

Department of Homeland Security Customs and Border Protection



Commercial Vehicle Tracker (CVT) Information Exchange Package Documentation

Version 2.0

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1 Executive Summary

The Commercial Vehicle Tracker (CVT) information exchange was developed to share information about commercial vehicles and their drivers between the Customs and Border Protection (CBP) and the Transportation Security Administration (TSA). The CVT information exchange will be used by CBP officers at border inspection stations to exchange information about commercial vehicles and drivers crossing the border with a database maintained by TSA with reported activities of commercial drivers and vehicles. Through this information exchange, suspicious activities by commercial drivers and vehicles can be better identified and the proper actions taken.

The purpose of this IEPD is to define the specifications of an information exchange between the CBP and TSA to exchange information about commercial vehicles, their drivers, and their activities. This IEPD can be reused in other commercial vehicle-related information exchanges as it contains basic data definitions for vehicles, drivers, and activities.

The value provided by this information exchange is through an increased awareness of the activities of commercial vehicles, a decrease in the risk of allowing suspicious vehicles to continue operating, and a decrease in the costs of addressing problems caused by these suspicious vehicles after the fact. Through this information exchange, suspicious commercial vehicle activity can be identified and proper steps can be taken to take these vehicles off the road.

The CVT IEPD was created by following the phases of the IEPD Lifecycle from requirements gathering to implementation. The business and technical requirements of the exchange were first understood and documented which led to the development of models for the exchange. Through these models and requirements, the schemas for the exchange were developed to define the data objects that would be contained within the exchange.

2 Commercial Vehicle Tracker Exchange

2.1 *Commercial Vehicle Tracker Purpose*

The purpose of the Commercial Vehicle Tracker information exchange is to share information about commercial vehicles, their drivers, and their activities between the Customs and Border Protection (CBP) and the Transportation Security Administration (TSA). Both the CBP and TSA store information independently about commercial vehicles but this data is often not shared between these organizations to provide a more complete picture of a commercial vehicle and its activities. Identifying information about a commercial vehicle and its driver will be shared between these organizations and matching activities for the commercial vehicle and its driver will be returned from the TSA database to the CBP application.

When CBP officers inspect a commercial vehicle at a port of entry, only a subset of information about the driver and the vehicle are available to the

CBP officer for review during the inspection. TSA, through efforts to secure transportation routes, has collected information about commercial vehicles and their activities. CBP would like to retrieve any information stored by TSA about a commercial vehicle and its driver and use this information during inspection and review of a commercial vehicle at the port of entry. By combining information about a commercial vehicle and its driver from the TSA system as well as the CBP system, a more detailed history of the commercial vehicle can be understood.

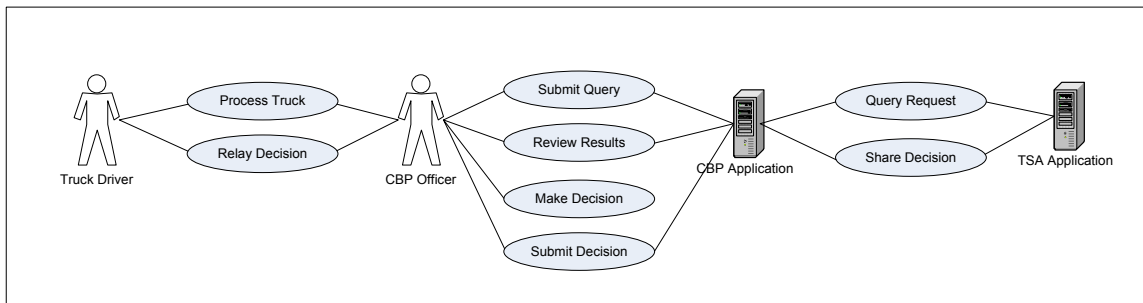
2.1.1 Overview of the Exchange

The CVT information exchange starts with a CBP officer inspecting a vehicle at a port or entry and collecting information that can uniquely identify both the commercial vehicle and driver. This identifying information is then entered into a CBP application that then shares this information with an external TSA web service. The TSA web service queries its own database with the identifying information of the vehicle and driver and returns any activity records it has stored for the matching vehicle or driver to the CBP application. The CBP officer then is able to view the record of activities for the vehicle and driver returned from the TSA web service while viewing the record for the vehicle and driver queried from its own system. The CBP officer then makes a decision regarding the vehicle and driver and enters this into the CBP application. An inspection report of the CBP officer's decision is then created and sent back to the TSA web service to enable greater information sharing capabilities.

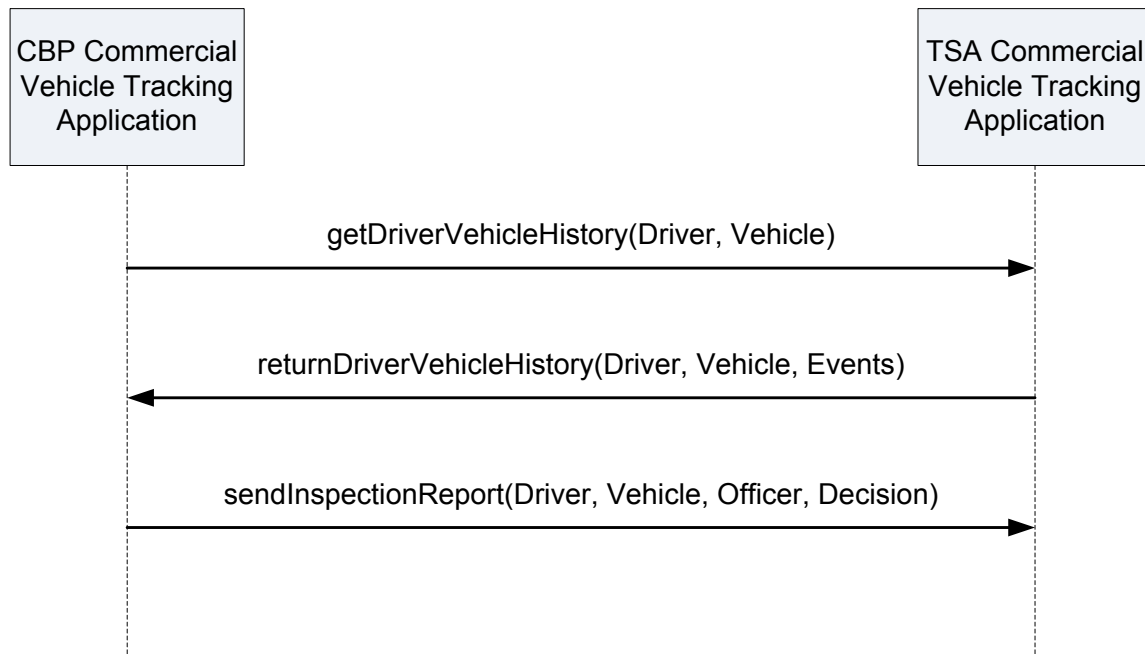
2.1.2 Interaction between Components

CBP and TSA are the components that will interact and share information during this information exchange. As stated previously, TSA manages a database of commercial vehicle activity records that CBP would like to access during the inspection of a commercial vehicle at a port of entry. CBP will make query requests to the TSA database through a web service and TSA will return any activity records for the matching vehicle or driver. Upon a completed inspection, an inspection report will be created and sent back to TSA to include within their activity database.

2.2 Use Cases



2.2.1 Sequence Diagram

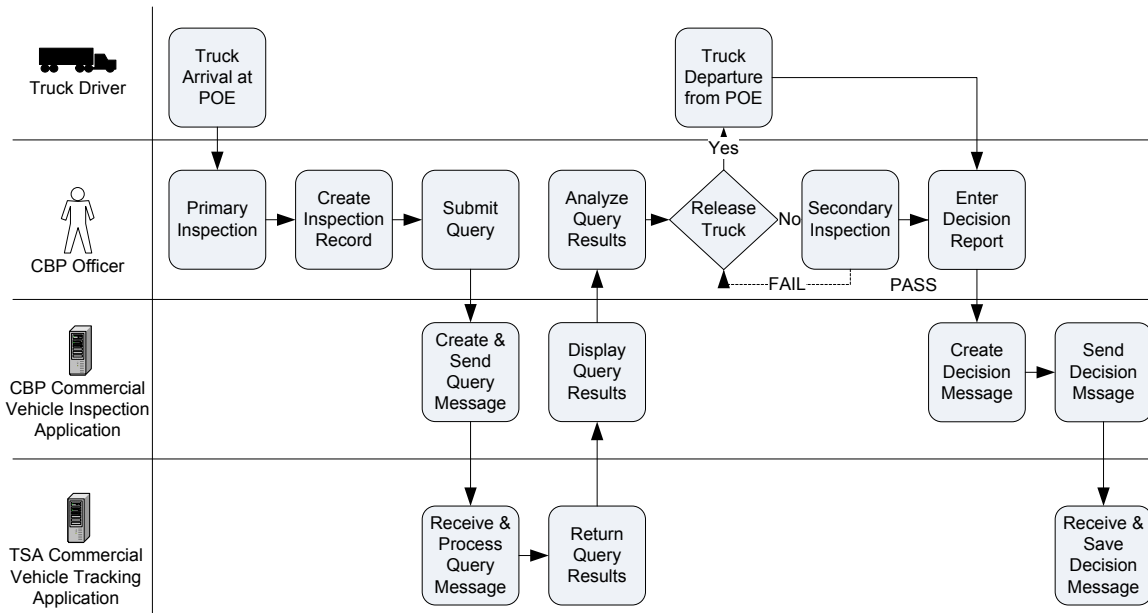


2.3 Business Processes

Business Process

1. Commercial truck stops at a CBP border station and presents license and registration information to a CBP officer
2. The CBP officer takes the license and registration and enters this information into a CBP commercial vehicle tracking application
3. After entering in the information, the CBP application then submits an information request to the TSA commercial vehicle tracking web service that contains person and vehicle information that is specific to the driver and truck being inspected.
4. Upon receipt of the information request, the TSA web service queries its own database of commercial vehicle information for records that match either the driver or the truck being inspected
5. The TSA web service returns the matching records for the driver or truck to the CBP commercial vehicle tracking application
6. The CBP commercial vehicle tracking application accepts these matching records and displays the information to the CBP officer who submitted the request
7. The CBP officer reviews the information and determines whether the driver or truck is a possible security threat

8. The CBP officer either allows the truck to pass upon inspection or holds the driver and truck for further inspection and questioning.
9. The CBP officer enters a record into the CBP commercial vehicle tracking application that indicates the decision that was made on the driver and truck and all necessary information about the border crossing (time/date, inspecting officer, etc.)
10. The CBP commercial vehicle tracking application then sends the decision information for the driver and truck involved in the border crossing to the TSA commercial vehicle tracking web service to be saved within that database for future queries.



3 Business Requirements

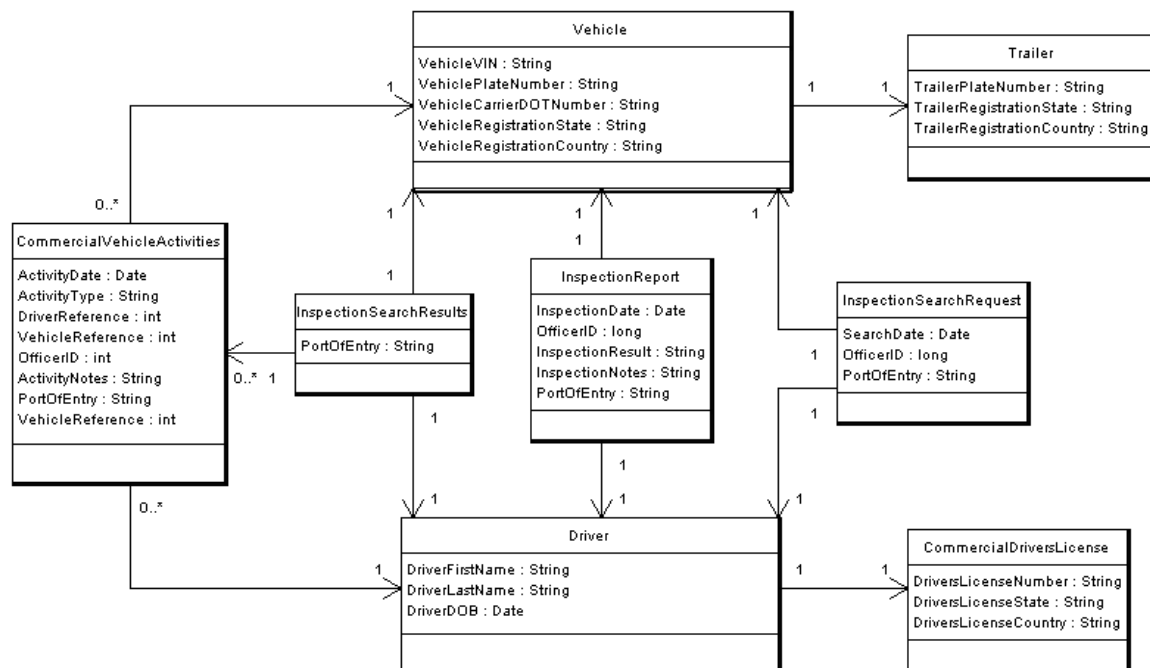
| Business Requirements | |
|-----------------------|--|
| Req. Number | Requirement Definition |
| 1 | CVT shall provide CBP officers with a consolidated view of the activity of a driver and his/her commercial vehicle |
| 2 | CVT shall help share information between TSA's commercial vehicle tracking database and CBP's commercial vehicle tracking database |
| 3 | CVT shall allow searching of the TSA commercial tracking application through commercial driver or commercial vehicle search criteria |
| 4 | CVT shall not unnecessarily extend the amount of time it takes to inspect and release a vehicle from the Port of Entry |

| Business Requirements | |
|------------------------------|--|
| Req. Number | Requirement Definition |
| 5 | CVT shall help identify suspicious driver and/or vehicle activity in order to secure our borders and protect our transportation system |
| 6 | CVT shall allow real-time access to TSA's commercial vehicle tracking application data in order to provide CBP officer's with the most current information about a commercial driver and a vehicle |
| 7 | CVT shall provide the flexibility to add other information providers beyond TSA's commercial vehicle tracking application in order to provide a more consolidated picture of a commercial driver's activity |
| 8 | CVT shall allow CBP to share the final inspection report of a commercial vehicle with TSA in order to synchronize the activity of a commercial driver and vehicle between these two systems |
| 9 | CVT shall only allow for authorized access of commercial driver and vehicle information from the TSA commercial vehicle tracking web service |
| 10 | CVT shall not make any decisions regarding the inspection of a vehicle and will only be used as a source of information to help make the decision of whether to allow a commercial vehicle across the border |

4 Business Rules

1. InspectionResult will have a maximum of 20 characters
2. InspectionNotes will have a maximum of 100 characters
3. DriverFirstName will have a maximum of 20 characters
4. DriverLastName will have a maximum of 20 characters
5. VehicleVINA will have a maximum of 20 characters
6. All base elements in InspectionSearchRequest can only appear once per message
7. All base elements in InspectionSearchResults can only appear once per message
8. All base elements in InspectionReport can only appear once per message
9. Each element in a CommercialVehicleActivity can only appear once per activity
10. Trailer data will only be sent in an InspectionSearchRequest and InspectionReport message if a trailer is attached to the commercial vehicle being inspected

5 Domain Model



6 Testing and Conformance

N/A

7 Tools and Methodologies

This section provides information regarding tools and methodologies used during the development of the IEPD. There is some standard information that has been added to the sections below.

If different tools and methodologies were used for developing the IEPD, change the information below with IEPD development process that was used.

7.1 IEPD Definition

To expand NIEM use while enabling the reusability of local implementations, Information Exchange Package Documents (IEPDs) were defined and a methodology for their development created. To understand what an IEPD is, it is important to understand the foundation upon which it is built.

EXtensible Markup Language (XML) is the first layer in the foundation of IEPDs. XML offers technologists a universal way of sending and receiving data. For those not familiar with XML, think of it being much like HTML. While HTML has tags that define how data is displayed on a website or screen (centered, bold, red, or 12-point font), XML has tags that describe what the data is (victim, agency, automobile, or suspect). The limitation of XML, however, is that it does not inherently constrain how one can describe data. That means one could call the Volvo S80 an <automobile>, a second could call it a <make and

model>, and another could call it the <get-away vehicle>. So NIEM was born; a way to constrain XML for all our citizen welfare communities.

Given the vast and widely diverse communities it supports, NIEM contains an enormous number of elements. It is prudent, therefore, to develop Information Exchange Packages (IEPs) which carry only the sub-set of NIEM elements necessary for a specific information exchange purpose. This allows implementers to limit their focus to NIEM elements relevant to the particular exchange events, triggers, conditions, and agencies their IEP is designed to support. This leads us to the development of Information Exchange Package Documents (IEPDs).

An IEPD is a collection of artifacts that support an implementer's creation of IEPs. IEP Documents are typically comprised of seven unique artifacts. A UML (Universal Modeling Language) domain model provides a graphical depiction of the data being exchanged and the cardinality of contained data elements to one another. IEPDs include a Standards Mapping spreadsheet which associates each exchange data element with its corresponding NIEM data element and namespace. Third, IEPDs include the actual NIEM compliant schemas which can consist of a document, extension, and constraint schema. Since most people are not comfortable reading XML schemas, it is recommended that all IEPDs include at least one sample XML Instance and associated style-sheet to help practitioners validate the model, mapping, and schemas in a user-friendly way. The XML Instance is simply the schema with actual data while the style-sheet transforms that Instance into a user-known document, form, or screen. Lastly, the seventh IEPD artifact is a written description of the approach used, people involved, and key assumptions made, during IEPD development. This collection of IEPD artifacts gives implementers tangible products which can be tailored for local implementation. Use of IEPDs has proven to save time and money on interface development phases from requirements to testing. Moreover, use of IEPD artifacts advances the widespread adoption of national standards as well as the realization of reuse benefits.

7.2 Development Process Description

A robust, yet flexible methodology exists for creating and refining IEPDs, graphically illustrated in Figure 5.3-a. This process is not unlike most system development life-cycles where requirements are defined, analysis and design performed, and development and testing executed. The biggest difference with an IEPD development process is the end result is a series of artifacts that can be used in the ultimate system interface development by subsequent implementers. It is about building a tool which enables standardized communication and general reuse.

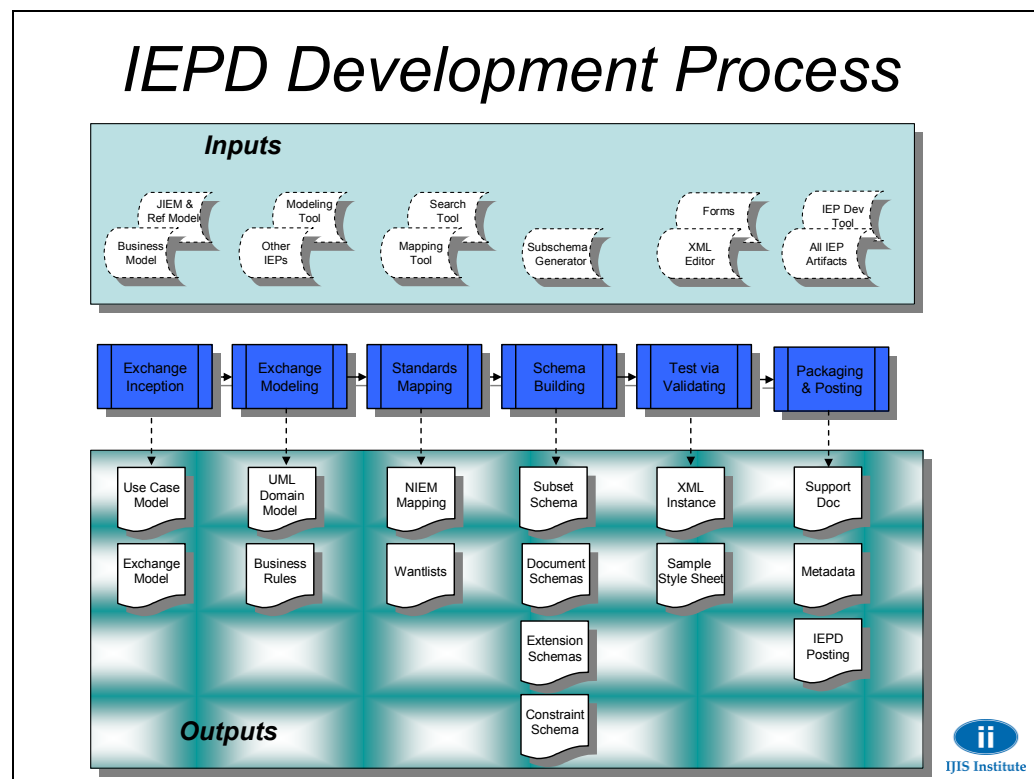


Figure 7.2-1: IEPD Development Process

7.3 Commercial Vehicle Tracker Approach

The Commercial Vehicle Tracker IEPD was developed according to the IEPD Lifecycle. The scenario for the exchange was first developed that determined the need for the exchange as well as how the exchange will improve the commercial vehicle inspection process at ports of entry. A use case was then developed to further define the actors in the exchange and how the exchange would be used in the inspection process. From this use case, a business process for the exchange was developed that addressed the business needs of the exchange as well as the steps to be completed in the exchange. Additionally, a sequence diagram was developed to identify the sequential flow of messages within the exchange.

Using the design specifications from the use case, business process diagram, and sequence diagram, a set of business rules and requirements was developed. These business rules and requirements documented the expectations for the exchange as well as set specifications for the actual format of data within the exchange. A domain model was then developed using ArgoUML, a UML modeling tool, that showed the data objects that would be used within the exchange as well as the specific attributes, or elements, for each data object.

The domain model was then used as a reference during the mapping process and completion of the Component Mapping Template (CMT) spreadsheet.

Each element within the domain model was put into the CMT and searches for possible matches within NIEM were completed. Once matches were found for these elements, a wantlist was created that declared the elements and types within NIEM that would be reused in this exchange. The wantlist was then loaded into the Schema Subset Generation Tool and subset schemas were generated and downloaded.

An exchange schema was then created that contained the root structure for the three types of messages within the exchange: the search request message, the search results message, and the inspection report message. An extension schema was also created that contained the elements and types that would be used within this exchange that were not already defined within the subset schemas. Finally, a constraint schema was created that was a copy of the subset schema but with additional constraints.

These schemas were then used within the web services that processed the CVT messages both within CBP and TSA. Both CBP and TSA implemented these web services within their Service Oriented Architecture (SOA). Within this model, the web services that support the CVT information exchange can be modified as necessary without impact on the other web services hosted within the organizations' SOA.

Appendix A. IEPD Metadata

| IEPD Metadata | |
|---------------------------------------|-------------------------------|
| Metadata | Definition |
| Participating Component | Customs and Border Protection |
| Participating Organization | |
| IEPD Author Name | Pat NIEM |
| IEPD Author Title | Project Manager |
| IEPD Author Component | Customs and Border Protection |
| IEPD Author Phone Number | 202-383-7777 |
| IEPD Author Email Address | pniem@cbp.gov |
| Date of Submission | 2009-07-07 |
| Document Version Number | 1 |
| Exchange or Service currently in use? | Y |
| NIEM Version | 2.0 |
| Security Marking | N |
| Associations | |

In addition to completing the table above, IEPD metadata needs to be represented in a machine readable format (XML) as well. The code below provides an XML skeleton that can be populated for the metadata:

```
<?xml version="1.0" encoding="UTF-8" ?>
<IEPDMetadata xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="metadata.xsd">
  <SecurityMarkings></SecurityMarkings>
  <ComponentOrOrganization>
    <ParticipatingComponent></ParticipatingComponent>
    <ParticipatingOrganization></ParticipatingOrganization>
  </ComponentOrOrganization>
  <IEPDAuthor>
    <IEPDAuthorName></IEPDAuthorName>
    <IEPDAuthorTitle></IEPDAuthorTitle>
    <IEPDAuthorComponent></IEPDAuthorComponent>
    <IEPDAuthorPhone></IEPDAuthorPhone>
    <IEPDAuthorEmail></IEPDAuthorEmail>
  </IEPDAuthor>
  <DocumentInformation>
    <IEPDDateofSubmission></IEPDDateofSubmission>
    <DocumentVersion></DocumentVersion>
    <CurrentlyInUse></CurrentlyInUse>
    <NIEMVersion></NIEMVersion>
  </DocumentInformation>
  <IEPDAssociations>
    <Associations></Associations>
  </IEPDAssociations>
</IEPDMetadata>
```

Appendix B. List of IEPD Artifacts

An IEPD is constructed of two types of artifacts: the first includes the business context of the information exchange, reference and supporting documentation. The second type of artifact is the technical documentation which is reusable for other information exchanges. Artifacts required by DHS are indicated with a '*'.

NOTE: Please be sure to complete the "Artifact Location" and "Included" columns in the table based on artifacts that are present as part of the IEPD package. If there is an artifact that isn't present, please go ahead and add it, but make sure it is marked as though it wasn't part of the original list.

| IEPD Artifacts | | | | |
|-----------------------|--|---|------------|----------|
| IEPD Artifact | Description | Artifact Location | File Types | Included |
| Exchange Files | | | | |
| Subset Schema* | Subset of the full NIEM schema—a compressed directory of schemas to distinguish from other schema sets. | ..\..\Schemas\Subset | xsd | Y |
| Wantlist* | User requirements - distinguishes user-required data components from components they depend on for conformance. Generated by and uploaded to the Schema Subset Generation Tool (SSGT). This is an open specification and the SSGT is not required to create a wantlist, though it is easier. | ..\..\Schemas\Subset\wantlist_cvt.xml | xml | Y |
| Exchange Schema* | Base document schema that defines the XML root element and is generally named after the IEPD itself. Also known as the document schema, reference schema, or root schema. | ..\..\Schemas\Exchange\cvt-x.xsd | xsd | Y |
| Constraint Schema* | Constraints for separate constraint validation path—a compressed directory of schemas to distinguish from other schema sets. | ..\..\Schemas\Constraint | xsd | Y |

| IEPD Artifacts | | | | |
|------------------------|---|---|---------------------------------|----------|
| IEPD Artifact | Description | Artifact Location | File Types | Included |
| Extension Schema* | Specification for extended components—separate local namespaces of components not contained in NIEM. | ..\Schemas\Extension\cvt-e.xsd | xsd | Y |
| Sample XML Instance* | Example instance(s) – may reference optional stylesheet. | ..\Schemas\Sample XML Instances\cvt_searchrequest.xml | xml | Y |
| Style sheet* | Example stylesheet for display of instance(s). | ..\Schemas\Sample XML Instances\iepdstyle.xsl | xsl | Y |
| Documentation | | | | |
| Master Documentation* | The Master Document is the main document for which all of the context and details around the exchange are explained. This document includes, the overview, as well as details surrounding the exchange, business drivers for the exchange, etc. | cvt-Main Document.doc | txt, doc | Y |
| Business Requirements* | Business drivers/business need for the exchange | cvt-Main Document.doc | txt, doc | Y |
| Business Rules* | Rules around how data is structured and represented as part of the exchange | cvt-Main Document.doc | txt, doc | Y |
| Domain model* | Domain model in standard open format (xmi, vsd, zargo) and standard open graphic (jpg, pdf, etc.) preferably a Unified Modeling Language (UML) model. | ..\Models\cvt-DomainModel.png | vsd, xml, zargo, jpg, pdf, etc. | Y |
| Sequence Diagram* | Diagram that represents a sequence of events that occur during an information exchange | cvt-Main Document.doc | vsd, xml, zargo, jpg, pdf, etc. | Y |

| IEPD Artifacts | | | | |
|-----------------------------|---|--|---------------|----------|
| IEPD Artifact | Description | Artifact Location | File Types | Included |
| Use Case Model* | Use case diagram that depicts the business level perspective of the information exchange | cvt-Main Document.doc | txt, doc | Y |
| Component Mapping Template* | Mapping of domain components to NIEM components. Components created because they were not in NIEM Need to be represented in the Component Mapping Tool (CMT). | ..\Mapping Templates\cvt-CMT.xls | xls, csv | Y |
| Change log* | Record of cumulative changes from previous IEPD versions. The initial IEPD simple records its creation date. | | xml, txt, doc | N |
| MOUs | Memorandums of understanding among participating agencies relating to an information exchange. | | txt, doc | N |
| Endorsement letters | Documentation from professional or governmental organizations that confirms support. (Refer to <i>Endorsement</i> in metadata.) | | txt, doc | N |
| Methodology and tools | Methodology and tools used to build IEPD; may contain URLs or references to tools, methodology, or documentation. | cvt-Main Document.doc | txt, doc | Y |
| Testing and conformance | Description and results of validation and conformance testing performed—may include testing output or products. | | txt, doc | N |
| Catalog | | | | |

| IEPD Artifacts | | | | |
|----------------|---|---|------------|----------|
| IEPD Artifact | Description | Artifact Location | File Types | Included |
| Catalog* | A machine-readable list of artifacts in the IEPD in an open, portable and browser-displayable format. | ..\..\Catalog\catalog.html | xml, xhtml | Y |
| Metadata* | All metadata registered with the IEPD | ..\..\Metadata\cvt-metadata.xml | xml, xhtml | Y |

Appendix C. Reference Documentation

This is a table that includes reference documents that pertain to the exchange. These documents can be documents used to design/build the exchange, such as, the System Design Document, System Requirements Document, Interface Control Document, etc. It can also include MOUs between participating organizations.

Since IEPD packages are meant to be self-sustaining, all of the documents listed as reference documents should also be included as part of the IEPD package.

| Document Type | Date | Document Title |
|---------------|------|----------------|
| | | |

Appendix D. IEPD Catalog



Department of Homeland Security

Commercial Vehicle Tracker (CVT) IEPD Catalog

The Commercial Vehicle Tracker (CVT) IEPD was developed to share information about commercial vehicles as they pass through inspection stations at the border. Customs and Border Protection (CBP) officers will use the CVT information exchange to share commercial vehicle-related information with the Transportation Security Administration (TSA). By accessing the commercial vehicle information stored within TSA's database, CBP officers will be able to see a more complete picture of the activities of a commercial vehicle and its driver.

Exchange Files

- Exchange Schema: [Exchange Schema](#)
- Extension Schema: [Extension Schema](#)
- Subset Schema: [Subset Schema](#)
- Constraint Schema: [Constraint Schema](#)
- Wantlist: [Wantlist](#)

Sample XML Instances

- Inspection Search Request: [Inspection Search Request](#)
- Inspection Search Results: [Inspection Search Results](#)
- Inspection Report: [Inspection Report](#)

MetaData

- MetaData: [MetaData File](#)

Other Documentation

- Domain Model: [IEPD Domain Model](#)

- NIEM Mapping: [Component Mapping Template](#)