below). The test cases cover both local testing and testing in the NHS Digital hosted test environments.

Test Case/ Step	Env	Description	Expected Outcome	Evidence Required	In Scope?	Pass?	Comments	Business Requirements covered by test case
TC14	INT	Create Pointer - With Master ID						NRL-PR-CP NRL-PR-AP
Step 1		System initiates create with a unique Master ID		N/A				
Step 2		Construct a new Create request conforming to the Create interaction For details on the Create interaction, including examples, see the technical spec: https://developer.nhs.uk/apis/nrl/api_interaction_create.html	The DocumentReference Resource should be populated with the following fields: Patient's NHS Number Custodian **Unique Master ID** Author Record Type Record URL Record MIME Type Pointer Status Record Category Profile Clinical Setting Record Format Record Stability	N/A				
Step 3		Audit log created with details of create request	Audit must contain: ASID HTTP Request Body HTTP Request URL HTTP Verb ODS Code NHS Number Request Datetime User ID For more detail, see the technical specification: https://developer.nhs.uk/apis/nrl/integration_auditing.html	Save extract/screenshot of audit log for this specific test in appropriate folder				
Step 4		Send HTTP POST Request to NRL Receive response from NRL	'RESOURCE_CREATED' OperationOutcome response body Pointer Logical ID in the location response header	Please provide relevant section of the message log				
Step 5		Audit log created with details of response	Audit must contain: HTTP Response Body HTTP Status Code Response Datetime For more detail, see the technical specification: https://developer.nhs.uk/apis/nrl/integration_auditing.html	Save extract/screenshot of audit log for this specific test in appropriate folder (may be included in Step 3 evidence)				

Figure 2 Test Case Example

Scope

The SCAL and Test Cases document will be scoped for each Client. Clients must only complete and submit evidence for requirements and tests that are in scope. If you have any questions about the scope, please contact nrlnems.ls@nhs.net.

Evidence Files

Each test case specifies the evidence which must be submitted to Solutions Assurance. A directory structure is provided to organise the test evidence and ensure that the assurance process is thorough and is completed efficiently.

The structure contains an empty directory for each test case number. The evidence files for each test must be placed in the appropriate directory in the structure.

Submitting Test Evidence

When testing is complete, please submit your SCAL, test cases document and evidence files (in provided structure) to itkconformance@nhs.net. This should be done at 2 stages:

1. After local testing is complete
2. After testing in NHS Digital INT environment is complete

Validation and test reports should be reviewed before submitted evidence to ensure all issues are resolved, where possible.

Testing NRL Interactions (Local)

NRL interactions for managing pointers and pointer retrieval are tested locally using the Toolkit Workbench (TKW).

Toolkit Workbench

The TKW is an application that can be run locally to test conformance of a solution against a defined NHS Digital API specification. The purpose of the TKW is to test and validate both success and error scenarios for API interactions and ensure that audit capabilities are in place.

TKW evidence must be submitted to NHS Digital's Solutions Assurance team before connection to the hosted test environments is set up. For more information, see the **Evidence** section.

Prerequisites

- JRE installed on system the TKW will run on
- Capability to run .bat file (e.g. Windows operating system)

Installing the TKW

1. Download the latest version of the NRL TKW Installer jar file from Github: https://github.com/nhsconnect/FHIR-NRLS-API/tree/develop/content/uploads/onboarding/assurance
2. Install the TKW to your preferred location on your PC by running the installer.

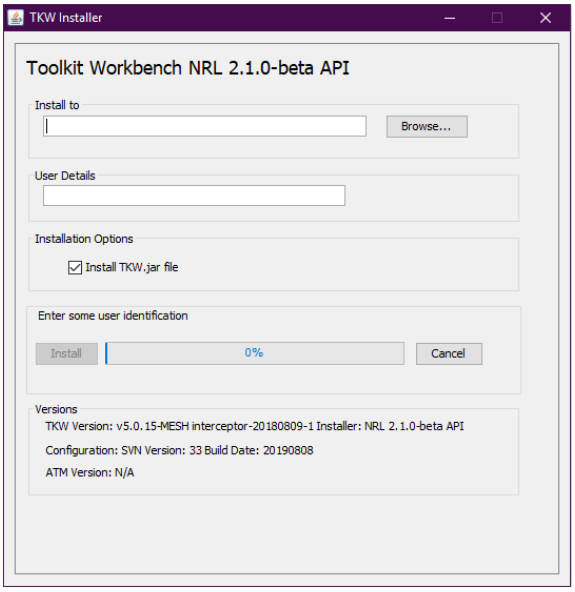


Figure 3 TKW Installer

The a TKW directory will be created in the location specified, with contents as shown in the image below.

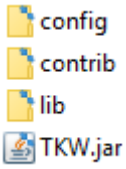


Figure 4 TKW Directory

TKW Components

The TKW consists of 3 main components:

1. Simulator – simulates responses from NRL
2. Transmitter – transmits HTTP requests
3. Validator – validates requests sent to the simulator

Simulator

The simulator acts as a stub API responder to simulate responses for NRL interactions. HTTP requests can be sent to the simulator and the appropriate success or error response will be returned.

Triggers

The simulator is configured to respond to a set of triggers. The triggers are defined for success and error scenarios for each interaction as defined on the NRL specification. The SCAL and Test Cases document will list the triggers for which you need to submit evidence (see the **Conformance Testing Evidence** section for further detail). The complete list of NRL triggers can be used for test purposes and it is recommended that the tests for all error scenarios are run.

Note that triggers exist for Consumers to test information retrieval interactions with the SSP, however an empty response body is returned for the success scenario trigger (HTTP 200 status code).

Full list of NRL TKW Triggers can be found on Github at the following address:

https://github.com/nhsconnect/FHIR-NRLS-API/tree/develop/content/uploads/onboarding/assurance

Instructions

1. Navigate to ***TKW/config/SPINE_NRLS/TestRun***

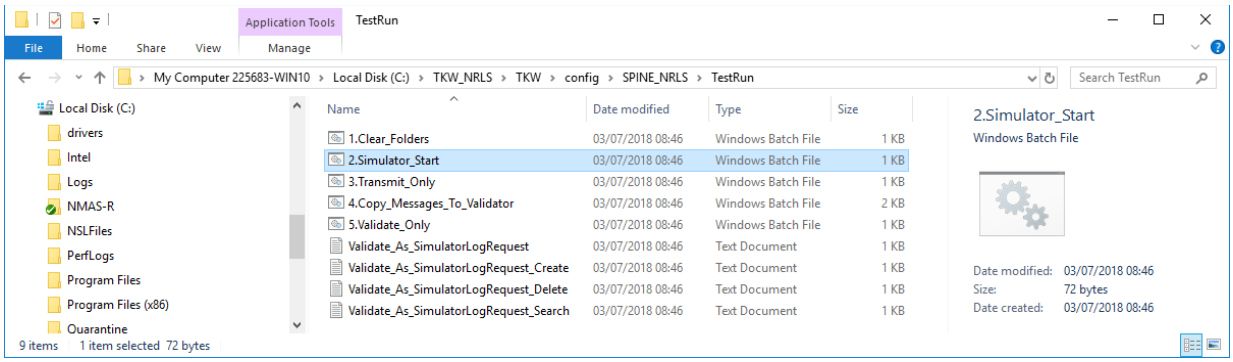


Figure 5 TestRun Directory

2. Run ***2.Simulator_Start.bat*** to run the simulator, you should see a command prompt window open in the background.

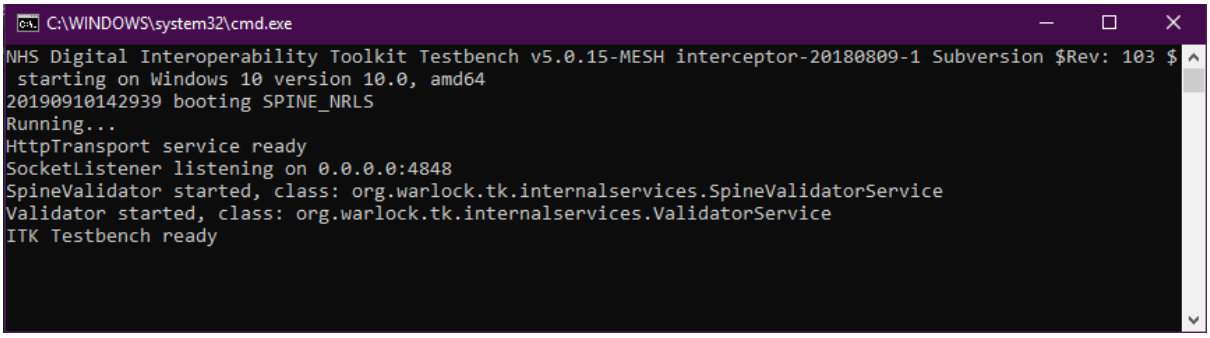


Figure 6 Simulator Command Prompt

3. By default, the simulator listens on http://127.0.0.1:4848. This can be changed in the file ***TKW/config/SPINE_NRLS/tkw.properties***

4. HTTP requests can be made to the TKW using the interactions defined on the NRL specification and the variables/parameters defined for each trigger.

Note that the simulator is a stub responder based on the triggers and will not validate all technical requirements for the HTTP request. The request can be validated using the TKW validator as described in the **Validator** section below. Each request should be validated individually.

Request Logs

Each HTTP request to the TKW simulator is logged with the response in the directory ***TKW/config/SPINE_NRLS/simulator_saved_messages***. A log file is created for each request.

The request and response logs are required for validation and TKW evidence.

Note that the filenames should remain unchanged in order to work with the TKW validator.

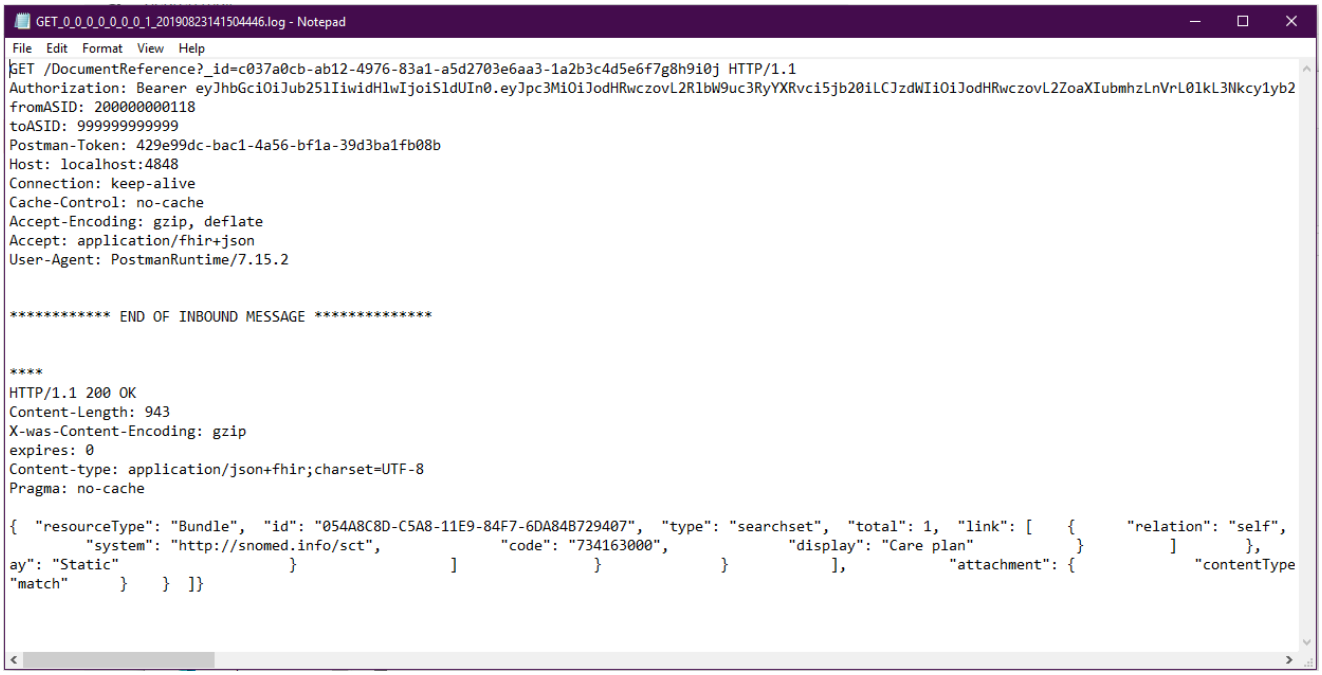


Figure 7 Example Request Log

Validator

The TKW validator tests the HTTP requests against the NRL pointer model and associated business rules, using the simulator request logs. The validator produces a report which identifies issues with conformance to the API specification.

Note that requests should be validated individually to supply evidence for separate test cases.

> Please note the validator does not check against the specified value sets for the following attributes of the NRL-DocumentReference-1 profile:
>
> - DocumentReference.class
> - DocumentReference.type
> - DocumentReference.content.format
> - DocumentReference.context.practiceSetting

Instructions

1. Navigate to ***TKW/config/SPINE_NRLS/TestRun***
2. Run ***4.Copy_Messages_To_Validator.bat*** to copy the request logs from ***TKW/config/SPINE_NRLS/simulator_saved_messages*** to ***TKW/config/SPINE_NRLS/messages_for_validation***

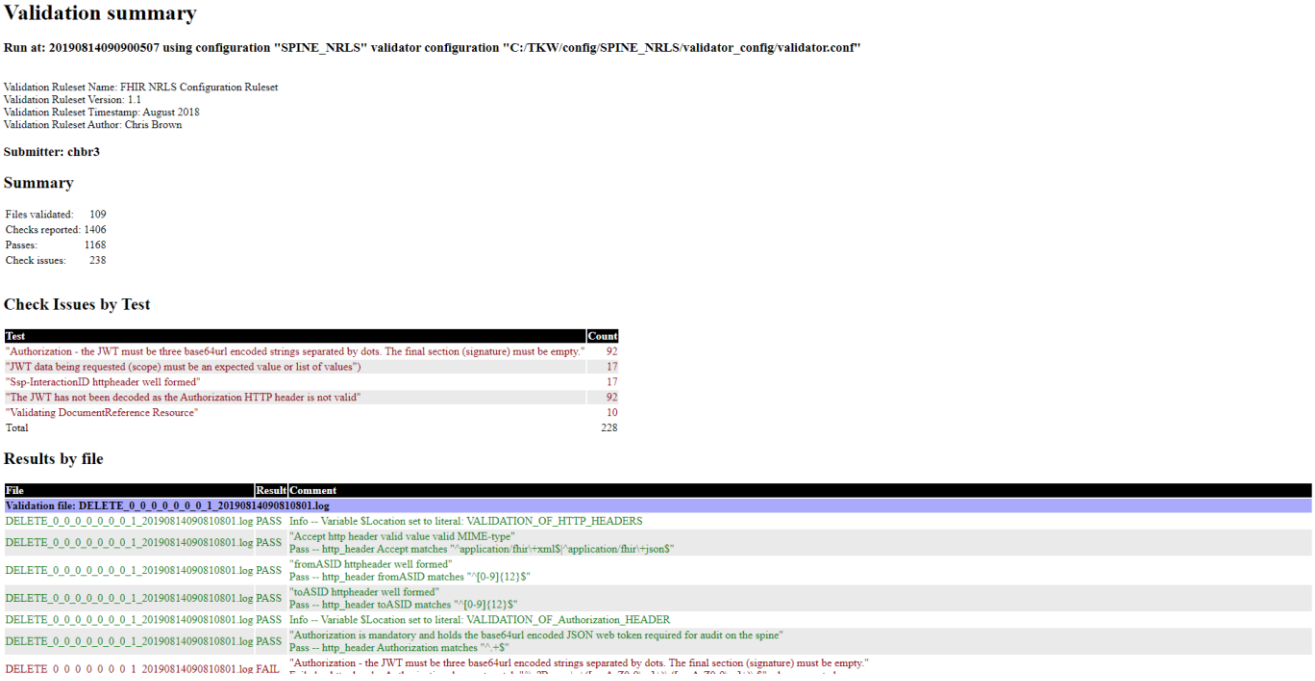
   The request logs must **not** be copied manually, as this process prepends an interaction ID to each file to determine the validation rules for the interaction.

   Note that this step is only required for success scenarios.

3. Run ***5.Validate_Only.bat*** to validate all request messages in the ***TKW/config/SPINE_NRLS/messages_for_validation*** directory.

This step will produce a validation report (.html file) in the ***TKW/config/SPINE_NRLS/validator_reports*** directory

4. Review the validation report produced in step 3.



Validation summary

Run at: 20190814090900507 using configuration "SPINE_NRLS" validator configuration "C:/TKW/config/SPINE_NRLS/validator_config/validator.conf"

Validation Ruleset Name: FHIR NRLS Configuration Ruleset
Validation Ruleset Version: 1.1
Validation Ruleset Timestamp: August 2018
Validation Ruleset Author: Chris Brown

Submitter: chbr3

Summary

Files validated: 109
Checks reported: 1406
Passes: 1168
Check issues: 238

Check Issues by Test

Test	Count
"Authorization - the JWT must be three base64url encoded strings separated by dots. The final section (signature) must be empty."	92
"JWT data being requested (scope) must be an expected value or list of values")	17
"Ssp-InteractionID httpheader well formed"	17
"The JWT has not been decoded as the Authorization HTTP header is not valid"	92
"Validating DocumentReference Resource"	10
Total	228

Results by file

File	Result	Comment
Validation file: DELETE_0_0_0_0_0_0_0_1_20190814090810801.log		
DELETE_0_0_0_0_0_0_0_1_20190814090810801.log	PASS	Info -- Variable $Location set to literal: VALIDATION_OF_HTTP_HEADERS
DELETE_0_0_0_0_0_0_0_1_20190814090810801.log	PASS	"Accept http header valid value valid MIME-type" Pass -- http_header Accept matches "^application/fhir\+xml$|^application/fhir\+json$"
DELETE_0_0_0_0_0_0_0_1_20190814090810801.log	PASS	"fromASID httpheader well formed" Pass -- http_header fromASID matches "^[0-9]{12}$"
DELETE_0_0_0_0_0_0_0_1_20190814090810801.log	PASS	"toASID httpheader well formed" Pass -- http_header toASID matches "^[0-9]{12}$"
DELETE_0_0_0_0_0_0_0_1_20190814090810801.log	PASS	Info -- Variable $Location set to literal: VALIDATION_OF_Authorization_HEADER
DELETE_0_0_0_0_0_0_0_1_20190814090810801.log	PASS	"Authorization is mandatory and holds the base64url encoded JSON web token required for audit on the spine" Pass -- http_header Authorization matches "^.+$"
DELETE_0_0_0_0_0_0_0_1_20190814090810801.log	FAIL	"Authorization - the JWT must be three base64url encoded strings separated by dots. The final section (signature) must be empty."

Figure 8 Example Validation Report

The validation report includes a summary and count of test issues and detail of the test results for each HTTP request. Any issues should be addressed before submitted test evidence to NHS Digital.

Install Integrity Check

An integrity check can be run to test the install of the TKW. This is done using the transmitter to send a test request to the TKW.

Transmitter

The TKW transmitter can be used to send HTTP requests to test an endpoint. The request details can be configured in the file ***TKW/config/SPINE_NRLS/tkw.properties***.

On installing the TKW, the configuration is set to test the Search by Subject trigger with patient NHS Number 9462205655.

Integrity Check Instructions

1. Navigate to ***TKW/config/SPINE_NRLS/TestRun***
2. Run ***2.Simulator_Start.bat*** to run the simulator, you should see a command prompt window open in the background.
3. Run ***3.Transmit_Only.bat*** to run the transmitter and send the test HTTP request to the simulator
4. Run ***4.Copy_Messages_To_Validator.bat*** to copy the request logs from ***TKW/config/SPINE_NRLS/simulator_saved_messages*** to ***TKW/config/SPINE_NRLS/messages_for_validation***

5. Run ***5.Validate_Only.bat*** to validate the request message

   This step will produce a validation report (.html file) in the ***TKW/config/SPINE_NRLS/validator_reports*** directory

Testing NRL Interactions (INT)

When local testing has been completed successfully and reviewed by the NHS Digital Solutions Assurance team, suppliers can begin testing solutions in the NHS Digital INT environment.

Instructions for setting up access to the INT environment can be found in the NRL Onboarding Guide for Direct API Integration

Evidence for testing in INT will need to be submitted:

1. Completion of Test Cases document
2. Evidence files (placed in appropriate directory in the provided structure)

See the **Conformance Testing Evidence** section above for further detail.

Note that some test cases may require the involvement of the NHS Digital Solutions Assurance team to check the test environment database and audit logs. All other tests in scope must be completed with evidence submitted before it can be arranged for these tests to take place.

Test Data

The following test data will be required for testing NRL interactions in INT:

- Provider – NHS numbers for test patients
- Consumer – NHS numbers for test patients with pointers created for each test case

Some of the test data required is outlined in the Test Cases document. If additional test data is required, contact the NHS Digital Test Data team: testdata@nhs.net.

Test Portal

Testing in the INT environment is done using the NRL test portal, including retrieval via the SSP. The online portal can be accessed through this link:

http://itw-work.itblab.nic.cfh.nhs.uk

An account is required to access the portal – this can be set up through the live services team.

The test portal is available directly via a HSCN connection, but tests can also be run in INT via the test portal through the OpenTest environment, which does not require a HSCN connection.

Test Portal Via OpenTest

Where a system is connecting to NRL using the internet gateway and does not have a HSCN connection, the testing can be performed via the test portal in the OpenTest environment. Information on OpenTest how to request access can be found on the following page:

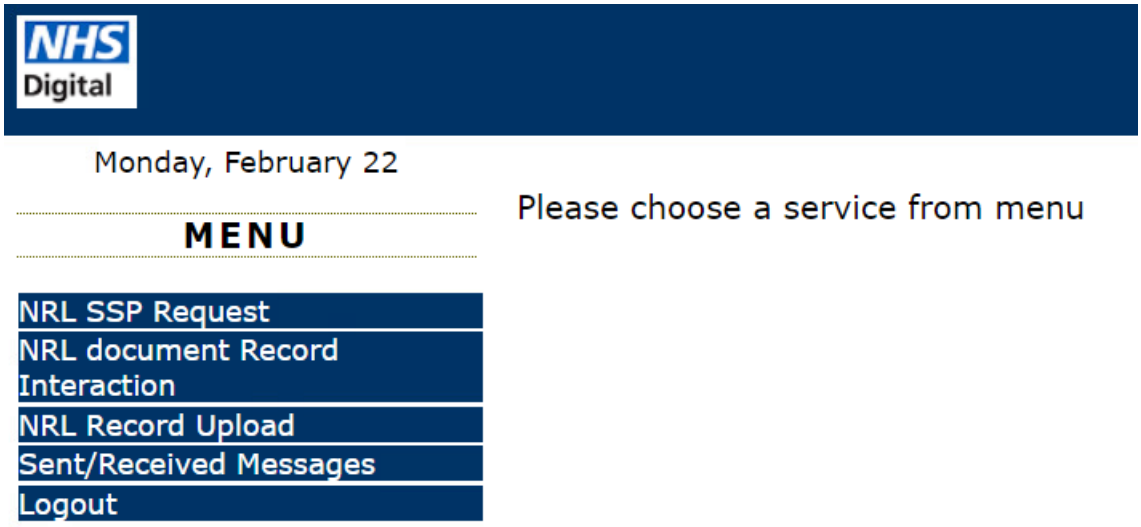
https://digital.nhs.uk/services/spine/open-access-test-environment-for-spine-opentest

As per the test portal in the INT environment, an account is required to access the portal which can be set up through the live services team. Once connected to the OpenTest environment, via the VPN, you can access the NRL test portal at the following link:

http://192.168.128.22/Login.aspx

Running Tests

When you have logged into the test portal, you should see this page:



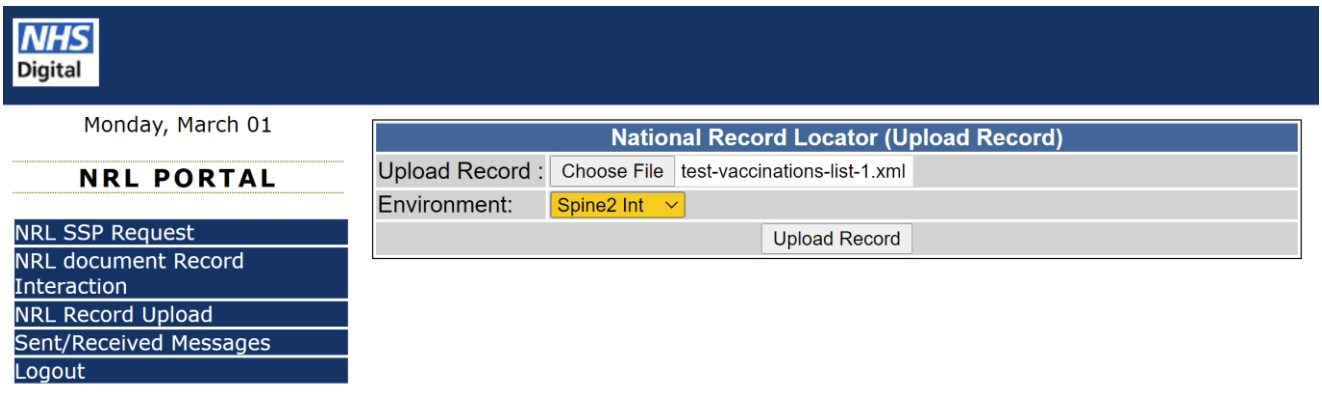
The various options are described in the detail below.

Record Upload

The “NRL Record Upload” page allows you to upload a document, such as a PDF or XML file, which will be stored and can be accessed via the SSP in order to test retrieval.

The intended use for this interaction is to mock a Provider retrieval endpoint for suppliers acting as NRL Consumers to test information retrieval via the SSP in the NHS Digital hosted environments.

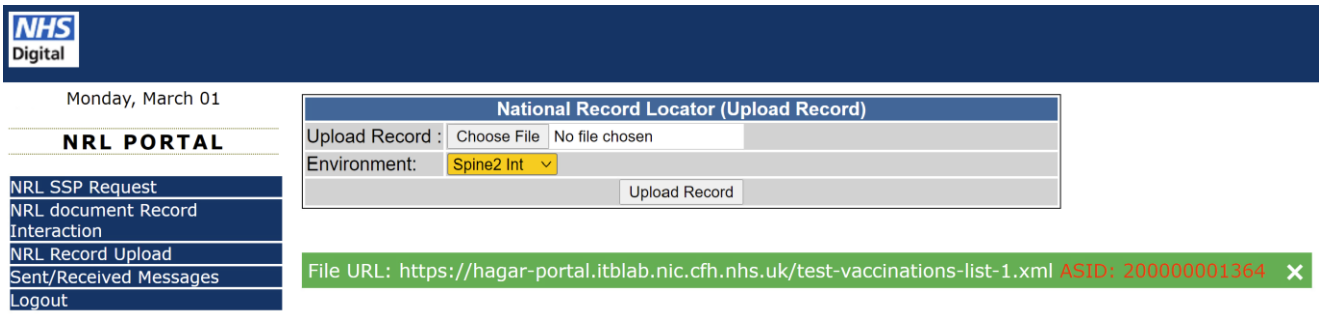
The content of the response body for record retrieval is out of scope for NRL conformance testing, but suppliers can use the portal to simulate any relevant error scenarios for processing and displaying the data retrieved from a Provider endpoint.



When a record is uploaded, the test portal will return the following details for the endpoint to be used in the information retrieval request:

- Endpoint URL
- ASID (to be used in the SSP-To header)

An example of this can be seen in the screenshot below:



NRL document Record Interaction

The “NRL Document Record Interaction” page allows a user to interact with the NRL using the following interactions:

- Search for Pointers (Provider Testing)
- Create Pointer (Consumer Testing)
- Delete Pointer (Consumer Testing)

The `create` and `delete` interactions allow for NRL consumers to set up pointers in the test environment which can then be used for testing within their NRL Consumer system.

The `search` interaction allows providers to retrieve pointers they have created within the test environment.

Creating Pointers Using The Portal

When creating a pointer using the portal, a file containing the pointer to be created needs to be selected and uploaded. This file needs to be a JSON file containing the pointer FHIR DocumentReference that you want creating on the NRL in the test environment, such as the example file below:

pointer-create-example.json

In the INT environment the custodian element must contain the ODS code “RHM”, but access via the OpenTest environment it must be “X26”.

The pointer file can be updated, before creating the pointer, to include the URL returned by the record upload interaction in test portal, document type and retrieval format to allow end to end testing by a consumer.

Providing Evidence

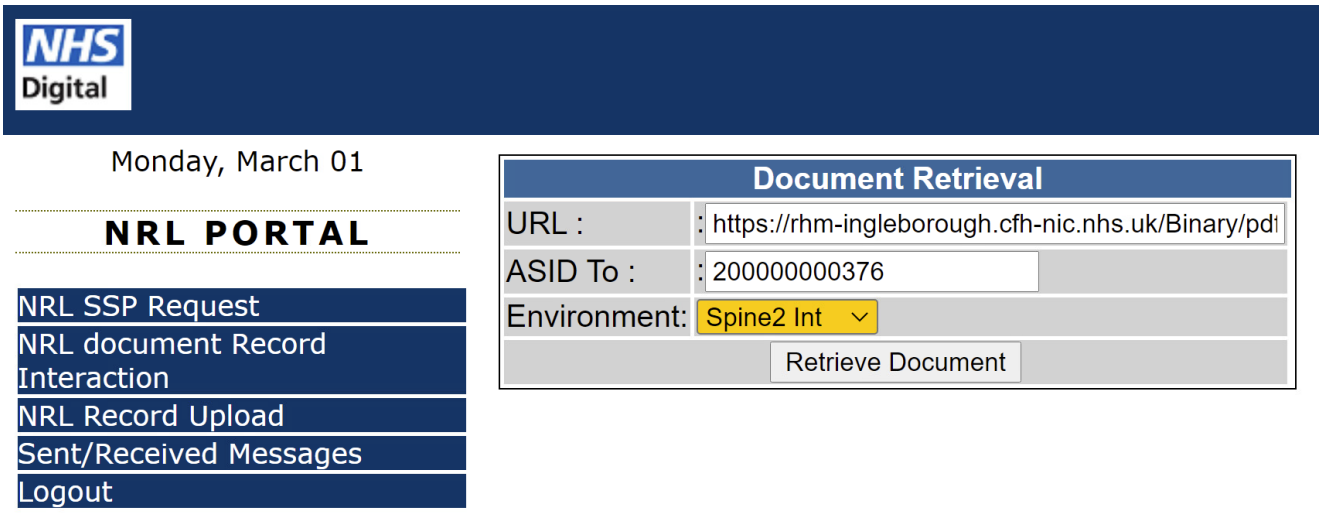
The following evidence will need to be provided for testing Consumer information retrieval:

- Supplier system screenshots
- Supplier system audit logs

Further detail on providing evidence can be found in the test cases spreadsheet. Tests must cover at least one positive case (record found) and at least one negative case (e.g. record not found). As described above, the content of the response body for information retrieval is out of scope for NRL conformance testing.

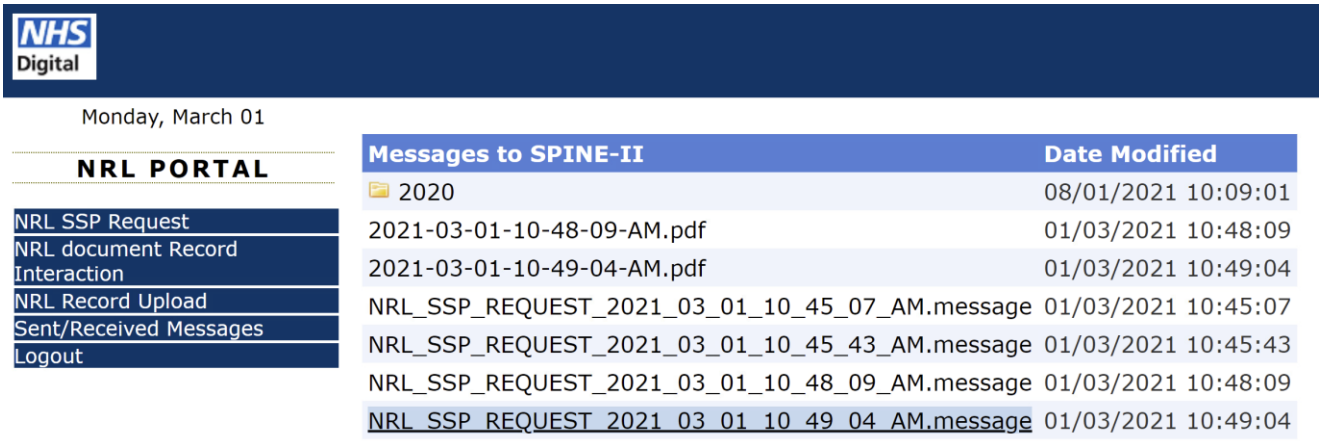
SSP Retrieval Request

The “NRL SSP Request” page on the portal allows a user to retrieve information through the SSP using the SSP Retrieval Interaction. You will need to input the retrieval URL from the pointer and the ASID for the retrieval endpoint. The URL does not need to be prefixed with the SSP base URL as this will be done by the test portal.



If the request is successful, you should see the pop up as in the screenshot below:

The request log and request body can be found under “Sent/Received Messages” (in separate files), and can be used as conformance test evidence.



Providing Evidence

As described above, the request log and request body files can be used as conformance test evidence for Provider information retrieval.

Tests must cover at least one positive case (record found) and at least one negative case (e.g. record not found).