



HMA-T G-POD Job Submission Interface Control Document

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1 Introduction

1.1 Purpose of the document

This document describes the interface protocol implemented by ESA's GRID Processing on-Demand (G-POD) for remote job submission and control from client computers using a SAML security token as authentication method.

This ICD describes solely the generic components of the interface. In addition, this generic interface description may be complemented by other documents (ICDs or e.g. SOAP Service definition sheets), specific to the application-services effectively deployed on G-POD.

1.2 Background

This ICD was written in the context of the HMA-T project to test and implement the OGC User Management specification.

1.3 Content Overview

Section 1

This section.

Section 2

This section gives the list of all documents applicable to this document and the list of the project document used as reference.

Section 3

This section list all abbreviation and terms used throughout the document.

Section 4

This section provides a high-level description of the Interface protocol and dataflow involved in a job-control session with G-POD.

Section 5

This section describes each interface access point in more details. The WSDL files corresponding to the SOAP access points to G-POD are provided in Annex.

2 Applicable and Reference Documents

2.1 Applicable Documents

[A1]	Space Engineering Software Standards	ECSS-E-40B	-
[A2]	Software Product Assurance Standard	ECSS-Q-80B	10-10-2003

2.2 Reference Documents

[R1]	G-POD Portal User Manual	GRID-GODS-EOPG-MA-06-0004]	24-05-2007
[R2]	G-POD Administrator Manual	GRID-GODS-EOPG-MA-07-0014	27-06-2007

3 Terms, Definitions and Abbreviated Terms

3.1 Definition of Terms

This document and its appendices use the terms:

G-POD	GRID Processing on-Demand
TBD	To Be Determined

3.2 Abbreviated Terms

CE	Computing Element
HMA	Heterogeneous Missions Accessibility
HMA-T	Heterogeneous Missions Accessibility - Testbed
HTML	HyperText Markup Language (and file extension)
HTTP	HyperText Transfer Protocol
HTTPS	HyperText Transfer Protocol Secure
ICD	Interface Control Document
ISO	International Organization for Standardization
RPC	Remote Procedure Call
SAML	Security Assertion Markup Language
SOAP	Simple Object Access Protocol (XML protocol)
URL	Uniform Resource Locator (world wide web address)
WS	Web Service

4 Interface Overview

4.1 Introduction

In parallel to the G-POD portal pages published in HTML, the HMA-T/G-POD Web Service high-level functions and services are published via a job-control interface implemented using SOAP.

This chapter describes the high-level the SOAP services available at the interface and the protocol for invoking and using them.

4.2 Access Point

The HMA-T/G-POD Web Service is available at:

<http://gpod-dev.terradue.com/ws/hma.asmx>

4.3 Transport Layer

The HMA-T/G-POD Web Service interface is implemented as a set of SOAP document style services published on the G-POD portal computer (e.g. <http://eogrid.esrin.esa.int>) via HTTP or HTTPS.

4.4 Session Protocol

Unlike the generic G-POD Job Submission Web Service, the HMA-T/G-POD Web Service does not keep a G-POD session state over more than one request. The authentication is performed by a SAML security token (see section 5.2), which is verified at each call of a web service method. No login with username and password is done on G-POD.

From a client perspective, however, an application usually invokes a sequence of calls that can be considered as a "session".

4.4.1 Overview

HMA-T/G-POD Web Service invocation follows a well-defined protocol sequence summarized here and depicted in Figure 1:

- The client optionally requests the description of a service, i.e. the required service parameters and their meaning.
- The client submits a task and receives a task token (a unique alphanumeric string representing the created task).
- The client periodically polls for the status of the task until it has completed successfully (or until it has failed).
- If the task has completed successfully, the client requests the URLs of the result files.

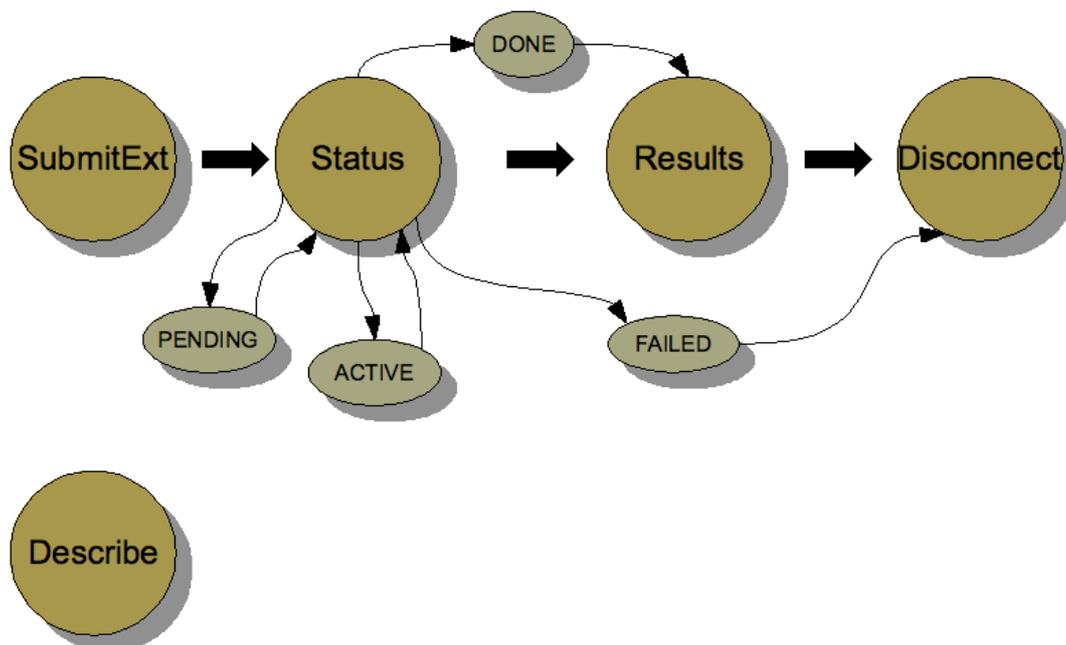


Figure 1 G-POD Job Submission Web Service flow

4.4.2 Invoke and Monitor an G-POD Application Service

Only users presenting a valid SAML security token can invoke and monitor application processes. The permissions on G-POD services or Computing Elements that can be used by an HMA-T-authenticated user may be further restricted by user group policies on G-POD.

4.4.2.1 Data Object Definition (Optional)

Application service triggering may, for some services, require the definition of data objects used as input parameters to the process invocation call. Such task input parameters may be simple type objects (e.g. formatted strings), arrays or more complex objects.

4.4.2.2 Create a Task

Applications can only be triggered via higher-level SOAP service ports, simplifying the definition process of application parameters and options.

All service invocation SOAP calls commonly return a unique task token, to be used as input parameter to subsequent task monitoring functions calls.

4.4.2.3 Monitor a Task

Once created on HMA-T/G-POD Web Service, the client may monitor the status of a task processing asynchronously using the task token received after the submission as argument.

4.4.3 Retrieving Task Results

Once the task is successfully concluded and no client-specific *OutboxUrl* was defined the *IEOServices* returns the list of files created.

4.4.3.1 Results Published on the Portal

The Results property returns all an array of strings with the URLs to access the files that were published on the portal.

4.4.3.1.1 Results Published on External Servers

It is the client responsibility to access and discover the files when a specific Output Box URL was defined.

4.5 Exception Handling

All exceptions at the interface calls are handled via raw SOAP Exceptions and are raised in case of an unrecoverable error while processing the call. The error will be described and coded in the exception message.

5 SOAP Services Description

5.1 Data Types

Name	Type	Description	Examples
Date/Time	string	Date/Time parameters are formatted according to the ISO 8601:2004 Date-Time notation	<ul style="list-style-type: none"> 2002-03-01T13:00:00
Date/Time Period	string	Time Period are formatted according to ISO 8601:2004 Date/Time representations for periods of time	<ul style="list-style-type: none"> 2002-03-01T13:00:00 2003-05-11T15:30:00
		Group of time Periods are formatted according to ISO 8601:2004 Date/Time notation and are separated by a comma	<ul style="list-style-type: none"> 2003-01-01T10:30:00 2003-01-01T12:30:00, 2003-01-01T20:30:00 2003-01-01T21:30:00
Bounding Box	string	Bounding Box parameters are formatted as follows: bbox-string := <min_long> ',' <min_lat> ',' <max_long> ',' <max_lat>	<ul style="list-style-type: none"> -10,-20,30,45
Output Box URL	string	Output Box URLs are defined as <protocol>://<user-name>@<server-name><sink-directory>	<ul style="list-style-type: none"> ftp://myuser@myserver.com/myfolder

5.2 Authentication

All requests (except DescribeService) must contain a SAML security token. The security token consists in a SAML assertion (must be signed and may be encrypted) with the necessary cryptographic information on how to decrypt and verify the assertion information. The SAML assertion needs at least an attribute named *E-mail* containing the requestor's e-mail address as a unique identifier.

Example of a signed and unencrypted SAML assertion in a WS Security header:

```
<?xml version="1.0" encoding="utf-8"?>
<soap12:Envelope
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema"
  xmlns:soap12="http://www.w3.org/2003/05/soap-envelope">
  <soap12:Header>
    <wsse:Security
      xmlns:wsse="http://schemas.xmlsoap.org/ws/2002/04/secext">
      <saml:Assertion
        AssertionID="HGG-GAT-TC-01"
        IssueInstant="2009-07-03T11:20:10Z"
        Issuer="Terradue"
        MajorVersion="1"
        MinorVersion="1"
        xmlns:saml="urn:oasis:names:tc:SAML:1.0:assertion">
        <saml:Conditions
          NotBefore="2009-07-03T11:20:10Z"
          NotOnOrAfter="2009-07-03T12:20:10Z"/>
        <saml:AuthenticationStatement
          AuthenticationInstant="2009-07-03T11:20:10Z"
          AuthenticationMethod="urn:oasis:names:tc:SAML:1.0:am:password">
```

```

<saml:Subject>
  <saml:NameIdentifier>SamlTokenUser</saml:NameIdentifier>
  <saml:SubjectConfirmation>
    <saml:ConfirmationMethod>urn:oasis:names:tc:SAML:1.0:cm:bearer
    </saml:ConfirmationMethod>
  </saml:SubjectConfirmation>
</saml:Subject>
</saml:AuthenticationStatement>
<saml:AttributeStatement>
  <saml:Subject>
    <saml:NameIdentifier>SamlTokenUser</saml:NameIdentifier>
    <saml:SubjectConfirmation>
      <saml:ConfirmationMethod>urn:oasis:names:tc:SAML:1.0:cm:bearer
      </saml:ConfirmationMethod>
    </saml:SubjectConfirmation>
  </saml:Subject>
  <saml:Attribute AttributeName="E-mail">
    <saml:AttributeValue>saml.token.user@terradue.com</saml:AttributeValue>
  </saml:Attribute>
</saml:AttributeStatement>
</saml:Assertion>
<wsse:SecurityTokenReference
  <wsse:KeyIdentifier valueType="saml:Assertion">SecurityToken-ef375268
  </wsse:KeyIdentifier>
</wsse:SecurityTokenReference>
</wsse:Security>
</soap12:Header>
<soap12:Body>
  <SubmitExt xmlns="http://eogrid.esrin.esa.int/ws/">
    <ServiceName>ProductExtraction</ServiceName>
    <Description>This is the description</Description>
    <Parameters>
      <FeatureType>
        <Name>startdate</Name>
        <Value>2004-09-01T02:55:00</Value>
        <Description />
      </FeatureType>
      <FeatureType>
        <Name>stopdate</Name>
        <Value>2004-09-01T03:29:40</Value>
        <Description />
      </FeatureType>
      <FeatureType>
        <Name>datasetname</Name>
        <Value>MER_RR_2P</Value>
        <Description />
      </FeatureType>
    </Parameters>
    <OutputBoxUrl />
    <NotificationPort />
  </SubmitExt>
</soap12:Body>
</soap12:Envelope>

```

```

<?xml version="1.0" encoding="utf-8"?>
<soap12:Envelope
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema"
  xmlns:soap12="http://www.w3.org/2003/05/soap-envelope">
  <soap12:Header>
    <wsse:Security
      xmlns:wsse="http://schemas.xmlsoap.org/ws/2002/04/secext">
      <EncryptedData
        Id="enc"
        Type="http://www.w3.org/2001/04/xmlenc#Element"
        xmlns="http://www.w3.org/2001/04/xmlenc#">
        <EncryptionMethod
          Algorithm="http://www.w3.org/2001/04/xmlenc#aes256-cbc" />
        <KeyInfo xmlns="http://www.w3.org/2000/09/xmldsig#">
          <EncryptedKey

```

```

xmlns="http://www.w3.org/2001/04/xmlenc#">
  <EncryptionMethod
    Algorithm="http://www.w3.org/2001/04/xmlenc#rsa-1_5" />
  <KeyInfo
    xmlns="http://www.w3.org/2000/09/xmldsig#">
    <KeyName>rsa</KeyName>
  </KeyInfo>
  <CipherData>
    <CipherValue>TVA4LLR5W16zSMw[...]ZPKMIjvSPKd00luvVY=</CipherValue>
  </CipherData>
  <ReferenceList>
    <DataReference URI="#enc" />
  </ReferenceList>
</EncryptedKey>
</KeyInfo>
<CipherData>
  <CipherValue>G490U3h/Ng[...]UN7s+PTMwOuw==</CipherValue>
</CipherData>
</EncryptedData>
<wsse:SecurityTokenReference
  <wsse:KeyIdentifier valueType="saml:Assertion">SecurityToken-ef375268
  </wsse:KeyIdentifier>
</wsse:SecurityTokenReference>
</wsse:Security>
</soap12:Header>
<soap12:Body>
  <SubmitExt xmlns="http://eogrid.esrin.esa.int/ws/">
    <ServiceName>ProductExtraction</ServiceName>
    <Description>This is the description</Description>
    <Parameters>
      <FeatureType>
        <Name>startdate</Name>
        <Value>2004-09-01T02:55:00</Value>
        <Description />
      </FeatureType>
      <FeatureType>
        <Name>stopdate</Name>
        <Value>2004-09-01T03:29:40</Value>
        <Description />
      </FeatureType>
      <FeatureType>
        <Name>datasetname</Name>
        <Value>MER_RR_2P</Value>
        <Description />
      </FeatureType>
    </Parameters>
    <OutputBoxUrl />
    <NotificationPort />
  </SubmitExt>
</soap12:Body>
</soap12:Envelope>

```

In order to avoid compatibility problems, the HMA-T/G-POD Web Service accepts a signed (and optionally encrypted) SAML assertion also in other places of the SOAP message, such as in the SOAP Body element or in the Header without a WS Security wrapper element.

5.3 Ify Service Ports

The following tables describe the available service ports, i.e. methods to be used with the web service.

DescribeService	
Definition	ArrayOfFeatureType DescribeService = IfyService.DescribeService(string ServiceName)

Description	List in an array of feature type the necessary parameters for a given service and their actual meaning.
Parameters	string ServiceName - String Token identifying the service as given by the site admin
Returned Value	ArrayOfFeatureType DescribeService - Array with the name, description and mandatory values for a given service

SubmitExt	
Definition	string TaskToken = IfyService. SubmitExt (string ServiceName , string Description , ArrayOfFeatureType Parameters , string OutputBoxUrl , string NotificationPort)
Description	Creates a task of the ServiceName type and submits it for execution. A unique task identifier (task token) is returned on submission success, otherwise a SOAP exception is thrown.
Parameters	string ServiceName - The service name. This is a keyword that should be delivered to the user when access is granted to the web service. Please contact site admin if this value is unknown
	string Description - The new task description
	ArrayOfFeatureType Parameters - An array of FeatureType with the pairs name-value for the service
	string OutputBoxUrl - URL prefix of the output server, including protocol, server name and directory pointing to a user storage registered in the portal (as defined in 5.1)
	string NotificationPort - SOAP port address hosting the IContact notification client-service. To be left Empty if explicit notification to the client is not required.
Returned Value	string TaskToken - A unique task identifier is returned on submission success, otherwise a SOAP exception is returned. This value must be used to query the status of the task or to retrieve the URLs of the produced results. The task token is unique for all tasks and is valid throughout a task's entire lifetime, i.e. also in later sessions.
Remarks	SOAP request message must contain a valid SAML security token.

Status	
Definition	string Status = IfyService. Status (string TaskToken)
Description	Returns the current status of the service process referred by the value returned by the SubmitExt function. The keyword "DONE" is returned on task successful completion.
Parameters	string TaskToken - a task token as returned by a <i>SubmitExt</i> operation
Returned Value	string Status - Possible values are: <ul style="list-style-type: none"> • PENDING - Task is accepted and is waiting for resources availability • ACTIVE - Task is being executed • DONE - Task is successfully terminated • FAILED - Task terminated with error
Remarks	SOAP request message must contain a valid SAML security token. If the operation returns FAILED status, it is possible to obtain more information or further investigate the failure reasons through the web portal

	interface.
--	------------

GetTaskMetadata	
Definition	ArrayOfString Describe = IfyService. GetTaskMetadata (string TaskToken)
Description	List in a key name value pair array all the task parameters classified as metadata by the actual G-POD service being accessed.
Parameters	string TaskToken - a task token as returned by a <i>SubmitExt</i> operation
Returned Value	ArrayOfString Describe - Key name and value array with the task metadata
Remarks	SOAP request message must contain a valid SAML security token.

Results	
Definition	ArrayOfString Results = IfyService. Results (string TaskToken)
Description	Returns an array of strings with the URL to access the results published on the portal associated to this task. If the results were published on external server the array will be empty.
Parameters	string TaskToken - a task token as returned by a <i>SubmitExt</i> operation
Returned Value	ArrayOfString Results - the URLs to access the files that were published on the portal
Remarks	SOAP request message must contain a valid SAML security token.

Annex

The following are sample SOAP 1.2 requests and responses. The placeholders shown need to be replaced with actual values.

DescribeService

```
POST /ws/hma.asmx HTTP/1.1
Host: gpod-dev.terradue.com
Content-Type: application/soap+xml; charset=utf-8
Content-Length: length

<?xml version="1.0" encoding="utf-8"?>
<soap12:Envelope xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:soap12="http://www.w3.org/2003/05/soap-envelope">
  <soap12:Body>
    <DescribeService xmlns="http://eogrid.esrin.esa.int/ws/">
      <ServiceName>string</ServiceName>
    </DescribeService>
  </soap12:Body>
</soap12:Envelope>
```

```
HTTP/1.1 200 OK
Content-Type: application/soap+xml; charset=utf-8
Content-Length: length

<?xml version="1.0" encoding="utf-8"?>
<soap12:Envelope xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:soap12="http://www.w3.org/2003/05/soap-envelope">
  <soap12:Body>
    <DescribeServiceResponse xmlns="http://eogrid.esrin.esa.int/ws/">
      <DescribeServiceResult>
        <FeatureType>
          <Name>string</Name>
          <Value>string</Value>
          <Description>string</Description>
        </FeatureType>
        <FeatureType>
          <Name>string</Name>
          <Value>string</Value>
          <Description>string</Description>
        </FeatureType>
      </DescribeServiceResult>
    </DescribeServiceResponse>
  </soap12:Body>
</soap12:Envelope>
```

GetTaskMetadata

```
POST /ws/hma.asmx HTTP/1.1
Host: gpod-dev.terradue.com
Content-Type: application/soap+xml; charset=utf-8
Content-Length: length

<?xml version="1.0" encoding="utf-8"?>
```

```
<soap12:Envelope xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:soap12="http://www.w3.org/2003/05/soap-envelope">
  <soap12:Body>
    <GetTaskMetadata xmlns="http://eogrid.esrin.esa.int/ws/">
      <TaskToken>string</TaskToken>
    </GetTaskMetadata>
  </soap12:Body>
</soap12:Envelope>
```

```
HTTP/1.1 200 OK
Content-Type: application/soap+xml; charset=utf-8
Content-Length: length
```

```
<?xml version="1.0" encoding="utf-8"?>
<soap12:Envelope xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:soap12="http://www.w3.org/2003/05/soap-envelope">
  <soap12:Body>
    <GetTaskMetadataResponse xmlns="http://eogrid.esrin.esa.int/ws/">
      <GetTaskMetadataResult>string</GetTaskMetadataResult>
    </GetTaskMetadataResponse>
  </soap12:Body>
</soap12:Envelope>
```

Results

```
POST /ws/hma.asmx HTTP/1.1
Host: gpod-dev.terradue.com
Content-Type: application/soap+xml; charset=utf-8
Content-Length: length
```

```
<?xml version="1.0" encoding="utf-8"?>
<soap12:Envelope xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:soap12="http://www.w3.org/2003/05/soap-envelope">
  <soap12:Body>
    <Results xmlns="http://eogrid.esrin.esa.int/ws/">
      <TaskToken>string</TaskToken>
    </Results>
  </soap12:Body>
</soap12:Envelope>
```

```
HTTP/1.1 200 OK
Content-Type: application/soap+xml; charset=utf-8
Content-Length: length
```

```
<?xml version="1.0" encoding="utf-8"?>
<soap12:Envelope xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:soap12="http://www.w3.org/2003/05/soap-envelope">
  <soap12:Body>
    <ResultsResponse xmlns="http://eogrid.esrin.esa.int/ws/">
      <ResultsResult>
        <string>string</string>
        <string>string</string>
      </ResultsResult>
    </ResultsResponse>
  </soap12:Body>
</soap12:Envelope>
```

Status

```
POST /ws/hma.asmx HTTP/1.1
Host: gpod-dev.terradue.com
Content-Type: application/soap+xml; charset=utf-8
Content-Length: length

<?xml version="1.0" encoding="utf-8"?>
<soap12:Envelope xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:soap12="http://www.w3.org/2003/05/soap-envelope">
  <soap12:Body>
    <Status xmlns="http://eogrid.esrin.esa.int/ws/">
      <TaskToken>string</TaskToken>
    </Status>
  </soap12:Body>
</soap12:Envelope>
```

```
HTTP/1.1 200 OK
Content-Type: application/soap+xml; charset=utf-8
Content-Length: length

<?xml version="1.0" encoding="utf-8"?>
<soap12:Envelope xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:soap12="http://www.w3.org/2003/05/soap-envelope">
  <soap12:Body>
    <StatusResponse xmlns="http://eogrid.esrin.esa.int/ws/">
      <StatusResult>string</StatusResult>
    </StatusResponse>
  </soap12:Body>
</soap12:Envelope>
```

SubmitExt

```
POST /ws/hma.asmx HTTP/1.1
Host: gpod-dev.terradue.com
Content-Type: application/soap+xml; charset=utf-8
Content-Length: length

<?xml version="1.0" encoding="utf-8"?>
<soap12:Envelope xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:soap12="http://www.w3.org/2003/05/soap-envelope">
  <soap12:Body>
    <SubmitExt xmlns="http://eogrid.esrin.esa.int/ws/">
      <ServiceName>string</ServiceName>
      <Description>string</Description>
      <Parameters>
        <FeatureType>
          <Name>string</Name>
          <Value>string</Value>
          <Description>string</Description>
        </FeatureType>
        <FeatureType>
          <Name>string</Name>
          <Value>string</Value>
        </FeatureType>
      </Parameters>
    </SubmitExt>
  </soap12:Body>
</soap12:Envelope>
```

```
<Description>string</Description>
  </FeatureType>
</Parameters>
  <OutputBoxUrl>string</OutputBoxUrl>
  <NotificationPort>string</NotificationPort>
</SubmitExt>
</soap12:Body>
</soap12:Envelope>
```

```
HTTP/1.1 200 OK
Content-Type: application/soap+xml; charset=utf-8
Content-Length: length

<?xml version="1.0" encoding="utf-8"?>
<soap12:Envelope xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:soap12="http://www.w3.org/2003/05/soap-envelope">
  <soap12:Body>
    <SubmitExtResponse xmlns="http://eogrid.esrin.esa.int/ws/">
      <SubmitExtResult>string</SubmitExtResult>
    </SubmitExtResponse>
  </soap12:Body>
</soap12:Envelope>
```