

# SOAP

# Transport Protocol

## Enhancing EHR-IIS Interoperability



**U.S. Department of  
Health and Human Services**  
Centers for Disease  
Control and Prevention

Each protocol was evaluated against 20 agreed-upon business requirements, as well as the HL7 2.5.1 Use Cases.



The Centers for Disease Control & Prevention (CDC) Immunization Information System Support Branch (IISSB) initiated the Electronic Health Record (EHR)-Immunization Information Systems (IIS) Interoperability Enhancement Project to provide support for the enhanced interoperability of EHRs with IIS, specifically focusing on the exchange of vaccination records. The CDC established a panel of subject matter experts (SMEs) and reviewers to evaluate and analyze currently utilized industry transport protocols and recommend the most suitable option for EHR-IIS interoperability.

**The Transport Layer Expert Panel consisted of 41 industry experts representing:**

- Office of the National Coordinator (ONC)
- CDC Public Health Informatics and Technology Program Office (PHITPO)
- American Immunization Registry Association (AIRA)
- Electronic Health Record Association (EHRA)
- Indian Health Service (IHS)
- IIS vendors
- EHR vendors
- IIS programs

**The panel conducted a thorough investigation and comparison of five transport protocol options:**

- ebXML (PHINMS)
- SMTP+S/MIME (Direct Project)
- SFTP
- HTTPS POST/REST
- SOAP

The panel's intent was to identify and recommend a unified technical interoperability framework for immunization-related transport that would allow for both broad adoption and long-term viability as an industry standard.

Panel members identified Simple Object Access Protocol (SOAP) as the protocol that can meet the current and future needs of IIS data exchange and that also has the best chance for broad adoption across disparate healthcare systems. While the panel recommended SOAP, it significantly acknowledged the role and value of the other transport layer options. It was not the expectation of the panel or of the EHR-IIS Interoperability Project that IIS programs discontinue the use of existing transport protocols or those currently under development. The panel's findings do not represent a mandate for IIS programs but rather a recommendation to move toward standardization in the immunization community.

## Justification of SOAP Selection

<b>Best Chance for Broad Adoption Across Disparate Systems</b>
This is a key factor in the success of any technology decision but is even more important for an interoperability project. The panel addressed this by looking at key stakeholders, prior implementations, and industry trends
<b>Wide Usage by EHR Community</b>
The 2011 Integrating the Healthcare Enterprise (IHE) Connectathon, the largest interoperability testing event for the healthcare IT industry, included 40 EHRs that support SOAP.
<b>Natural Language Syntax</b>
From a developer standpoint, multiple SOAP development and support tools exist, ranging from open source to privately-licensed software. There is also a large community of practice, web resources, tutorials, and example code to heighten ease of use.
<b>Machine-Readable Contract/WSDL</b>
SOAP has a machine-readable contract between the sender and receiver to describe its conventions, such as how and where to specify authentication credentials, that is referred to as a Web Services Definition Language (WSDL). This allows for a clear interface across all healthcare systems. The panel created its own WSDL to provide a common contract for query/response between EHRs and IIS and therefore reduce implementation timelines.
<b>Usage by IIS Community</b>
Several IIS are either live with a SOAP web service or working toward a SOAP service. Currently, these include: Arizona, Colorado, Kansas, Massachusetts, Missouri, Nevada, New York City, Oregon, Utah, and Wisconsin.
<b>Support for Current and Future HL7 Messages</b>
If immunization messaging moves towards HL7 Version 3 with XML-based messages, SOAP has the ability to transport streams of text as well as object models.
<b>Support for Future Interoperability Initiatives</b>
The SOAP transport methodology supports the long-term goals of immunization messaging interoperability and future potential Meaningful Use requirements.

## Findings

The panel's findings were formally presented at the National Immunization Conference (NIC) in March 2011. The collaborative work of the panel was documented in a 75-page Recommendations Document which details the panel's methodology, the justifications for its recommendation, a detailed acknowledgement of the other transport protocols, and a summary of the impacts of a SOAP implementation. The Recommendation Document can be found on the IISB web site at: <http://www.cdc.gov/vaccines/programs/iis/interop-proj/downloads/ehr-interop-trans-layer-tech-recs.pdf>

By identifying SOAP as a recommended transport, EHR vendors will be able to focus on one transport protocol as a baseline for interoperability with immunization registries, while having a protocol that is scalable enough for the emerging requirements for query functionality.



## Impact

The recommendation of SOAP web services has a number of effects on the IIS and EHR communities. IIS that have implemented a SOAP service have been able to build their capabilities over time. This means it is entirely possible to build a simple SOAP service which only processes vaccination updates at first. Once stable, the IIS can then focus on expanding its SOAP service to handle query/response use cases. EHR vendors and their clients at healthcare facilities will need to work with IIS to connect the software deployed at hospitals, clinics, and private doctors' offices to the IIS. The Electronic Health Record Association (EHRA) supports the effort to recommend a single transport option that member companies would utilize for immunization interoperability. When technology companies need to assign resources for the same clinical functionality (exporting/importing immunization information to/from registries), but with different technical implementations, it increases the cost to the entire stakeholder base.

## Resources

To support the SOAP recommendation, the expert panel developed SOAP Implementation Resources in addition to the Recommendation Document. These resources include:

- Case studies of SOAP implementation efforts
- Lessons learned
- Documentation of SOAP tools
- Coding samples for the WSDL in Java and .Net

The panel also developed a Formal Specification Document to support software interface engineers and technical project managers. For SOAP-based HL7 transmissions to an IIS, the Specification describes operations, parameters, and faults, as well as addressing transport and security.

All resources and references can be found on the IISB web site at: <https://www.cdc.gov/vaccines/programs/iis/technical-guidance/soap/service>

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