The purpose of this track is to test FHIR interactions across intermediaries as opposed to direct point to point interactions. In this track we'll test multiple scenarios where FHIR RESTful exchanges are routed to the destination through one or more intermediaries, as described in the balloted STU1 IG.

During previous Connectathons, stakeholders tested multiple approaches for routing FHIR requests through intermediaries – resulting in a STU1 FHIR IG being balloted.
<table>
<thead>
<tr>
<th>Submittting Workgroup</th>
<th>FHIR at Scale Taskforce (FAST): Exchange Tiger Team</th>
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<tbody>
<tr>
<td>FHIR-I Workgroup</td>
<td></td>
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</table>
| Track Lead(s) | Durwin Day, Patrick Murta  
|              | dayd@bcbsil.com; pmurta@humana.com  
| Track Lead Email(s) |  
| Related Tracks |  
| 2022-01 FAST Security & Identity - FHIR  
| 2021-09 ONC FAST - National Directory US Realm  
| FHIR Version | FHIR R4  
| Kick-Off | Kick-Off - January 4 (During the HL7 FAST Exchange Tiger Team call)  
| Join Meeting | https://global.gotomeeting.com/join/262996117  
<p>|</p>
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<tr>
<th>Specifications (s) this track uses</th>
<th><a href="http://hl7.org/fhir/us/exchange-routing/2022Jan/index.html">http://hl7.org/fhir/us/exchange-routing/2022Jan/index.html</a></th>
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<tr>
<td>Expected participants</td>
<td>Humana, HCSC, eHealth Exchange, CAQH, MCG</td>
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<td>Zulip stream</td>
<td><a href="https://chat.fhir.org/#narrow/stream/264775-FHIR-at.20Scale.20(FAST).3A.20Exchange.20with.2Fwithout.20intermediaries">https://chat.fhir.org/#narrow/stream/264775-FHIR-at.20Scale.20(FAST).3A.20Exchange.20with.2Fwithout.20intermediaries</a></td>
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<td>Date</td>
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<tr>
<td>Jan 4</td>
<td>12:00 - 1:00 CST</td>
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<td>Jan 11</td>
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The Connectathon track will test final content of the proposed STU IG currently in ballot and enable us to discuss opportunities for future enhancements to the IG.

This track will use simple FHIR content to test routing of FHIR requests through one or two intermediaries to the destination server. The focus will be on the routing methods used to transmit the exchange between the originator, intermediaries and destination.

The return response will also be part of the exercise.
To test this interaction, no specific clinical input is needed and the tests can rely on existing use cases with any type of data.

System roles
- **Originator/Requestor**
  - Send a request message, including routing information in the URL
  - Receive a response message
- **Destination/Responder**
  - Receive a request message
  - Send a response message, including routing information in the URL
- "Inbound Gateway" intermediary working on behalf of destination/responder
  - This intermediary receives the request from the originator and forwards it to a second intermediary
- Additional intermediary that participates in delivery to the destination
  - This intermediary receives the request from the first intermediary and forwards it to the destination system

Test Scenarios

1. Synchronous search, then retrieve a resource referenced in the search results (Single intermediary)

   **Steps:**
   1. Obtain public URL of a destination that uses an intermediary
      - Test multiple URL formats
      - Will use what participating intermediaries can support. Not necessarily test all formats
      - Final IG allows all: Intermediary hostname + destination segment, Destination's hostname, subdomain
      - Stretch: Retrieve public URL from an endpoint directory
   2. Submit search (GET)
      - Resolves to the intermediary. Forwarded to destination
      - Destination responds and uses its public URL in references to itself
      - Intermediary passes back results unchanged
   3. Retrieve a resource referenced in the search results (GET)
      - Steps as above

2. Multiple intermediaries. Synchronous search, then retrieve a resource referenced in the search results

   **Steps as in Single Intermediary above, except at Step 2 - Submit search (GET)
• Originator’s request resolves to the first intermediary
• First intermediary forwards to the second intermediary
• Second intermediary forwards to the destination
• Destination responds and uses its public URL in references to itself
• Intermediaries pass back results unchanged

Include: Optional error scenario: The second intermediary doesn’t recognize the destination. (E.g., second intermediary hasn’t updated its routing table and doesn’t kn

3. Asynchronous search for large set of data. Poll and then retrieve response (Single intermediary)

Steps:

1. Obtain public URL of a destination that uses an intermediary

2. Submit search (GET) using asynchronous pattern
   • Header: Include Prefer:respond-async
   • Query string: Include output format parameter _outputFormat(string, optional, defaults to application/fhir+ndjson)
   • Destination responds with 202 Accepted. Includes Content-Location header with a URL for subsequent status requests
   • Intermediary passes back response unchanged

3. Poll the URL provided in the Content-Location header to get the request status

4. Destination responds with 200 OK (results are ready) and body containing a link to the search results. E.g.,

   ```
   {
   "transactionTime": "[instant]",
   "request": "[base]/Patient/$export?_type=Patient,Observation",
   "requiresAccessToken": true,
   "output": []
   "type": "Patient",
   "url": "http://serverpath2/patient_file_1.ndjson"
   },
   "type": "Observation",
   "url": "http://serverpath2/observation_file_1.ndjson"
   
   "error": []
   }
   ```

5. Retrieve output files using links in the status response body
4. Intermediary exception handling scenario: The second intermediary doesn’t recognize the destination

At step 2 of the multiple-intermediary, synchronous search scenario above...

- The first intermediary forwards the request to the second intermediary
- The second intermediary determines that it cannot route the request to the destination
- The second intermediary responds to the first intermediary as follows:
  - Returns an HTTP 404 status code, indicating that the destination could not be determined based on the submitted FHIR service base URL
  - (Extra credit) Includes an OperationOutcome with additional details
- The first intermediary passes the response back to the originator, unchanged

Security and Privacy Considerations:

All content exchanged during the Connectathon is fictitious.

All exchanges in the exchange SHALL use Transport Layer Security (TLS).

- The inbound gateway intermediary SHALL hold the TLS certificate for the destination’s public FHIR service base URL
- The destination system and any delegated intermediaries SHALL hold the certificates for their servers’ private URLs.

Tokens are passed-through intermediaries. Security tokens generated by the destination for use by the originator SHALL be forwarded by any intermediaries to the originator.