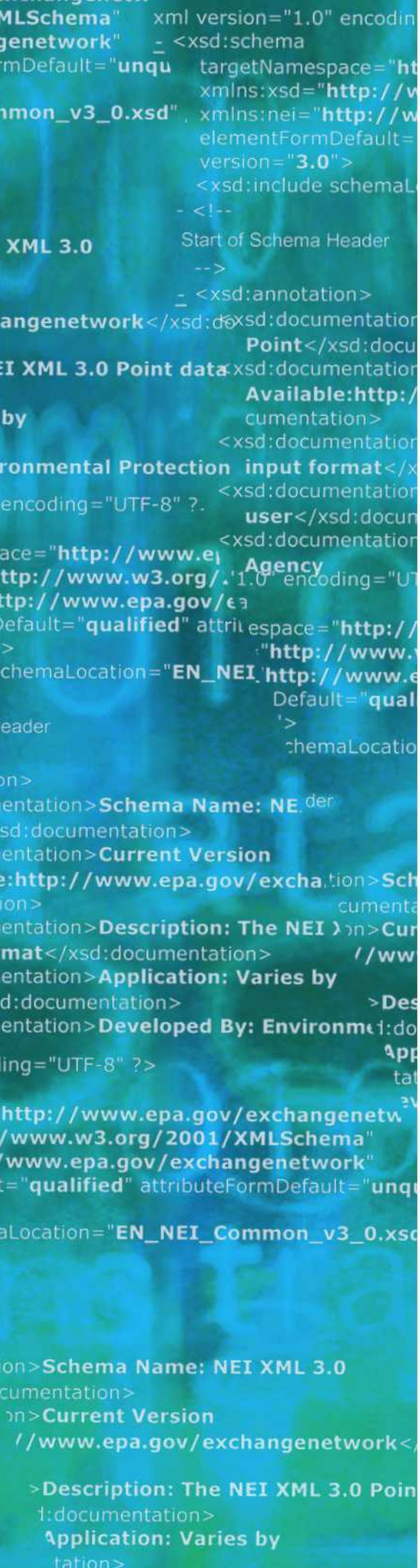

OpenNode2

EIS 1.2 Data Exchange Implementation Guide

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Environmental Information eXchange Network

Revision History

Date	Author	Changes	Version
12/15/2010	Windsor	Updated to include additional section to support troubleshooting flow problems.	1.2
3/21/2010	Windsor	Updated to include definitions of additional Submit data services for non-point data submissions.	1.1
11/13/2009	Windsor	Initial version	1.0

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Data Exchange Overview

The EIS data exchange is used to submit annual air emissions data from local, state, and tribal air pollution control agencies to EPA. The architecture for the exchange on OpenNode2 is similar to that of many other exchanges implemented on the OpenNode2 platform. The high level process for submitting EIS data is as follows:

1. Data is loaded from the submitting agency's source database(s) to a series of OpenNode2 staging tables. These staging tables mirror the structure of the EIS XML schema.
2. On a scheduled interval, OpenNode2 will retrieve data from the EIS staging tables and will formulate it into an XML file conforming to the EIS schema.
3. OpenNode2 will submit the data to EPA's CDX Node.
4. A staff person at the agency logs onto the EIS Gateway to view processing status and download processing reports.

For detailed information on the EIS data exchange, please review the EIS Flow Configuration Document (FCD) available at the Exchange Network web site as well as the EPA's 2008 NEI/EIS Implementation Plan (NEIP), available on the EPA Clearinghouse for Inventories & Emissions Factors Web site. Readers should also be familiar with the use of OpenNode2 plugins, services, and schedules as described in the OpenNode2 Administration Guide available from the OpenNode2 web site.

EIS Data Categories

EIS requires data in one of six distinct emissions data submission types or categories:

Facility Inventory

A permanent, continually maintained inventory of large stationary sources and voluntarily-reported smaller sources, which serves as the basis for all point emissions reported to the EIS. It contains information about facility sites and their physical location, emissions units, emissions processes, release points, control approaches, and regulations.

Point Emissions

Emissions must be reported to the EIS for those point sources exceeding minimum emission thresholds by pollutant defined by the Consolidated Emissions Reporting Rule (CERR) (see 40 CFR §51.20). The CERR requires that large point source emissions be reported annually and other emissions categories every three years.

Non-Point Emissions

Nonpoint emissions are emissions from stationary sources for which emissions have not been submitted as point emissions associated with facilities in the EIS Facility Inventory. Nonpoint sources are defined by their geographic area boundaries, or location, usually State and County FIPS code, or Tribal code, but other types of area are supported.

On-Road Mobile Activities or Emissions

Onroad, or highway, sources include vehicles used on roads for transportation of passengers or freight.

Non-Road Mobile Activities or Emissions

Nonroad sources include vehicles, engines, and equipment used off highways for construction, agriculture, transportation, recreation, and many other purposes. These were previously referred to collectively, along with other sources, as mobile sources.

Event Emissions

An event is a localized, short-duration emissions-producing incident that does not recur or recurs irregularly and infrequently at that location, such as wildfires.

The appropriate data category is included in the Exchange Network Header Document (Header) that accompanies each submission file. The Header provides metadata about the submission file such as when the submission file was created and who created it. The EIS plugin will automatically include the Header when the XML file is generated.

The valid data category values supplied in the Header for the submission are as follows:

EIS Data Category	Header Payload Value
Facility Inventory	FacilityInventory
Point Emissions	Point
Non-Point Emissions	Nonpoint
On-Road Mobile Emissions	Onroad
Non-Road Mobile Emissions	Nonroad
Event Emissions	Event

Note that On-Road and Non-Road activity data must be supplied in the form of attached documents as described in the EIS FCD as its own submission type. The OpenNode2 EIS plugin supports attachments (see following section).

Attached Files

The CERS schema supports attached files at various levels. Attached files must be referenced using the attached file complex type in the XML document, with the actual files themselves being attached to the Exchange Network message outside of the XML payload. In practice, EIS only allows attached files to be submitted in two situations. The first is to accompany event emission submissions. The second is in support of onroad/nonroad activity data submissions, when files exported from the NCD are attached to the Exchange Network message.

Attached files will be referenced in the appropriate staging database table. The physical files themselves may either be stored in the staging database as a binary object, or may be stored in a file system location. A parameter will be used within the configuration of the EIS plugin on OpenNode2 to direct the plugin to the appropriate file location.

Data Services

Services are functions that are exposed to OpenNode2 by a plugin. The EIS plugin provides two groups of data services. Solicit services are provided that will support the traditional generation of XML documents from data held in the staging database, and submission to EPA. These services support all of the data categories allowed by EIS. In addition, several Submit data services are also included which support the "pass-through" of XML documents generated outside of the OpenNode2 to EPA.

Solicit Operations

The EIS plugin provides seven traditional Solicit data services, six of which generate submissions for each of the EIS data categories described above plus a seventh service used for submitting On-Road and Non-Road Activity data using attachments. Each service that is required must be set up independently when the plugin is installed. These data services are designed to be executed by a schedule within OpenNode2, which will be configured to forward the data returned by the service appropriately.

The Solicit data services are as follows:

- EISGetFacilityInventory
- EISGetPointEmissions
- EISGetNonpointEmissions
- EISGetOnroadNonroadActivities
- EISGetOnroadEmissions
- EISGetNonroadEmissions
- EISGetEventEmissions

The plugin will filter the staging table data to produce the appropriate submission type. The staging database must contain the appropriate EIS Header payload value (see previous table) in the DATA_CATEGORY field of the CERS_CERS staging table in order for the data to be generated correctly.

It is assumed that the exchange implementer will create a Schedule in OpenNode2 to execute each service and submit the resulting XML file to EPA CDX. The process of setting up Schedules is described in the *Define Data Exchange Schedules* section below.

Configuration Arguments

Configuration arguments are specified using the OpenNode2 Admin Utility when adding or editing a plugin data service. All seven services will accept the following arguments:

Configuration Argument	**Required**	**Business Rules**
Author Name	Required	Used to provide the originator of the document, typically the individual responsible for preparing the NEI for the organization. This value is inserted into the submission's XML header "AuthorName" element.

Configuration Argument	Required	Business Rules
Organization Name	Required	The organization to which the author belongs. This value is inserted into the submission's XML header "OrganizationName" element.
Attachment Folder Path	Optional	The relative file path to the location of attachments for onroad/nonroad NCD files and supporting files for event emissions.
Sender Contact Info	Optional	The sender's additional contact information, typically an email address. This value is inserted into the submission's XML header "SenderContact" element.

Service Parameters

Service parameters are specified in the OpenNode2 schedule or as parameters to a Solicit or Query request. All data services will accept the following service parameters:

Service Parameter	Required	Business Rules
EmissionsYear	Required	Used to provide the year for which the emissions data is being submitted. Format YYYY. This will be used, along with the relevant data category for the data service, to filter data to be extracted from the staging database.
SubmissionType	Required	Allows the user to specify whether the XML file resulting from the data service execution should be submitted to the EIS Production or Quality Assurance environment. Accepted values: Production or QA.

Submit Operations

The EIS plugin provides three Submit data services which can be used to relay XML documents to EPA that might be generated outside of the OpenNode2. For example, an organization may choose to manage non-point or mobile emissions data in the EPA provided *EIS Bridge Tool* database. Rather than import this data into the OpenNode2 staging database, the organization may then use the *EIS Bridge Tool* provided by EPA to generate the relevant XML document. The resulting file can then be submitted to one of the Submit services on OpenNode2 which will add the Exchange Network Header Document structure and will relay the document to EPA CDX.

The Submit data services are as follows:

- EISSubmitNonPointEmissions
- EISSubmitOnRoadMobileEmissions
- EISSubmitNonRoadMobileActivities

Configuration Arguments

All three services will accept the following arguments that will provide OpenNode2 with the information needed to compose an appropriate Header Document for the submitted payload and will instruct the OpenNode2 to relay the submitted file appropriately:

Configuration Argument	Required	Business Rules
Author Name	Required	Used to provide the originator of the document, typically the individual responsible for preparing the NEI for the organization. This value is inserted into the submission's XML header "AuthorName" element.
Organization Name	Required	The organization to which the author belongs. This value is inserted into the submission's XML header "OrganizationName" element.
Sender Contact Info	Optional	The sender's additional contact information, typically an email address. This value is inserted into the submission's XML header "SenderContact" element.
Submission Type	Required	Used to specify whether the received file should be submitted to the EIS Production or Quality Assurance environment. Accepted values: "Production" or "QA".
Submission Partner Name	Required	Used to specify the name of the network partner to which the received file should be submitted. This will be the relevant EPA CDX endpoint for EIS submissions, and is defined in the "Network Partners" page of the Node Admin.
Submission Flow Name	Required	Used to specify the data flow name that should be specified in the submit operation to the target endpoint. This will be set to "EIS_v1_0".
Submission Operation Name	Required	Used to specify the data flow operation that should be specified in the submit operation to the target endpoint. This will be set to "Submit".

Create and Populate EIS Staging Tables

OpenNode2 uses a plugin-based architecture to support data exchanges with EPA and other Exchange Network partners. Data must first be loaded into a set of staging tables before it can be extracted by the plugin and shared through the EIS data exchange. This section outlines the steps required to set up the EIS data exchange database staging tables.

The following figure illustrates these steps:

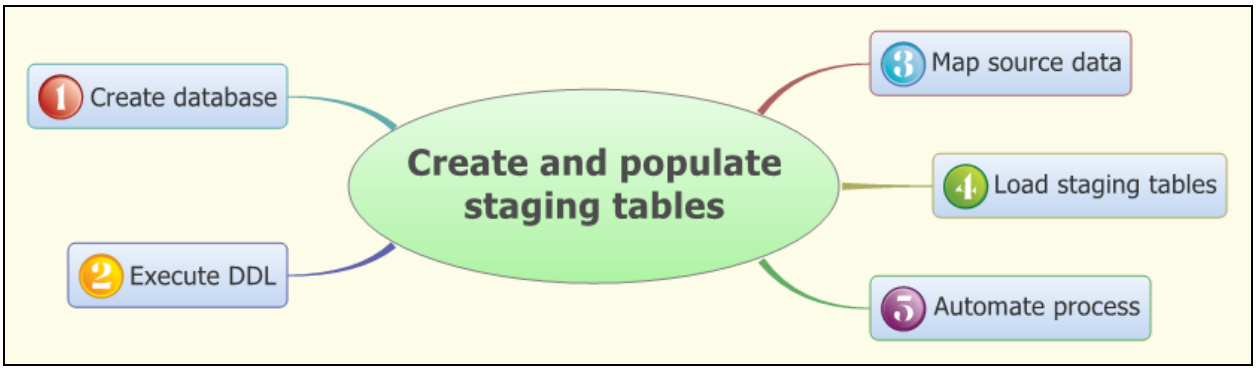


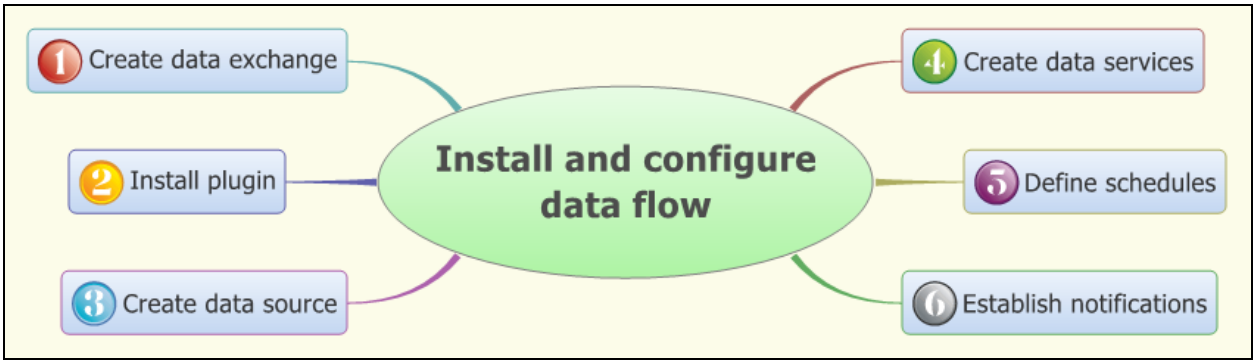
Figure 1: Create and Populate EIS Staging Tables

1. The first step is to create the staging database itself if one has not already been established to support another data exchange (typically named NODE_FLOW).
2. Once the staging database itself is created, a Database Definition Language (DDL) script included in the plugin package can be executed to create the staging tables themselves that will be used to store the data being made available through the EIS data exchange.
3. With the staging environment established, data must now be mapped from the source database(s) to the equivalent fields in the EIS staging tables. The staging tables closely reflect the structure and naming of the CERS XML schema.
4. Once the mapping is complete, a database extract routine should be developed to populate the tables in the staging database using the mapping prepared during the earlier step. This should be a repeatable process that will empty and replace all of the data in the staging tables, or a procedure that will incrementally add, update and remove data as it changes in the source system.
5. Once the data extract process has been developed, it should be automated to execute on a regular schedule as appropriate to the needs of the organization for submissions to EPA.

Install and Configure EIS Data Flow

This section describes the steps required to install and configure the EIS data exchange on the Microsoft .NET and Java implementations of the OpenNode2 using the Node Administration Web application (Node Admin).

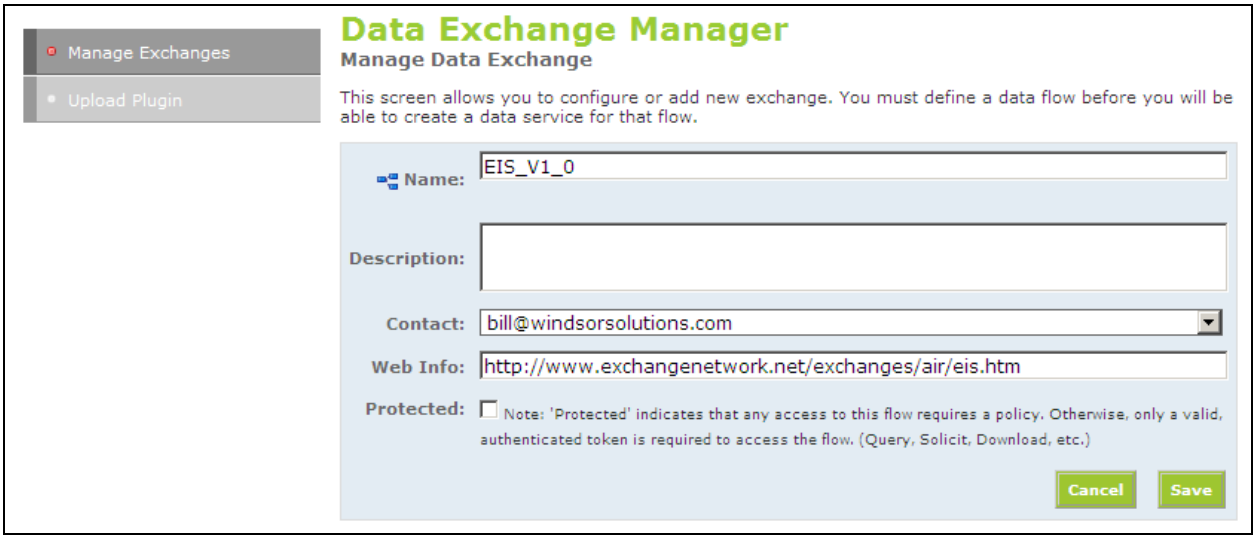
The following figure illustrates these steps:



Create EIS Data Exchange

The first step to implement the EIS data exchange on the OpenNode2 is to create the data exchange using the Node Admin Data Exchange Manager.

1. After logging into the Node Admin, click the **Exchange** tab on the top navigation bar.
2. Click the **Add Exchange** button. The Manage Data Exchange screen will be displayed:



3. Type *EIS_V1_0* in the **Name** field.
4. Type a short description in the **Description** field, e.g., *EIS data exchange*.

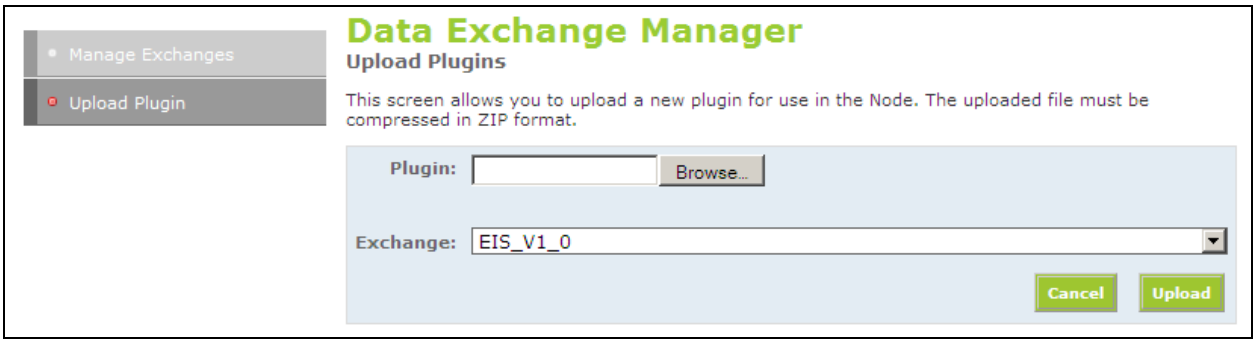
5. Select a user account name from the **Contact** drop down box. Contacts are populated with all accounts that have been set up on the OpenNode2. See the **Security** tab for a list of available accounts.
6. Type any valid URL in the **Web Info** field. Ideally, this will be the page on the Exchange Network Web site that describes the EIS data exchange:

   http://www.exchangenetwork.net/exchanges/air/EIS.htm
7. It is recommended that the **Protected** checkbox remain unchecked. This will enable all authenticated OpenNode2 users to access the EIS data services without needing special data exchange specific security permissions.
8. Click **Save** to save the data exchange.

Install EIS Plugin

Once the EIS data exchange has been created, the next step is to upload the EIS plugin into the OpenNode2 plugin repository.

1. From the **Exchange** tab, click the **Upload Plugin** button on the left navigation block.



2. Click the **Browse** button located to the right of the **Plugin** field.
3. Locate and select the compressed (zipped) file containing the code component for the EIS plugin you obtained with the OpenNode2.
4. Select *EIS_V1_0* from the **Exchange** drop-down menu. If *EIS_V1_0* is not available, ensure that the previous step was completed (*Create EIS Data Exchange*).
5. Click the **Upload** button to install the EIS plugin.

The newly uploaded plugin code will be placed in the OpenNode2 plugin repository. Any previous plugin versions will be retained in the repository but won't be accessible through the Node Admin. Only the latest version of any one plugin is made available during the next step to establish data services.

Create EIS Data Services

Data services are distinct functions provided by a plugin to support a given data exchange. Data services must be created and configured before they can be accessed through the OpenNode2.

Not all data services will be used by all organizations. Only those data services that are required should be created.

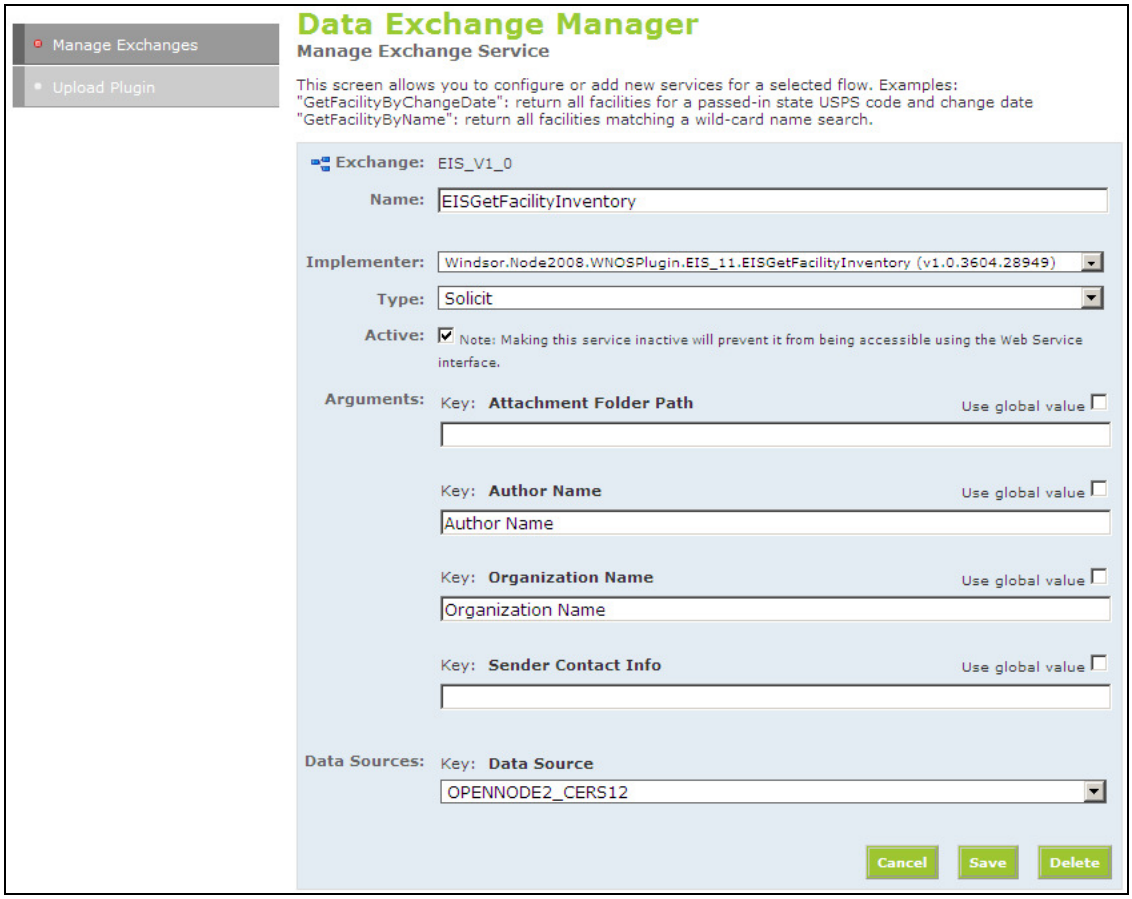
Solicit Data Services

For the EIS data exchange, there are seven specific Solicit data services provided by the plugin:

- EISGetFacilityInventory
- EISGetPointEmissions
- EISGetNonpointEmissions
- EISGetOnroadNonroadActivities
- EISGetOnroadEmissions
- EISGetNonroadEmissions
- EISGetEventEmissions

The following instructions detail the creation of the *EISGetFacilityInventory* data service as an example. The additional data services should be created by substituting the references to *EISGetFacilityInventory* to the desired data service from the list above.

1. From the **Exchange** tab, locate the EIS_V1_0 data exchange in the list of available exchanges.
2. Click the **Add Service** button located just beneath the EIS_V1_0 data exchange entry. The following page will be displayed to allow a new data service to be added.



3. In the **Name** field, enter *EISGetFacilityInventory*.

4. Select the relevant implementer reference value from the **Implementer** drop-down menu. This implementer provides the functionality for producing an EIS Facility Inventory XML file. The implementers are named to relate directly to the data service name.

   Note: When the implementer is selected, several arguments will appear. The Node Admin will obtain these properties directly from the loaded EIS plugin.

5. From the **Type** drop-down menu, select how you wish to make the service available. The options available will also be obtained by the Node Admin from the plugin itself. It is recommended that the EIS data service allow *Solicit* since this will allow the service to be executed by an OpenNode2 Schedule.
6. Enable the service by checking the **Active** checkbox.

Arguments

A list of arguments will appear. These are loaded directly from the plugin and displayed in the OpenNode2 Service configuration screen.

7. **Attachment Folder Path** – If the service must attach one or more files to the zipped XML submission, this argument should be set to the directory location were the attachments are stored. The file names in the EIS staging table are then used to locate and attach the appropriate files. If there are no attachments, leave this value blank.
8. **Author Name** – The text to include in the Header's AuthorName element. This must be supplied in order to produce a valid submission file. However the information is not directly used by EIS at EPA CDX.
9. **Organization Name** - The text to include in the Header's OrganizationName element. This must be supplied in order to produce a valid submission file. However the information is not directly used by EIS at EPA CDX.
10. **Sender Contact Info** - The text to include in the Header's ContactInfo element. This information is optional and is not directly used by EIS at EPA CDX.
11. **Data Source** – choose the Data Source that connects to the location where the EIS staging tables are located. Please see the *OpenNode2 Administration Guide* for more information on setting up and testing Data Sources.
12. Click the **Save** button to save the service.

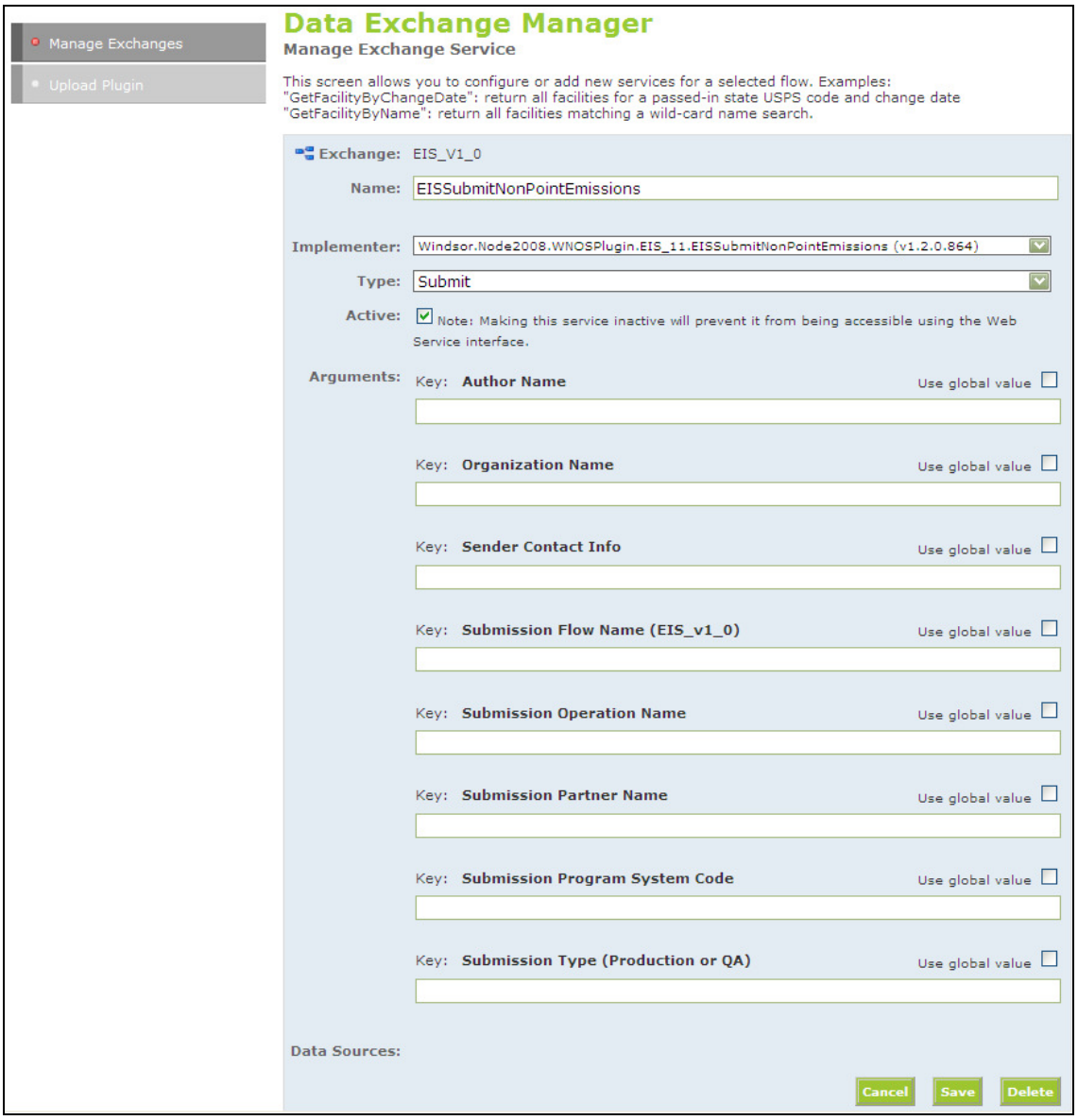
Submit Data Services

For the EIS data exchange, there are three specific Submit data services provided by the plugin:

- EISSubmitNonPointEmissions
- EISSubmitOnRoadMobileEmissions
- EISSubmitNonRoadMobileActivities

The following instructions detail the creation of the *EISSubmitNonPointEmissions* data service as an example. The additional data services should be created by substituting the references to *EISSubmitNonPointEmissions* to the desired data service from the list above.

1. From the **Exchange** tab, locate the EIS_V1_0 data exchange in the list of available exchanges.
2. Click the **Add Service** button located just beneath the EIS_V1_0 data exchange entry. The following page will be displayed to allow a new data service to be added.



3. In the **Name** field, enter *EISSubmitNonPointEmissions*.
4. Select the relevant implementer reference value from the **Implementer** drop-down menu. This implementer provides the functionality for forwarding a submitted EIS Nonpoint Emissions XML file. The implementers are named to relate directly to the data service name.

   Note: When the implementer is selected, several arguments will appear. The Node Admin will obtain these properties directly from the loaded EIS plugin.
5. From the **Type** drop-down menu, select how you wish to make the service available. The options available will also be obtained by the Node Admin from the plugin itself. This EIS data service will only allow *Submit,* since this will allow the service to be requested from a remote Node Client submission.
6. Enable the service by checking the **Active** checkbox.

Arguments

A list of arguments will appear. These are loaded directly from the plugin and displayed in the OpenNode2 Service configuration screen.

7. **Attachment Folder Path** – If the service must attach one or more files to the zipped XML submission, this argument should be set to the directory location were the attachments are stored. The file names in the EIS staging table are then used to locate and attach the appropriate files. If there are no attachments, leave this value blank.
8. **Author Name** – The text to include in the Header's AuthorName element. This must be supplied in order to produce a valid submission file, however the information is not directly used by EIS at EPA CDX.
9. **Organization Name** - The text to include in the Header's OrganizationName element. This must be supplied in order to produce a valid submission file, however the information is not directly used by EIS at EPA CDX.
10. **Sender Contact Info** - The text to include in the Header's ContactInfo element. This information is optional and is not directly used by EIS at EPA CDX.
11. **Data Source** – choose the Data Source that connects to the location where the EIS staging tables are located. Please see the OpenNode2 Administration Guide for more information on setting up and testing Data Sources.
12. **Submission Type** - Used to specify whether the received file should be submitted to the EIS Production or Quality Assurance environment. Accepted values: "Production" or "QA".
13. **Submission Partner Name** - Used to specify the name of the network partner to which the received file should be submitted. This will be the relevant EPA CDX endpoint for EIS submissions, and is defined in the "Network Partners" page of the Node Administration Tool.
14. **Submission Flow Name** - Used to specify the data flow name that should be specified in the submit operation to the target endpoint. This should be set to "EIS_V1_0".
15. **Submission Operation Name** - Used to specify the data flow operation that should be specified in the submit operation to the target endpoint. This should be set to "Submit".
16. Click the **Save** button to save the service.

Define Data Exchange Schedules

Scheduled jobs can be configured in the OpenNode2 to perform automated tasks, for example, submitting data to external Exchange Network partners or processing received files. For the EIS flow, it is necessary to set up a different schedule for each of the seven Solicit data services. Each schedule will be responsible for submitting a single EIS submission type. Please see the OpenNode2 Administration User Guide for more information on scheduling data exchanges if necessary.

Create the EISGetFacilityInventory Schedule

1. From the **Schedules** tab, click the **Add Schedule** button.
2. Type "EISGetFacilityInventory" in the **Name** field.
3. Enable the schedule by clicking the **Active** checkbox.
4. Select "EIS_V1_0" from the **Exchange** dropdown list.

5. Set the start date to the date on which you wish the schedule to run, this will typically be today's date.
6. Set the end date to the same date.
7. Set the frequency to "Once".
8. In the **Data Source** area, check the radio button labeled **Results of local service execution**.
9. In the **From** dropdown box, select the value "EISGetFacilityInventory". This informs the schedule to use the selected EIS service as the data source for the submission.
10. In the **Additional Parameters** area, click the **By Index** radio button, then click the  control twice to add two runtime parameters.
11. The first runtime parameter is the Emission Year. Type the appropriate four-digit year. This value is used to apply a filter to the staging table data for the appropriate emissions year. The value is located in the EMIS_YEAR field in the CERS_CERS staging table.
12. The second runtime parameter is the Submission Type. Type either "Production" or "QA" depending on the submission type to be performed.

    Note: More information on Submission Types can be found in the EIS FCD.
13. In the **Result Process** area, check the radio button labeled **Submit Result to Exchange Network Partner.**
14. From the **To** dropdown list select the partner configuration value for the EPA production CDX Node.
15. In the **Exchange** text field enter "EIS_v1_0". Leave the **Operation** text field empty.
16. Click the **Save** button to save the schedule.

Repeat the process above to create a Schedule for the *EISGetPointEmissions* data service and any of the remaining data services as required. The service parameters are the same for each Schedule.

Contact CDX to Establish Data Exchange Settings

Once the EIS data exchange is installed and configured, contact the EPA CDX Node helpdesk and ask them to perform the following tasks:

1. Authorize the OpenNode2 runtime (operator) NAAS account to submit to the EIS data exchange on the EPA systems.

Establish Email Notifications

If desired, using the Node Admin, a Node administrator may create NAAS accounts for one or more users and set up email notifications for the any OpenNode2 events related to the EIS data exchange. Please see the OpenNode2 Administration User Guide for more information on creating data exchange email notifications.

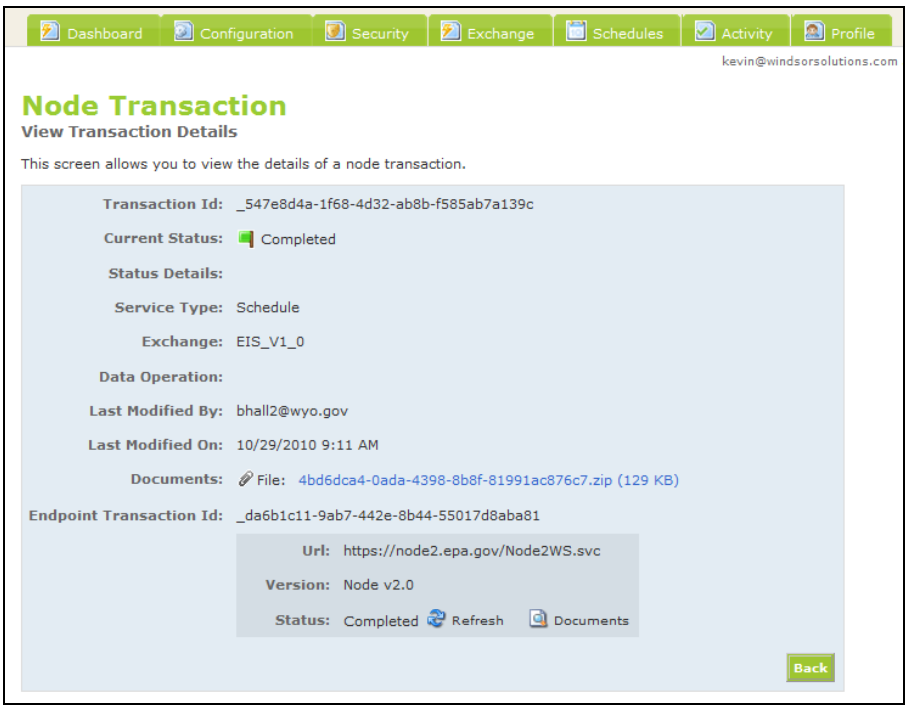
Data Submission Workflow

This section describes the steps involved in a data submission to the EPA EIS system with notes to describe how typical processing issues might be encountered and addressed.

1) Once created in the Node Admin, the schedule will be executed to generate an XML document for one of the Solicit data services. OpenNode2 will then submit the file to the EPA CDX Node

2) When the submission file is received by the EPA CDX Node, the processing status is set to "Received" and a notification email is sent to the NAAS user account used to submit the XML document

Issue: Typically OpenNode2 is configured to use a runtime operator account that isn't usually monitored for email notifications. To determine whether the submission was received by EPA CDX and the current status, the OpenNode2 transaction detail screen may be used. Find the transaction corresponding to the submission from OpenNode2 in the Node Admin and click on the "Refresh" link to update the processing status at EPA CDX.



3) The CDX Node then validates the XML document against the CERS XML schema. If errors are encountered, the processing status is set to "Failed" and a notification email is sent to the NAAS user account used to submit the XML document. If no errors are encountered, the processing status is set to "Completed".

Issue: Again, since OpenNode2 is typically configured to use a runtime operator account that isn't usually monitored for email notifications, to determine whether the status of processing at EPA CDX, the OpenNode2 transaction detail screen may be used. Find the transaction corresponding to the submission from OpenNode2 in the Node Admin and click on the

"Refresh" link to update the processing status at EPA CDX. If the status is "Failed", the XML schema validation report may be downloaded by clicking on the "Documents" link.

4) If XML validation errors are encountered with a submission file, the responsible user will review the processing report from the CDX Node. Steps will then be taken to manually resolve any errors identified in the processing report by modifying data in the source database or other actions.

5) If no errors are encountered during the XML schema validation, the CDX Node then passes the submission file on to the EIS Gateway for further processing.

6) Regardless of whether the SubmissionType specified in the Header Document is "QA" or "Production", the EIS Gateway validates the submitted file against the EIS business rules.

7) A processing report is generated which details the errors and warnings encountered in the submitted file. This processing report is made available to the user on the EIS Gateway Web application.

Note: For information about the EIS Gateway and to request access please see http://www.epa.gov/ttnchie1/eis/.

8) A notification email is sent to the email address of the EIS user account specified in the root CERS complex type included in the submitted XML document, and also to all other EIS user accounts associated with the same organization in the EIS Gateway. If validation errors are encountered, no further processing takes place.

Note: If business validation errors are encountered with a submission file, the responsible user will review the processing report from the EIS Gateway Web application. Steps will then be taken to manually resolve any errors identified in the processing report by modifying data in the source database or other actions.

9) If the SubmissionType is "QA". No further processing takes place.

10) If the SubmissionType is "Production", the submitted data is loaded into the EIS production database and made available for query and editing through the EIS Gateway.