



AIRA

AMERICAN IMMUNIZATION
REGISTRY ASSOCIATION

Transport Assessment

Aggregate Report

2023 – Quarter 3



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Background

In 2015, AIRA launched an initiative to determine the level of alignment among current immunization information systems (IIS) with community-vetted standards and recommendations. This [Measurement and Improvement \(M&I\) Initiative](#) is an ongoing project that connects with IIS preproduction systems directly and submits sample messages to these IIS development platforms.

[Testing and Discovery](#) (T&D) is the first stage of the overall IIS M&I process. The next stage is [IIS Assessment](#). The results from T&D are used to design the final measures and tests for the IIS Assessment process, which also relies on [IIS Functional Standards](#) and operational guidance statements. The final stage following IIS Assessment is [Validation](#).

In early 2016, the [Measurement for Assessment and Certification Advisory Workgroup](#) (MACAW) was initiated to systematically research and formulate key IIS assessment components, develop measures, and implement the IIS Assessment and Validation process. MACAW uses T&D results to identify and develop assessment measures for specific IIS components. Those measures are then vetted and approved by the IIS community. **Transport** is the first content area of the M&I Initiative, and this report contains the aggregate results of the IIS Assessment remeasurement completed in **Quarter 3 of 2023**. This process will be repeated in Quarter 1 of 2024 to measure progress within the community.

In addition to this aggregate report, a detailed individual report is provided to each jurisdiction for their own projects. AIRA does not redistribute any individual IIS results outside of each respective jurisdiction and the self-selected sharing settings within the Aggregate Analysis Reporting Tool ([AART](#)).

Transmission and receipt of health data from one system to another is achieved through an agreed-upon transport layer. In 2011, a panel of industry experts led by the Centers for Disease Control and Prevention (CDC) concluded that a SOAP-based transport methodology was the best fit for meeting the needs of transmitting immunization data via HL7 messaging. The panel also defined a WSDL (Web Services Description Language) for all partners to implement, commonly referred to as the CDC WSDL, and it is outlined in the [Transport Layer Protocol Recommendation: Formal Specification v1.2](#).

This report contains the results of conformance testing of the community's CDC WSDL implementation at the points where it was installed and where AIRA was able to connect with test systems. This conformance testing uses the [National Institute of Standards and](#)

[Technology \(NIST\) Immunization Test Suite Validation Tool](#). This tool provides consistent conformance-based results for all measured IIS.

Conformance Tests

MACAW, an advisory workgroup of IIS community members and partners, crafts the measures and tests for IIS Assessment. Message Transport is assessed with three following measures:

Measure 1: The IIS supports the Connectivity Test Operation as defined in the SOAP Standard Interface 1.2 specification, WSDL, as endorsed by CDC.

Measure 2: The IIS supports the Submit Single Message Operation as defined in the SOAP Standard Interface 1.2 specification, WSDL, as endorsed by CDC.

Measure 3: The IIS supports the Security Fault as defined in the SOAP Standard Interface 1.2 specification, WSDL, as endorsed by CDC.

The **Connectivity Test** operation is a “ping-like” feature that allows electronic health records (EHRs) and other sending systems to perform a simple test with an IIS to verify the two systems can at least “see” each other without HL7 messaging and/or authentication.

The **Submit Single Message** operation is the primary function of the CDC WSDL designed to carry an HL7 V2.x message, along with the authentication (username, password, facility ID) parameters to make data exchange possible.

The **Security Fault** shall be thrown by the IIS if the initiating system fails to authenticate (e.g., when a bad username-password combination occurs).

Please review the detailed measures and tests for Transport on the [AIRA repository](#).

Conformance Results

The following table highlights the possible results of each of the conformance tests in the above descriptions.

If any of the conformance tests fail, additional details are outlined in individual reports with individual site results. If an IIS conforms with the standard specified above, it is reported as “meets” for a specific test. “Deviates from standard” occurs when an IIS is close to meeting the standard but has work to do to meet the standard. An IIS that “does not meet” the standard may have substantially changed the CDC WSDL or chosen not to implement the entire CDC WSDL.

Connectivity Test	Submit Single Message	Security Fault
Meets	Meets	Meets
Deviates from Standard	Deviates from Standard	Deviates from Standard
Does Not Meet	Does Not Meet	Does Not Meet

Summary Results

Sixty-one¹ IIS were encouraged to be measured in the IIS Transport Assessment. Of the 61 participating IIS,² **58 (95%)** had a SOAP Web Services/CDC WSDL end point available for testing. This is an increase of 37 IIS since the baseline measurement in Quarter 3 of 2016 (n=21).

Specific results for each test were as follows:

Connectivity Test	Submit Single Message	Security Fault
57	57	48
0	0	4
1	1	6

Of the 58 IIS with a CDC WSDL end point available for testing:

- **48 (83%)** met all three measures.
- **8 (14%)** met two measures (Connectivity Test and Submit Single Message).³
- **2 (3%)** met one out of three measures.

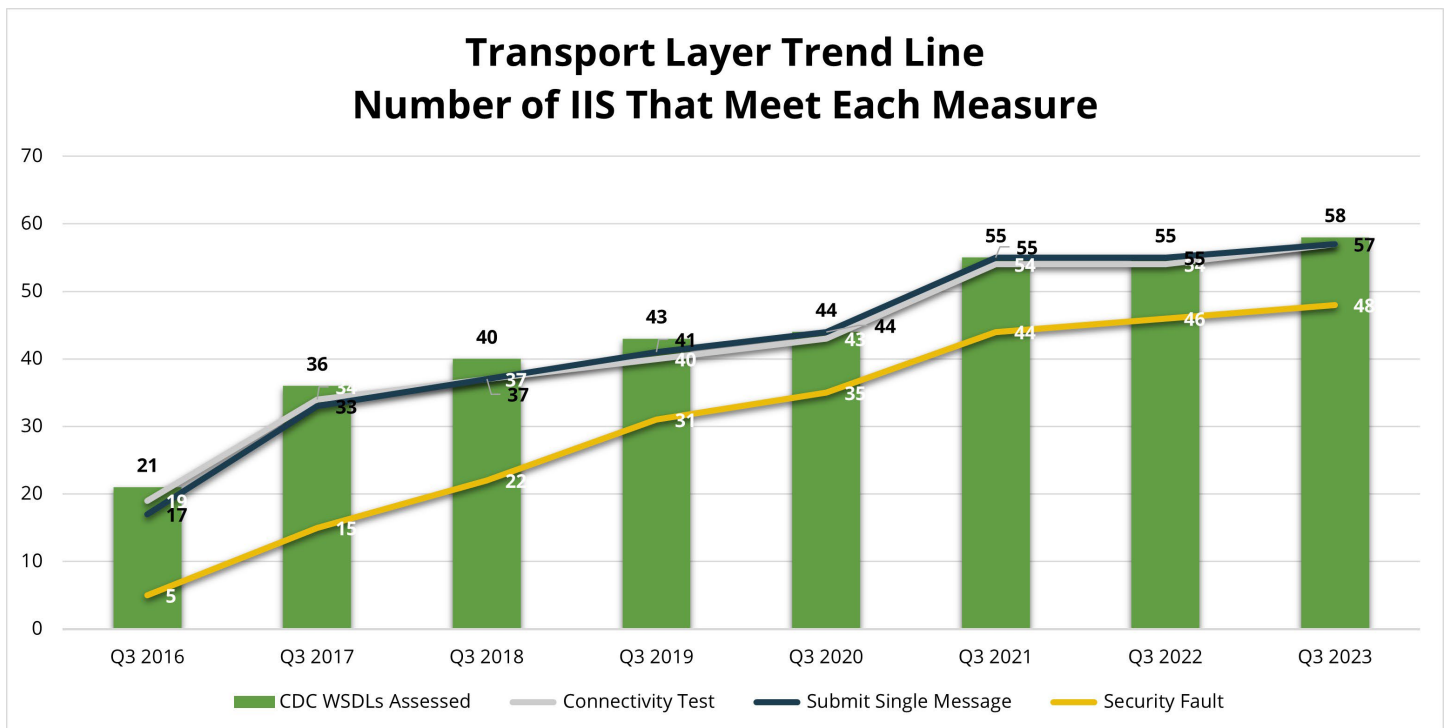
Please refer to [Appendix A](#) for additional details that contribute to IIS measure deviations and/or nonalignment.

¹ The denominator for M&I participation decreased from 62 to 61 in Q2 2022, due to San Diego IIS's merge with California's state IIS.

² Includes all 50 states, American Samoa, the Commonwealth of the Northern Mariana Islands, the District of Columbia, the Federated States of Micronesia, Guam, New York City, Philadelphia, Puerto Rico, the Republic of the Marshall Islands, the Republic of Palau, and the Virgin Islands.

³ It is important to note that the IIS that passed all measures except the Security Fault are interoperable with the CDC WSDL standard if the correct authentication parameters are sent. For this reason, these sites are functionally compatible for production use when authentication succeeds but improperly indicate authentication failure through the use of a conformant Security Fault.

Summary of Progress



Since the initial baseline measurement in Quarter 3 of 2016, the following progress has been observed:

- **Alignment with CDC WSDL specification:** 48 IIS have a fully compliant WSDL. This is an increase of 43 since the initial baseline.
- **Nearing alignment:** Eight additional IIS meet two of the three measures and are likely interoperable in production.
- **Known CDC WSDL implementations:** Fifty-eight IIS are known to have a CDC WSDL implementation. This is 37 more CDC WSDL implementations achieved since the baseline.⁴

Report Limitations

One limitation to note is that this report is based on conformance requirements that align with the standard, but it is not meant to suggest IIS cannot achieve interoperability outside of this standard. For example, although several IIS do not meet conformance on the Security Fault test, this does not imply the IIS are unable to interoperate using the Submit

⁴ Note that not all IIS were able to be assessed this quarter but they have been measured in previous quarters.

Single Message operation when authentication passes. It specifically means an IIS does not conform to the CDC WSDL when throwing a Security Fault during authentication failure. However, full conformance to standards across the IIS and EHR community will improve interoperability and onboarding timeliness.

General Recommendations for All IIS

1. Review conformance test results and target program efforts to improve areas of non-conformance.
 - a. In doing so, it is important to consider if the changes to conform will break existing connections. If the changes will break existing connections, it may be better to leave the existing non-conformant connection operational and provide a new end point that conforms with the CDC WSDL. This will provide an easy and natural transition strategy to the conformant CDC WSDL as new and existing providers/EHRs develop or upgrade their interfaces.
2. Use the conformance tool provided by NIST when developing and/or improving implementation of the CDC WSDL.
 - a. The tool can aid the software development process. The tool is located at <https://hl7v2-iz-r1-5-testing.nist.gov/iztool/#/cf> and is free to use without installation or registration requirements.
3. Publish and make available all transport layer requirements for use by potential trading partners.
 - a. Almost all IIS publish their HL7 guide, but only a limited number publish their transport layer requirements for use by trading partners prior to beginning the onboarding process. Waiting until onboarding to share transport layer requirements may delay or unnecessarily burden the onboarding process. The earlier a trading partner can access the requirements, the better chance it will have at developing its product to the requirements.
4. Consider sharing your Assessment results in AART with others, including EHRs.
 - a. This can be helpful as they prepare to exchange with your IIS. Please refer to [Information on AART Measurement and Sharing Settings](#) for guidance on sharing settings.

Questions and/or Comments

Please direct questions and/or comments via AIRA's online technical assistance [form](#).

Appendix A

The following appendix provides specific details as to why IIS either deviated from or did not meet the CDC WSDL standard across the three tests. In some cases, an IIS may have more than one reason it deviated or did not meet the test.

Connectivity Test

Deviates from Standard	Does Not Meet
	Changed request and response construct: The IIS modified the request and/or response construct of the Connectivity Test operation. This modification could include changing the operation name, adding parameters, and/or changing the return construct of the CDC-defined Connectivity Test. The functional requirements are the same but are implemented differently.

Submit Single Message

Deviates from Standard	Does Not Meet
	Malformed HL7: The HL7 returned by the IIS is missing newline characters required by HL7. Sending systems (e.g., EHRs) will need to create special parsing routines to read the HL7.

Security Fault

Deviates from Standard	Does Not Meet
Non-conformant fault: The IIS throws a fault as required by the standard, but the fault thrown by the IIS does not conform to the fault defined by the CDC WSDL.	Does not throw a fault: The IIS properly catches an authentication failure but returns the authentication failure where only HL7 responses are supposed to be returned rather than throwing a SOAP fault dedicated to authentication failures.
	Failure to respond: The IIS fails to respond with the CDC WSDL defined Security Fault when a client-side certificate is not sent.