



Nationwide Health Information Network (NHIN)

Trial Implementations

Service Interface Specifications

# **Health Information Event Messaging**

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## Contributors

Name	Organization	NHIE represented
Richard Franck	IBM	NCHICA
Craig Miller	Vangent	Federal NHIE

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## 1 Preface

### 1.1 Introduction

The NHIN Trial Implementations Service Interface Specifications constitute the core services of an operational Nationwide Health Information Network. They are intended to provide a standard set of service interfaces that enable Nationwide Health Information Exchange (NHIE) to NHIE exchange of interoperable health information. These services provide such functional capabilities as patient look-up, document query and retrieve, notification of consumer preferences, and access to logs for determining who has accessed what records and for what purpose for use. These functional services rest on a foundational set of messaging and security services. The current set of defined core services includes the following:

1. NHIN Trial Implementations Message Platform Service Interface Specification,
2. NHIN Trial Implementations Authorization Framework Service Interface Specification,
3. NHIN Trial Implementations Subject Discovery Service Interface Specification,
4. NHIN Trial Implementations Document Query Service Interface Specification,
5. NHIN Trial Implementations Document Retrieve Service Interface Specification,
6. NHIN Trial Implementations Audit Log Query Service Interface Specification,
7. NHIN Trial Implementations Consumer Preferences Service Interface Specification
8. NHIN Trial Implementations Health Information Event Messaging Service Interface Specification
9. NHIN Trial Implementations NHIE Service Registry Interface Specification
10. NHIN Trial Implementations Authorized Case Follow-Up Service Interface Specification

It is expected that these core services will be implemented together as a suite since the functional level services are dependent on the foundational services. Specifications #1 through #7 were the focus of the August 2008 testing event and September AHIC demonstrations. Specifications #1 through #9 were included in the November testing and demonstrations during the December 2008 NHIN Trial Implementations Forum.

### 1.2 Intended Audience

The primary audience for the NHIN Trial Implementations Service Interface Specifications is the individuals responsible for implementing software solutions that realize these interfaces for a NHIE. After reading this specification, one should have an understanding of the context in which the service interface is meant to be used, the behavior of the interface, the Web Services Description Language (WSDLs) used to define the service, any Extensible Markup Language (XML) schemas used to define the content and what “compliance” means from an implementation testing perspective.

### 1.3 Focus of this Specification

This document presents the NHIN Trial Implementations Specification for Health Information Event Messaging Interface Specification. This specification defines the messages used for one NHIE to subscribe to content from another NHIE, and to notify another NHIE about that content; but it does not define the content that can be subscribed to. It is intended that NHIEs responsible for implementing specific AHIC use cases will define this content for their specific domains, and will refer to this specification for the definition of the base subscribe, unsubscribe, and notify messages.

For the purposes of the 2008 NHIN Trial Implementations, this specification will provide the publish and subscribe mechanism to support implementations of the AHIC Quality and Biosurveillance use cases.

#### 1.3.1 Business Needs Supported by this Specification

This specification does not directly address particular business needs, but lays the groundwork for other NHIN Trial Implementation specifications to use the publish/subscribe mechanism defined here to meet business needs. Some of the NHIN Core Services that can be implemented through this publish-subscribe mechanism include:

- Secure data delivery, and confirmation of delivery, to EHRs, PHRs, other systems and networks



- Support for notification of the availability of new or updated data
- Support for secondary use of clinical data including data provisioning and distribution of data transmission parameters
- Support of consumer information location requests and data routing to consumer-identified personal health records

In some circumstances, an NHIE may implement either the Subscriber interface or the Notification Producer interface, but not both, for a particular content type.

### 1.3.2 NHIN Interface Specifications Referenced by this Specification

The underlying WS-BaseNotification capability described by Health Information Event Messaging provides the publish and subscribe mechanism for the Consumer Preferences Profile NHIN interface specification.

### 1.3.3 Key Attributes of the Specification

- The specification defines a subscribe and notify mechanism for the exchange of data between NHIEs.
- The particular types of data that can be exchanged through this subscribe and notify mechanism are not defined by this specifications, but are anticipated to be defined in other specifications that reference this specification.
- This specification does not include the business rules or policies that define the conditions under which an NHIE would choose to subscribe to particular data, or notify another NHIE when data is available. Such rules or policies would be defined in other specifications that reference this specification, or they may be separately addressed by NHIE-specific business rules and/or NHIN Cooperative Operating Procedures.
- This specification is based on the Web Services Base Notification (WS-Base Notification) standard from OASIS.

## 1.4 Related Documents

The following documents and standards were referenced during the development of this specification:

- WS-BaseNotification 1.3 OASIS standard ([http://docs.oasis-open.org/wsn/wsn-ws\\_base\\_notification-1.3-spec-os.pdf](http://docs.oasis-open.org/wsn/wsn-ws_base_notification-1.3-spec-os.pdf) ).
- WS Addressing (<http://www.w3.org/Submission/ws-addressing/> )
- IHE ITI White Paper: Publish/Subscribe Infrastructure ([http://wiki.ihe.net/index.php?title=ITI\\_White\\_Paper:\\_Publish/Subscribe\\_Infrastructure](http://wiki.ihe.net/index.php?title=ITI_White_Paper:_Publish/Subscribe_Infrastructure))

## 1.5 Relationship to HITSP Constructs

There are no HITSP Constructs that directly relate to the need for a Publish/Subscribe mechanism for the exchange of data.

## 1.6 Relationship to other NHIN Cooperative Specifications

This specification utilizes the transmission and security standards identified in the NHIN Messaging Platform Interface Specification and NHIN Authorization Framework.

# 2 Interface Description

## 2.1 Definition

This specification uses the WS-Base Notification standard from OASIS to allow NHIEs to indicate their desire to subscribe or unsubscribe to certain types of content, and to notify NHIEs when content matching



a subscription has been created or modified. The specific types of content that can be subscribed to, and the conditions under which notifications should occur, will be defined in other specifications that reference this specification.

WS-Base Notification defines three messages that are used to accomplish this:

1. Subscribe
2. Unsubscribe
3. Notify

WS-Base Notification also defines a “Renew” message to extend the life span of a subscription; however, this specification does not make use of time-limited subscriptions, so the “Renew” operation is not required.

## 2.2 Transaction Standard

This specification identifies the WS-Base Notification standard from OASIS as the base standard for these messages. Only the following messages from WS-Base Notification are required:

- Notify
- Subscribe
- SubscribeResponse
- Unsubscribe
- UnsubscribeResponse

## 2.3 Technical Pre-conditions

The following technical pre-conditions exist for this interface specification:

- An NHIE has performed the NHIN Subject Discovery Interface and identified that it has a consumer in common with another NHIE.

## 2.4 Technical Post-conditions

The following technical post-conditions will results after the execution of this interface specification:

- NONE

## 3 Interface Definition

### 3.1 Message Syntax

The messages defined in this specification utilize elements defined in several different places, as described in the following table. Readers and implementers are urged to pay careful attention to the XML namespaces used in this document.

Namespace prefix used in this document	Full namespace identifier	Description
wsnt	<a href="http://docs.oasis-open.org/wsn/b-2">http://docs.oasis-open.org/wsn/b-2</a>	WS-Base Notification standard
wsa	<a href="http://www.w3.org/2005/08/addressing">http://www.w3.org/2005/08/addressing</a>	WS-Addressing standard
nhin	<a href="http://www.hhs.gov/healthit/nhin">http://www.hhs.gov/healthit/nhin</a>	Defined by this specification in Appendix A

This specification establishes the use of the namespace identifier “<http://www.hhs.gov/healthit/nhin>” as the namespace identifier for the XML schema to support this Publish/Subscribe specification.



### 3.1.1 Use of SAML Assertions in Publish/Subscribe Messages

Each transaction identified in this specification must contain assertions about the identity and role of the user or system initiating the request. The transactions described in this specification should use a purpose for use assertion indicating a “Healthcare Operations”, since these messages are a kind of “infrastructure” message that is used to support the operations of an NHIE. In some cases, a “subscribe” message may be issued on behalf of a particular end user; in those cases that user’s name, organization, and role should be included in the SAML assertions as defined in the NHIN Authorization Framework. In other cases, a “subscribe”, “unsubscribe”, or “notify” message may be sent on behalf of the NHIE “system” or infrastructure itself. In those cases, the message should contain a name and organization of a systems administrator for the NHIE, a user role of “IT Professional”, and a purpose for use of “Healthcare Operations”.

### 3.1.2 Subscribe

The Subscribe message is used as defined by WS-Base Notification. It must contain:

- A <ConsumerReference> element, which is a wsa:EndpointReference giving the WS-Address of the endpoint to be notified as a result of this subscription, and
- A content element defined by another specification referencing this specification.

The SubscribeResponse must contain a <SubscriptionReference> element, which is a wsa:EndpointReference. This Endpoint Reference must contain a unique reference to the subscription created. This can be done by creating a unique URI to represent the subscription, or by using the <wsa:ReferenceParameters> element. If the wsa:ReferenceParameters is used, the content of the reference parameter may (but is not required to) use the nhin:SubscriptionId element defined in Appendix A.

The <SubscriptionReference> Endpoint Reference is the address to which future unsubscribe requests are addressed.

The SOAP Action for the subscribe request is:

<http://docs.oasis-open.org/wsn/bw-2/NotificationProducer/SubscribeRequest>

### 3.1.3 Unsubscribe

The Unsubscribe message is used as defined by WS-Base Notification. There is no content on the Unsubscribe request – only an empty “Unsubscribe” element is required. The Unsubscribe request is addressed to the Endpoint Reference that was returned on the SubscribeResponse.

This transaction should carry in the SOAP header a user identification of a system administrative user defined by the requesting NHIE, the name of the NHIE as the organization, and a user role of “IT Professional”.

The SOAP Action for the unsubscribe request is:

<http://docs.oasis-open.org/wsn/bw-2/SubscriptionManager/UnsubscribeRequest>

### 3.1.4 Notify

The Notify message is used as defined by WS-Base Notification. It must contain:

- A <wsnt:SubscriptionReference> element, containing the same content that was in the Subscription Reference of the Subscribe Response for the subscription that this Notify is in fulfillment of.
- A <wsnt:Message> element, containing content as defined by another specification that references this specification.

The Notification message must be addressed to the WS-Address given in the ConsumerReference element of the subscription request.

The SOAP Action for the Notify message is:

<http://docs.oasis-open.org/wsn/bw-2/NotificationConsumer/Notify>





### 3.2 Content Semantics

Content semantics contained in the Subscribe and Notify messages will be defined in other specifications.

### 3.3 Constraints and Extensions

Constraints on WS-Base Notification identified in this document are:

- Only the Subscribe, Unsubscribe, and Notify messages and their responses are used

### 3.4 Sample Messages

These sample messages show subscribe, unsubscribe, and notify messages with empty content. Comments within the XML show where content should be placed.

The SOAP addressing is shown in the Unsubscribe and Notify messages to demonstrate how the Endpoint References from other messages are used to address these messages.

#### 3.4.1 Sample Subscribe and SubscribeResponse

```
<wsnt:Subscribe xmlns:wsnt="http://docs.oasis-open.org/wsn/b-2"
  xmlns:wsa="http://www.w3.org/2005/08/addressing">

  <wsnt:ConsumerReference>
    <!-- this is the endpoint to notify -->
    <wsa:Address>https://csnhintapps03.cgifederal.com:6151/Subscribe
  </wsa:Address>
    <wsa:ReferenceParameters>
      <nhin:UserAddress>lee.morgan@carespark.com</nhin:UserAddress>
    </wsa:ReferenceParameters>
  </wsnt:ConsumerReference>

  <!-- Subscription content goes here -->

</wsnt:Subscribe>
```

```
<wsnt:SubscribeResponse xmlns:wsnt="http://docs.oasis-open.org/wsn/b-2"
  xmlns:wsa="http://www.w3.org/2005/08/addressing"
  xmlns:nhin="http://www.hhs.gov/healthit/nhin">

  <wsnt:SubscriptionReference>
    <wsa:Address>
      http://www.nchica.org/SubscriptionManager
    </wsa:Address>
    <wsa:ReferenceParameters>
      <nhin:SubscriptionId>382dc7-8e84-9fdc-8443-48fd83bca938</nhin:SubscriptionId>
    </wsa:ReferenceParameters>
  </wsnt:SubscriptionReference>
</wsnt:SubscribeResponse>
```





### 3.4.2 Sample Unsubscribe

This example shows the SOAP addressing headers. The Endpoint Reference contained on the SubscriptionReference element of the SubscribeResponse is now the address to which the Unsubscribe is addressed. The <wsa:ReferenceParameter> becomes a header block in the SOAP header, as specified by WS-Addressing. The unsubscribe response has no content.

```
<s:Envelope xmlns:s="http://www.w3.org/2003/05/soap-envelope"
  xmlns:wsa="http://www.w3.org/2005/08/addressing"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:wsnt="http://docs.oasis-open.org/wsn/b-2"
  xmlns:nhin="http://www.hhs.gov/healthit/nhin">
  <s:Header>
    <wsa:Action>http://docs.oasis-open.org/wsn/bw-2/SubscriptionManager/UnsubscribeRequest
    </wsa:Action>
    <wsa:MessageID>382dc9-8e86-9fde-8445-48fd83bca93a</wsa:MessageID>
    <wsa:To>http://www.nchica.org/SubscriptionManager</wsa:To>
    <nhin:SubscriptionId>382dc9-8e84-9fdc-8443-48fd83bca938</nhin:SubscriptionId>
  </s:Header>
  <s:Body>
    <wsnt:Unsubscribe/>
  </s:Body>
</s:Envelope>
```

### 3.4.3 Sample Notify

```
<s:Envelope xmlns:s="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:a="http://www.w3.org/2005/08/addressing"
  xmlns:wsnt="http://docs.oasis-open.org/wsn/b-2"
  xmlns:nhin="http://www.hhs.gov/healthit/nhin">
  <s:Header>
    <a:Action s:mustUnderstand="1">http://docs.oasis-open.org/wsn/bw-
2/NotificationConsumer/Notify</a:Action>
    <a:MessageID>urn:uuid:a02ca8cd-86fa-4afc-a27c-616c183b2055</a:MessageID>
    <a:To s:mustUnderstand="1"> https://csnhintiapps03.cgifederal.com:6151/Subscribe</a:To>
    <nhin:UserAddress> lee.morgan@carespark.com </nhin:UserAddress>
  </s:Header>
  <s:Body>
    <wsnt:Notify>
      <wsnt:NotificationMessage>
        <wsnt:Message>
          <!-- message content goes here -->
        </wsnt:Message>
      </wsnt:NotificationMessage>
    </wsnt:Notify>
  </s:Body>
</s:Envelope>
```



## **4 Error Handling**

Faults should be sent as defined by WS-Base Notification. Specifications referencing this “Base” specification may describe specific cases where certain faults should be used.

## **5 Auditing**

An NHIE should create an “Export” audit event when sending a Notify message to another NHIE.

An NHIE should create an “Import” audit event when receiving a Notify message to another NHIE.

NHIEs are encouraged to create audit events when requesting, terminating, or accepting subscriptions.



## 6 Appendix A – NHIN Schema to support Subscribe and Notification messages

The following schema is defined by this specification and is used in support of the messages described in this document.

```
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema"
  targetNamespace="http://www.hhs.gov/healthit/nhin"
  xmlns:nhin="http://www.hhs.gov/healthit/nhin">

  <xsd:complexType name="InstanceIdentifier">
    <xsd:attribute name="root" type="xsd:string"/>
    <xsd:attribute name="extension" type="xsd:string"/>
  </xsd:complexType>
  <xsd:element name="PatientId" type="nhin:InstanceIdentifier"/>

  <xsd:element name="UserAddress" type="xsd:string"/>

  <xsd:element name="SubscriptionId" type="xsd:string"/>

</xsd:schema>
```