

# NSI CS 2.0 Schema Changes

Coding against the NSI Connection Services (CS) 1.rio and 1.sc definitions revealed structural duplication due to the inclusion of common NSI framework messaging elements in each connection service operation. As a result, common NSI protocol header fields required dedicated handling code for each operation. It was determined that restructuring of the NSI message layout into a common NSI messaging header and CS specific message body could considerably reduce the number of element definitions within the WSDL and XML schema. This strategy would also move us closer to the original intent of the NSI architecture document, which defines a common NSI framework header and separate CS operation specific payload.

After discussion at OGF 34 in Oxford, it was agreed we would support this model by refactoring common NSI messaging header contents in the SOAP header, while leaving CS operation specific message components in SOAP body. This document describes these changes, as well as other agreed changes for NSI CS 2.0.

## NSI Framework Header

This section describes the new NSI framework header and provides example SOAP messages to illustrate the new structural layout of the common NSI operation request/acknowledgement, and confirmed/acknowledgement messaging interactions.

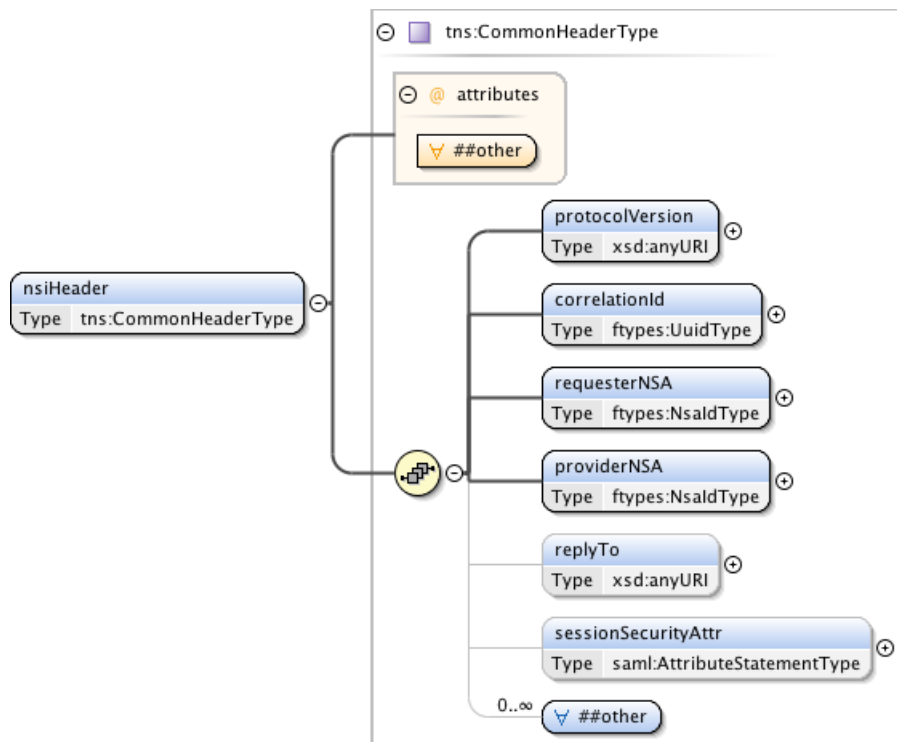


Figure 1 – Common NSI 2.0 framework message header.

## Header Definition

Figure 1 shows the new NSI 2.0 message header sent as part of every NSI message exchange. The original Oxford proposal was to create two separate header definitions, one for operation requests, and one for confirmed, failed, and notification messages. After further consideration a single header definition with optional elements was created to capture the semantics of both the request and response headers. The following attributes and elements are defined as part of the new NSI protocol header:

### Mandatory Elements:

#### *protocolVersion*

A URI identifying the specific protocol version carried in this NSI message. The protocol version is modeled separately from the namespace of the WSDL and XML schema to capture behavioral changes that cannot be modeled in schema definition, and to avoid updating of the schema namespace.

#### *correlationId*

An identifier provided by the requesting NSA used to correlate to an asynchronous response from the responder. It is recommended that a Universally Unique Identifier (UUID) URN as per IETF RFC 4122 be used as a globally unique value.

#### *requesterNSA*

The NSA identifier for the NSA acting in the Requester Agent role for the specific NSI operation.

#### *providerNSA*

The NSA identifier for the NSA acting in the Provider Agent role for the specific NSI operation.

### Optional Elements:

#### *replyTo*

The Requester NSA's SOAP endpoint address to which asynchronous messages associated with this operation request will be delivered. This is only populated for the original operation request (i.e. reserve, provision, release, terminate, and query), and not for any additional messaging associated with the operation. If no endpoint value is provided in a operation request, then it is assumed the requester is not interested in a response and will use alternative mechanism to determine the result.

### *sessionSecurityAttr*

Security attributes associated with the end user's NSI session. This field can be used to perform authentication, authorization, and policy enforcement of end user requests. Is only provided in the operation request (i.e. reserve, provision, release, terminate, and query), and not for any additional messaging associated with the operation.

### *other (any)*

Provides a flexible mechanism allowing additional elements in the protocol header for exchange between two-peered NSA. Use of this element field is beyond the current scope of this NSI specification, but may be used in the future to extend the existing protocol without requiring a schema change. Additionally, the field can be used between peered NSA to provide additional context not covered in the existing specification, however, this is left up to specific peering agreements.

### **Optional Attributes:**

#### *other (anyAttribute)*

Provides a flexible mechanism allowing additional attributes in the protocol header for exchange between two-peered NSA. Use of this attribute field is beyond the current scope of this NSI specification, but may be used in the future to extend the existing protocol without requiring a schema change. Additionally, the field can be used between peered NSA to provide additional context not covered in the existing specification, however, this is left up to specific peering agreements.

In addition, we identify the specific NSI CS operation being invoked using the "Soapaction:" element in the HTTP header as per section 6.1.1 of "Simple Object Access Protocol (SOAP) 1.1" found at <http://www.w3.org/TR/SOAP>. Discussion occurred in Oxford on the topic of including a specific "operation" element within the NSI header, however, this would have been a duplicate of the "Soapaction:" element, and therefore, was left out.

### **SOAP Messaging Examples**

The following SOAP over HTTP message shows the new structural layout of the Reserve request primitive using data from the existing Automated GOLE demo system.

```
POST /nsi-v2/ConnectionServiceProvider HTTP/1.1
Content-type: text/xml;charset="utf-8"
Authorization: Basic bnNpZGVtbzpzSaW9QbHVnLUZlc3QyMDExIQ==
Soapaction: "http://schemas.ogf.org/nsi/2012/03/connection/service/reserve"
Accept: text/xml, multipart/related, text/html, image/gif, image/jpeg, *, q=.2, */*; q=.2
User-Agent: JAX-WS RI 2.1.6 in JDK 6
Host: localhost:8084
Connection: keep-alive
Content-Length: 2511
```

```

<?xml version="1.0" ?>
<S:Envelope xmlns:S="http://schemas.xmlsoap.org/soap/envelope/">
  <S:Header>
    <ns5:nsiHeader xmlns:ns2="http://www.w3.org/2001/04/xmlenc#"
      xmlns:ns3="http://www.w3.org/2000/09/xmldsig#"
      xmlns:ns4="urn:oasis:names:tc:SAML:2.0:assertion"
      xmlns:ns5="http://schemas.ogf.org/nsi/2012/03/framework/headers"
      xmlns:ns6="http://schemas.ogf.org/nsi/2012/03/connection/interface"
      xmlns:ns7="http://schemas.ogf.org/nsi/2012/03/connection/types">
      <protocolVersion>http://schemas.ogf.org/nsi/2012/03/connection</protocolVersion>
      <correlationId>urn:uuid:b0dea3cf-dd4b-4c2c-bee3-f9ec8cf3affa</correlationId>
      <replyTo>http://localhost:9080/nsi-v2/ConnectionServiceRequester</replyTo>
      <requesterNSA>urn:ogf:network:nsa:netherlight</requesterNSA>
      <providerNSA>urn:ogf:network:nsa:czechlight</providerNSA>
      <sessionSecurityAttr>
        <ns4:Attribute NameFormat="urn:oasis:names:tc:SAML:2.0:attrname-format:basic" Name="globalUserName">
          <ns4:AttributeValue xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
            xmlns:xs="http://www.w3.org/2001/XMLSchema" xsi:type="xs:string"
            >jrv@internet2.edu</ns4:AttributeValue>
        </ns4:Attribute>
        <ns4:Attribute NameFormat="urn:oasis:names:tc:SAML:2.0:attrname-format:basic" Name="role">
          <ns4:AttributeValue xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
            xmlns:xs="http://www.w3.org/2001/XMLSchema" xsi:type="xs:string"
            >AuthorizedUser</ns4:AttributeValue>
        </ns4:Attribute>
      </sessionSecurityAttr>
    </ns5:nsiHeader>
  </S:Header>
  <S:Body>
    <ns7:reserve xmlns:ns2="http://www.w3.org/2001/04/xmlenc#"
      xmlns:ns3="http://www.w3.org/2000/09/xmldsig#"
      xmlns:ns4="urn:oasis:names:tc:SAML:2.0:assertion"
      xmlns:ns5="http://schemas.ogf.org/nsi/2012/03/framework/headers"
      xmlns:ns6="http://schemas.ogf.org/nsi/2012/03/connection/interface"
      xmlns:ns7="http://schemas.ogf.org/nsi/2012/03/connection/types">
      <reservation>
        <globalReservationId>urn:ogf:network:service:9cd41aa0-b019-435f-b3dc-075098816737</globalReservationId>
        <description>This is a test schedule connecting ps-80 to ams-80</description>
        <connectionId>urn:uuid:deb6aa8d-3e59-4821-9f7f-5c808be42bde</connectionId>
        <serviceParameters>
          <schedule>
            <startTime>2012-05-02T15:47:33.937Z</startTime>
            <endTime>2012-05-02T15:49:33.945Z</endTime>
          </schedule>
          <bandwidth>500</bandwidth>
        </serviceParameters>
        <path>
          <directionality>Bidirectional</directionality>
          <sourceSTP>
            <stpId>urn:ogf:network:stp:czechlight.ets:ps-80</stpId>
          </sourceSTP>
          <destSTP>
            <stpId>urn:ogf:network:stp:czechlight.ets:ams-80</stpId>
          </destSTP>
        </path>
      </reservation>
    </ns7:reserve>
  </S:Body>
</S:Envelope>

```

The following message is the HTTP response containing the acknowledgement to the previous Reserve request.

```

HTTP/1.1 200 OK
Server: Apache-Coyote/1.1
Content-Type: text/xml;charset=utf-8

```

Transfer-Encoding: chunked  
Date: Wed, 02 May 2012 15:45:34 GMT

```
<?xml version='1.0' encoding='UTF-8'?>
<S:Envelope xmlns:S="http://schemas.xmlsoap.org/soap/envelope/">
  <S:Header>
    <ns7:nsiHeader xmlns:ns2="urn:oasis:names:tc:SAML:2.0:assertion"
      xmlns:ns3="http://www.w3.org/2000/09/xmldsig#"
      xmlns:ns4="http://www.w3.org/2001/04/xmlenc#"
      xmlns:ns5="http://schemas.ogf.org/nsi/2012/03/connection/types"
      xmlns:ns6="http://schemas.ogf.org/nsi/2012/03/connection/interface"
      xmlns:ns7="http://schemas.ogf.org/nsi/2012/03/framework/headers">
      <protocolVersion>http://schemas.ogf.org/nsi/2012/03/connection</protocolVersion>
      <correlationId>urn:uuid:b0dea3cf-dd4b-4c2c-bee3-f9ec8cf3affa</correlationId>
      <requesterNSA>urn:ogf:network:nsa:netherlight</requesterNSA>
      <providerNSA>urn:ogf:network:nsa:czechlight</providerNSA>
    </ns7:nsiHeader>
  </S:Header>
  <S:Body>
    <ns6:acknowledgment xmlns:ns2="urn:oasis:names:tc:SAML:2.0:assertion"
      xmlns:ns3="http://www.w3.org/2000/09/xmldsig#"
      xmlns:ns4="http://www.w3.org/2001/04/xmlenc#"
      xmlns:ns5="http://schemas.ogf.org/nsi/2012/03/connection/types"
      xmlns:ns6="http://schemas.ogf.org/nsi/2012/03/connection/interface"
      xmlns:ns7="http://schemas.ogf.org/nsi/2012/03/framework/headers" />
  </S:Body>
</S:Envelope>
```

The following SOAP over HTTP message shows the new structural layout of the ReserveConfirmed primitive in response to a successful schedule creation as requested in the previous Reserve request operation.

```
POST /nsi-v2/ConnectionServiceRequester HTTP/1.1
Content-type: text/xml;charset="utf-8"
Authorization: Basic bnNpZGVtbzpzSaW9QbHVnLUZlc3QyMDExIQ==
Soapaction: "http://schemas.ogf.org/nsi/2012/03/connection/service/reserveConfirmed"
Accept: text/xml, multipart/related, text/html, image/gif, image/jpeg, *; q=.2, */*; q=.2
User-Agent: JAX-WS RI 2.1.6 in JDK 6
Host: localhost:9080
Connection: keep-alive
Content-Length: 2529
```

```
<?xml version="1.0" ?>
<S:Envelope xmlns:S="http://schemas.xmlsoap.org/soap/envelope/">
  <S:Header>
    <ns7:nsiHeader xmlns:ns2="http://www.w3.org/2000/09/xmldsig#"
      xmlns:ns3="http://www.w3.org/2001/04/xmlenc#"
      xmlns:ns4="urn:oasis:names:tc:SAML:2.0:assertion"
      xmlns:ns5="http://schemas.ogf.org/nsi/2012/03/connection/types"
      xmlns:ns6="http://schemas.ogf.org/nsi/2012/03/connection/interface"
      xmlns:ns7="http://schemas.ogf.org/nsi/2012/03/framework/headers">
      <protocolVersion>http://schemas.ogf.org/nsi/2012/03/connection</protocolVersion>
      <correlationId>urn:uuid:67724f3b-38aa-4508-af84-10df715c5b41</correlationId>
      <requesterNSA>urn:ogf:network:nsa:netherlight</requesterNSA>
      <providerNSA>urn:ogf:network:nsa:czechlight</providerNSA>
    </ns7:nsiHeader>
  </S:Header>
  <S:Body>
    <ns5:reserveConfirmed xmlns:ns2="http://www.w3.org/2000/09/xmldsig#"
      xmlns:ns3="http://www.w3.org/2001/04/xmlenc#"
      xmlns:ns4="urn:oasis:names:tc:SAML:2.0:assertion"
      xmlns:ns5="http://schemas.ogf.org/nsi/2012/03/connection/types"
      xmlns:ns6="http://schemas.ogf.org/nsi/2012/03/connection/interface"
      xmlns:ns7="http://schemas.ogf.org/nsi/2012/03/framework/headers">
      <reservation>
        <globalReservationId>urn:ogf:network:service:9cd41aa0-b019-435f-b3dc-075098816737</globalReservationId>
      </reservation>
    </ns5:reserveConfirmed>
  </S:Body>
</S:Envelope>
```

```

<description>This is a test schedule connecting ps-80 to ams-80</description>
<connectionId>urn:uuid:deb6aa8d-3e59-4821-9f7f-5c808be42bde</connectionId>
<serviceParameters>
  <schedule>
    <startTime>2012-05-02T15:47:33.937Z</startTime>
    <endTime>2012-05-02T15:49:33.945Z</endTime>
  </schedule>
  <bandwidth>500</bandwidth>
</serviceParameters>
<path>
  <directionality>Bidirectional</directionality>
  <sourceSTP>
    <stpId>urn:ogf.network:stp:czechlight.ets:ps-80</stpId>
  </sourceSTP>
  <destSTP>
    <stpId>urn:ogf.network:stp:czechlight.ets:ams-80</stpId>
  </destSTP>
</path>
</reservation>
</ns5:reserveConfirmed>
</S:Body>
</S:Envelope>

```

The following message is the HTTP response containing the acknowledgement to the previous ReserveConfirmed primitive.

```

HTTP/1.1 200 OK
Server: Apache-Coyote/1.1
Content-Type: text/xml;charset=utf-8
Transfer-Encoding: chunked
Date: Wed, 02 May 2012 15:45:34 GMT

```

```

<?xml version='1.0' encoding='UTF-8'?>
<S:Envelope xmlns:S="http://schemas.xmlsoap.org/soap/envelope/">
  <S:Header>
    <ns6:nsiHeader xmlns:ns2="http://www.w3.org/2000/09/xmldsig#"
      xmlns:ns3="http://www.w3.org/2001/04/xmlenc#"
      xmlns:ns4="urn:oasis:names:tc:SAML:2.0:assertion"
      xmlns:ns5="http://schemas.ogf.org/nsi/2012/03/connection/interface"
      xmlns:ns6="http://schemas.ogf.org/nsi/2012/03/framework/headers"
      xmlns:ns7="http://schemas.ogf.org/nsi/2012/03/connection/types">
      <protocolVersion>http://schemas.ogf.org/nsi/2012/03/connection</protocolVersion>
      <correlationId>urn:uuid:67724f3b-38aa-4508-af84-10df715c5b41</correlationId>
      <requesterNSA>urn:ogf.network:nsa:netherlight</requesterNSA>
      <providerNSA>urn:ogf.network:nsa:czechlight</providerNSA>
    </ns6:nsiHeader>
  </S:Header>
  <S:Body>
    <ns5:acknowledgment xmlns:ns2="http://www.w3.org/2000/09/xmldsig#"
      xmlns:ns3="http://www.w3.org/2001/04/xmlenc#"
      xmlns:ns4="urn:oasis:names:tc:SAML:2.0:assertion"
      xmlns:ns5="http://schemas.ogf.org/nsi/2012/03/connection/interface"
      xmlns:ns6="http://schemas.ogf.org/nsi/2012/03/framework/headers"
      xmlns:ns7="http://schemas.ogf.org/nsi/2012/03/connection/types" />
  </S:Body>
</S:Envelope>

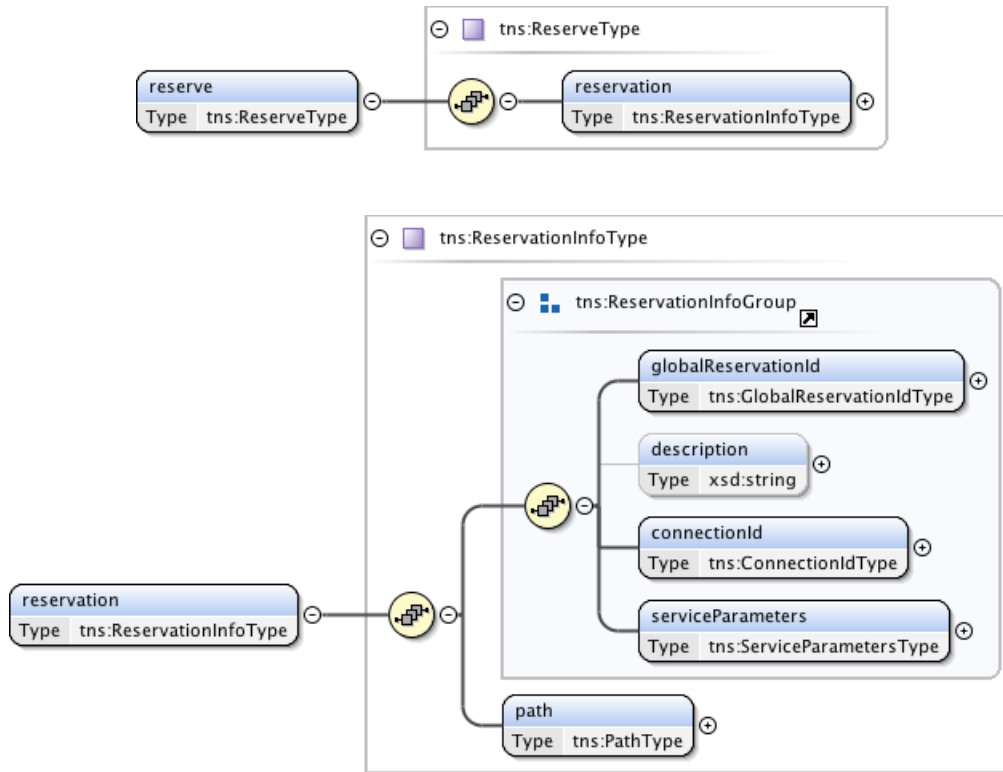
```

## NSI Connection Services Primitives

Restructuring of the NSI message layout into a common NSI messaging header and CS specific message body has resulted in a simplified definition of the NSI CS operation message structures. This section documents the new schema definitions for these primitives.

## Reserve

Make a request to reserve network resources for a connection between two STP's constrained by a certain service parameters.



## forcedEnd

