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SP 800-156

DRAFT Representation of PIV Chain-of-Trust for Import and Export

NIST announces that Draft Special Publication (SP) 800-156, *Representation of PIV Chain-of-Trust for Import and Export*, is now available for public comment. This document provides the data representation of a chain-of-trust record for the exchange of records between issuers. The exchanged record can be used by an agency to personalize a PIV Card for a transferred employee, or by a service provider to personalize a PIV Card on behalf of client federal agencies. The data representation is based on a common XML schema to facilitate interoperable information sharing and data exchange. The document also provides support for data integrity through digital signatures and confidentiality through encryption of chain-of-trust data in transit and at rest.

[The comment period for this draft document closes on: **January 28, 2016**. Email comments to: [piv_comments @nist.gov](mailto:piv_comments@nist.gov) with "Questions on Draft SP 156" in the subject line.]

1 **Draft NIST Special Publication 800-156**

2 **Representation of**
3 **PIV Chain-of-Trust for**
4 **Import and Export (Draft)**

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Reports on Computer Systems Technology

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83

Abstract

84 This document provides a common XML-based data representation of a chain-of-trust record to
85 facilitate the exchange of PIV Card enrollment data. The exchanged record is the basis to
86 personalize a PIV Card for a transferred employee and also for service providers to personalize a
87 PIV Card on behalf of client federal agencies.

88

Keywords

89 Enrollment record, Federal Information Processing Standards (FIPS) 201, HSPD-12,
90 identification, identity infrastructure, Personal Identity Verification (PIV), PIV Architecture, PIV
91 Card, PIV chain-of-trust, XML information sharing

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Table of Contents

1 Introduction 6

 1.1 Background..... 6

 1.2 Purpose and Scope 6

 1.3 Document Structure 7

 1.4 Document Conventions..... 7

2 Chain-of-Trust Data Requirements and Namespaces..... 8

 2.1 Namespaces Declaration for Chain-of-Trust Schema..... 8

3 Chain-of-Trust Schema Description 10

 3.1 Schema Header and Namespace Declarations 10

 3.2 Element <PIVChainOfTrust> 10

 3.3 Complex Type PIVChainOfTrustType 10

 3.4 Complex Type EnrollmentRecordType 12

 3.5 Complex Type PersonalInformationType 13

 3.6 Complex Type AdjudicationInformationType 14

 3.7 Complex Type EnrollmentPackageType 15

 3.8 Complex Type EPBiographicType 16

 3.9 Complex Type EPBiometricsType 18

 3.10 Complex Type EPDocumentType 19

 3.11 Complex Type PIVCardTopographyType 22

4 Chain-of-trust Record Encryption in Transit 27

5 Log and Historical Data 28

List of Appendices

Appendix A— XML Schema 29

Appendix B— XML Sample PIVChainOfTrust Record..... 35

Appendix C— References 39

Appendix D— Glossary of Terms 41

Appendix E— Acronyms 42

123

List of Tables

124 **Table 1: Standard Namespace** 9

125 **Table 2: Ethnicity Codes**..... 17

126

127 **1 Introduction**

128 **1.1 Background**

129 The Homeland Security Presidential Directive 12 [[HSPD12](#)] called for a common
130 identification standard to be adopted governing the interoperable use of identity
131 credentials to allow physical and logical access to federal government locations and
132 systems. The Federal Information Processing Standard 201 [[FIPS201](#)] titled “Personal
133 Identity Verification (PIV) of Federal Employees and Contractors,” was developed as the
134 standard for the identity credentials hosted on a smart card called the PIV Card.
135 [[FIPS201](#)] defines the identity proofing, registration, and issuance requirements for
136 issuing PIV Cards to federal government employees and contractors. Data collected
137 during the identity proofing, registration, and issuance may be maintained in a chain-of-
138 trust record. As per FIPS 201-2, “a card issuer may optionally maintain, for each PIV
139 Card issued, a documentary chain-of-trust for the identification data it collects.” The
140 chain-of-trust is a sequence of related enrollment data records that are created and
141 maintained through the methods of contemporaneous acquisition of data within each
142 enrollment data record, and biometric matching of samples between enrollment data
143 records.” The chain-of-trust offers process efficiencies because a PIV Card can be re-
144 issued based on the most current chain-of-trust record and; more importantly, avoid
145 repeating the identity proofing and re-registration (re-enrollment) process. Departments
146 and agencies who implement a chain-of-trust will also be able to transfer the record to
147 another agency or to a service provider so that the receiving agency or service provider
148 can use the record to issue a PIV Card rather than re-enroll an applicant. This special
149 publication provides the representation of a chain-of-trust for import and export between
150 PIV Card issuers.

151 **1.2 Purpose and Scope**

152 [[FIPS201](#)] describes three use-cases for a chain-of-trust: 1) to extend enrollment, 2) to re-
153 issuance a PIV Card, and 3) to transfer PIV Card enrollment records to another federal
154 issuer or to a service provider. The purpose of this document is to provide the data
155 representation of a chain-of-trust record for the transferal use-case. The data
156 representation is based on a common XML schema to facilitate interoperable information
157 sharing and data exchange. The sending and receiving federal agencies will be able to
158 exchange the chain-of-trust data according to the specifications provided in this
159 document. Similarly, a service provider will be able to receive chain-of-trust records
160 from different client agencies that are based on a common XML schema specified in this
161 document. This document also provides support for data integrity through digital
162 signatures and confidentiality through encryption of chain-of-trust data in transit and at
163 rest.

164 There are two use cases within the transferal scenario which this document supports:

165 Agency to agency: In this use case, an existing PIV cardholder from agency A is
166 transferring to agency B, where the user will require a new PIV Card issued by agency B.
167 Rather than re-enrolling the user, the chain-of-trust record is sent, (upon Agency B’s

168 request) from agency A to agency B such that agency B is able to reuse the enrollment
169 data, thus reducing the time and effort required for agency B to issue a new PIV Card.

170 Agency to service provider: In this use case, an agency does not directly issue PIV Cards
171 to their employees and contractors, but instead utilize a separate service provider for
172 issuance of PIV Cards. The agency can use the chain-of-trust to send PIV Card
173 enrollment data collected by the agency to the service provider.

174 Regardless of the use case, the goal is to provide a common chain-of-trust schema to
175 facilitate information sharing and data exchange between different issuers.

176 1.3 Document Structure

177 The remainder of this document is divided into the following sections and appendices:

- 178 • [Section 2](#), *Chain-of-Trust Data Requirements and Namespaces*, discusses the
179 representation of chain-of-trust data in XML schemas.
180
- 181 • [Section 3](#), *Chain-of-Trust Schema Description*, documents the detail of chain-of-
182 trust XML schema.
183
- 184 • [Section 4](#), *Chain-of-trust Record Encryption in Transit*, identifies the
185 requirements for encrypting chain-of-trust data.
186
- 187 • [Section 5](#), *Log and Historical Data*, discusses the requirement for the chain-of-
188 trust producer to maintain records related to the cardholder.
- 189 • [Appendix A](#) contains the XML schema for the chain-of-trust.
- 190 • [Appendix B](#) contains a sample XML chain-of-trust data record.
- 191 • [Appendix C](#) identifies references used in this document.
- 192 • [Appendix D](#) provides a glossary of terms used in this document.
- 193 • [Appendix E](#) provides a list of acronyms and abbreviations used in this document.

194 1.4 Document Conventions

195 Throughout this document key words are used to identify requirements. The key words
196 “optional”, “required”, “shall”, “shall not”, and “should” are used. These words are a
197 subset of the IETF Request For Comments (RFC) 2119 [[RFC2119](#)] key words, and have
198 been chosen based on convention in other normative documents. In addition to the key
199 words, the words ‘need,’ ‘can,’ and ‘may’ are used in this document, but are not intended
200 to be normative.

201 **2 Chain-of-Trust Data Requirements and Namespaces**

202 [\[FIPS201\]](#) recommends that the following data be included in the chain-of-trust:

- 203 • A log of activities that documents who took the action, what action was taken,
204 when and where the action took place, and what identification data was collected.
- 205 • An enrollment data record that contains the most recent collection of each of the
206 biometric data collected. The enrollment data record describes the circumstances
207 of biometric acquisition including the name and role of the acquiring agent, the
208 office and organization, time, place, and acquisition method. The enrollment data
209 record may also document unavailable biometric data or failed attempts to collect
210 biometric data. The enrollment data record may contain historical biometric data.
- 211 • The most recent unique identifiers (i.e., Federal Agency Smart Credential Number
212 (FASC-N) and Universally Unique Identifier (UUID)) issued to the individual's
213 card. The record may contain historical unique identifiers.
- 214 • Information about the authorizing entity who has approved the issuance of a
215 credential.
- 216 • Current status of the background investigation, including the results of the
217 investigation once completed.
- 218 • The evidence of authorization if the credential is issued under a pseudonym.
- 219 • Any data or any subsequent changes in the data about the cardholder. If the
220 changed data is the cardholder's name, then the issuer should include the evidence
221 of a formal name change.

222 The following sections provide an XML schema representation of the baseline data
223 included in the chain-of-trust.

224 Users of this XML schema may extend the schema as needed. This schema has been
225 authored to address the broadest envisioned range of chain-of-trust data to be able to
226 transfer PIV Card enrollment records across federal agencies and to a service provider.
227 Extending the XML schema will allow the exchange of additional elements to meet
228 requirements for specialized exchange of chain-of-trust data. However, extending the
229 XML schema will also result in custom exchange that is less interoperable.

230 **2.1 Namespaces Declaration for Chain-of-Trust Schema**

231 XML namespace prefixes are used throughout this specification to stand for their
232 respective namespaces as follows:

233

234

Table 1: Standard Namespace

Prefix	XML Namespace	Comments
<i>ds:</i>	http://www.w3.org/2000/09/xmldsig#	This is the W3C XML Signature namespace [XMLSig].
<i>nist:</i>	http://csrc.nist.gov/ns/piv/chain-of-trust/1.0	This is the NIST's Computer Security Division's chain-of-trust namespace. This namespace will be active upon final publication of this document.
<i>xenc:</i>	http://www.w3.org/2001/04/xmlenc#	This is the W3C XML Encryption namespace [XMLEnc].
<i>xs:</i>	http://www.w3.org/2001/XMLSchema	This is the schema for XML schemas namespace [XMLSchema].

235

236 This specification uses the following typographical conventions in the text: <Element>,
 237 **Defined Type**, XML and XML schema.

238 **3 Chain-of-Trust Schema Description**

239 The chain-of-trust data is encoded in the XML format specified in this document. The
 240 chain-of-trust XML records are intended to be used in a direct-exchange. While log and
 241 historical data are not included in the XML chain-of-trust record, the issuer of the chain-
 242 of-trust record should be able to correlate the chain-of-trust record to the associated log
 243 and historic data, if requested to do so by the recipient of the chain-of-trust record. The
 244 <PIVTrustChain> element may include the records for multiple subjects, with each
 245 <EnrollmentRecord> element containing the record for a single subject.

246 This section contains an overview of the elements that may appear in a chain-of-trust
 247 XML file.

248 **3.1 Schema Header and Namespace Declarations**

249 The following schema fragment defines the XML namespaces and other header
 250 information for the PIV chain-of-trust schema:

```
251 <xs:schema elementFormDefault="qualified" xmlns:xs="http://www.w3.org/2001/XMLSchema"
252           targetNamespace="http://csrc.nist.gov/ns/piv/chain-of-trust/1.0"
253           xmlns="http://csrc.nist.gov/ns/piv/chain-of-trust/1.0"
254           xmlns:ds="http://www.w3.org/2000/09/xmldsig#"
255           xmlns:xenc="http://www.w3.org/2001/04/xmlenc#">
256
257 <xs:import namespace="http://www.w3.org/2000/09/xmldsig#"
258           schemaLocation="http://www.w3.org/TR/2002/REC-xmldsig-core-20020212/xmldsig-core-
259           schema.xsd"/>
260 <xs:import namespace="http://www.w3.org/2001/04/xmlenc#"
261           schemaLocation="http://www.w3.org/TR/2002/REC-xmlenc-core-20021210/xenc-schema.xsd"/>
262
```

263 **3.2 Element <PIVChainOfTrust>**

264 The following schema fragment defines the <PIVChainOfTrust> element:

```
265 <xs:element name="PIVChainOfTrust" type="PIVChainOfTrustType"/>
```

266 The <PIVChainOfTrust> element is of **PIVChainOfTrustType** complex type, and
 267 carries one or more <EnrollmentRecord> elements.

268 **3.3 Complex Type PIVChainOfTrustType**

269 The following schema fragment defines the **PIVChainOfTrustType** complex type:

```
270 <xs:complexType name="PIVChainOfTrustType">
271   <xs:sequence>
272     <xs:choice>
273       <xs:sequence>
274         <xs:element ref="xenc:EncryptedData" minOccurs="1" maxOccurs="1"/>
275         <xs:element ref="xenc:EncryptedKey" minOccurs="1" maxOccurs="unbounded"/>
276       </xs:sequence>
277       <xs:sequence>
278         <xs:element name="EnrollmentRecord" type="EnrollmentRecordType" minOccurs="1"
279         maxOccurs="unbounded"/>
280         <xs:element ref="ds:Signature" minOccurs="1" maxOccurs="1"/>
281       </xs:sequence>
282     </xs:choice>
283   </xs:sequence>
```

284 </xs:complexType>

285

286 The **PIVChainOfTrustType** complex type offers a choice to either encrypt the PIV
287 chain-of-trust records, or to leave the record unencrypted. PIV chain-of-trust records
288 contain personally identifiable information (PII) of actual PIV cardholder thus should
289 always be encrypted when in transit. The unencrypted sequence is intended to allow a
290 recipient of the record to validate/test XML records as required. The recipient of the
291 record should protect the records accordingly when not used (i.e., data at rest protection).

292 Each instance of the <EnrollmentRecord> element contains the enrollment information
293 captured by the PIV issuer for a single PIV cardholder. There is a minimum of one
294 instance of this element, and there is no limit to the maximum number of
295 <EnrollmentRecord> elements that may be contained in the <PIVChainOfTrust>
296 element. This allows a single instance of the <PIVChainOfTrust> element to contain
297 several PIV cardholder records in a XML file.

298 Encrypted PIV chain-of-trust records are intended to include a confidentiality protection
299 mechanism. The encrypted content and associated encryption details are defined by the
300 XML Encryption Syntax and Processing specification [[XMLEnc](#)]. The <EncryptedData>
301 Type attribute should be present and contain a value of
302 <http://www.w3.org/2001/04/xmlenc#Element>. The encryption method algorithm for the
303 <EncryptedData> element should be set to: [http://www.w3.org/2001/04/xmlenc#aes256-](http://www.w3.org/2001/04/xmlenc#aes256-cbc)
304 [cbc](http://www.w3.org/2001/04/xmlenc#aes256-cbc).

305 The <xenc:EncryptedKey> element is defined in the [[XMLEnc](#)] standard and used to
306 transport encrypted symmetric keys from the originator to a known recipient(s). The
307 symmetric key value is always encrypted to the recipient(s). A public key from a PKI
308 certificate should be used to encrypt the symmetric key. The sender should select an
309 encryption certificate for the recipient issued under a policy that has been cross-certified
310 with the Federal Bridge CA (FBCA) at the Medium Hardware or High Assurance Level.
311 The sender should use <http://www.w3.org/2001/04/xmlenc#rsa-oaep-mgf1p> as the key
312 transport algorithm to encrypt the key. Each encrypted key should include a Recipient
313 attribute that contains a hint as to which recipient the encrypted key value is intended for.
314 An example value that could be used in the Recipient attribute is the distinguished name
315 (DN) from the recipient's encryption certificate subject field.

316 A procedure for the exchange of the key encryption key is outside of scope of this
317 document. Some example mechanisms for this exchange include the use of
318 Secure/Multipurpose Internet Mail Extensions (S/MIME) email exchanges to share the
319 encryption certificates, or a webpage that supports Hyper Text Transfer Protocol with
320 Secure Sockets Layer (HTTPS) using an Extended Validation Secure Sockets Layer
321 (EVSSL) certificate, where links to the encryption certificates for recipient federal
322 agencies or service providers can be accessed and downloaded.

323 All PIV chain-of-trust records are signed using XML Signature. An XML Signature
324 protects the integrity of the data and authenticates the issuer of the chain-of-trust. A valid
325 PIV Card or a private key generated under the id-fpki-common-piv-contentSigning

326 certificate policy should be used to sign the XML record.

327

328 **3.4 Complex Type EnrollmentRecordType**

329 The following schema fragment defines the **EnrollmentRecordType** complex type:

```

330 <xs:complexType name="EnrollmentRecordType">
331   <xs:sequence>
332     <xs:element name="PersonalInformation" type="PersonalInformationType" minOccurs="1"
333       maxOccurs="1"/>
334     <xs:element name="AdjudicationInformation" type="AdjudicationInformationType" minOccurs="1"
335       maxOccurs="1"/>
336     <xs:element name="EnrollmentPackage" type="EnrollmentPackageType" minOccurs="1"
337       maxOccurs="1"/>
338     <xs:element name="PIVCardTopography" type="PIVCardTopographyType" minOccurs="1"
339       maxOccurs="1"/>
340   </xs:sequence>
341 </xs:complexType>

```

342 The **EnrollmentRecordType** complex type contains four elements carrying data
 343 required for the issuance of a PIV Card to cardholder. The elements contained in the
 344 **EnrollmentRecordType** complex type are:

345 <PersonalInformation>: This element is an instance of the **PersonalInformationType**
 346 complex type and contains personally identifying information on the subject of the chain-
 347 of-trust enrollment record. The <PersonalInformation> element is a required element that
 348 appears once in the **EnrollmentRecordType** complex type.

349 <AdjudicationInformation>: This element is an instance of the
 350 **AdjudicationInformationType** complex type and contains information on the status of
 351 the background investigation into the subject of the chain-of-trust enrollment record. The
 352 <AdjudicationInformation> element is a required element that appears once in the
 353 **EnrollmentRecordType** complex type.

354 <EnrollmentPackage>: This element is an instance of the **EnrollmentPackageType**
 355 complex type and contains biographic and biometric information on the subject of the
 356 chain-of-trust enrollment record. The <EnrollmentPackage> element is a required
 357 element that appears once in the **EnrollmentPackageType** complex type.

358 <PIVCardTopography>: This element is an instance of the **PIVCardTopographyType**
 359 complex type and contains information used for the physical printing of PIV Cards. The
 360 <PIVCardTopography> element is an optional element. If used, it would appear once in
 361 the **EnrollmentRecordType** complex type.

362 The **EnrollmentRecordType** for an agency to agency record exchange use case would
 363 typically include the following types:

- 364 • **PersonalInformationType**
- 365 • **AdjudicationInformationType**
- 366 • **EnrollmentPackageType**

367 The **EnrollmentRecordType** for an agency to service provider record exchange use case
368 would typically include the following types:

- 369 • **PersonalInformationType**
- 370 • **AdjudicationInformationType**
- 371 • **EnrollmentPackageType**
- 372 • **PIVCardTopographyType**

373 As indicated above, the PIV CardTopographyType data element is more likely to be
374 included in the service provider record exchange use case rather than the agency to
375 agency record exchange use case. This is because a client agency needs to provide
376 information about their agency and their new employees/contractors to be printed on the
377 surface of each card. For the agency to agency record exchange, topographic information
378 may not be needed as the receiving agency will use its own topographic elements to be
379 printed on the PIV Card.

380 381 3.5 Complex Type PersonalInformationType

382 The following schema fragment defines the **PersonalInformationType** complex type:

```
383 <xs:complexType name="PersonalInformationType">
384   <xs:sequence>
385     <xs:element name="PrimaryIdentifier" type="xs:string" minOccurs="1" maxOccurs="1"/>
386     <xs:element name="SecondaryIdentifier" type="xs:string" minOccurs="1" maxOccurs="1"/>
387     <xs:element name="PrintedName" type="xs:string" minOccurs="1" maxOccurs="1"/>
388     <xs:element name="SSN" type="xs:string" minOccurs="0" maxOccurs="1"/>
389     <xs:element name="IsUSCitizen" type="xs:boolean" minOccurs="1" maxOccurs="1"/>
390     <xs:element name="CitizenshipCountryCode" type="xs:string" minOccurs="1"
391       maxOccurs="unbounded"/>
392     <xs:element name="CardUUID" type="xs:string" minOccurs="0" maxOccurs="1"/>
393     <xs:element name="CHUID" type="xs:string" minOccurs="0" maxOccurs="1"/>
394   </xs:sequence>
395 </xs:complexType>
```

396 The CardUUID and CHUID type data element is likely not used for the agency to agency
397 record exchange use case as the new agency will generate these values. For the agency to
398 to servicer provider record exchange use case, however, the client agency may specify
399 the CardUUID and CHUID to be personalized for each PIV cardholder.

400 The **PersonalInformationType** complex type contains eight elements that describe the
401 subject of the chain-of-trust enrollment record. Those elements are:

402 <PrimaryIdentifier>: This element contains the Primary Identifier of the subject of the
403 chain-of-trust enrollment record. The Primary Identifier is defined in [\[FIPS 201-2\]](#) as the
404 surnames or family names of the PIV cardholder. The <PrimaryIdentifier> element is
405 always included in the **PersonalInformationType** complex type and appears only once.
406 The data is provided in an xs:string format.

407 <SecondaryIdentifier>: This element contains the Secondary Identifier of the subject of
408 the chain-of-trust enrollment record. The Secondary Identifier is defined in [\[FIPS 201-2\]](#)
409 as pre-names or given names of the PIV Cardholder. The <SecondaryIdentifier> element

410 is always included in the **PersonalInformationType** complex type and occurs only once.
411 The data is provided in an xs:string format.

412 <PrintedName>: This element contains the Printed Name of the subject of the chain-of-
413 trust enrollment record. The Printed Name is a combination of the card holder's primary
414 and secondary identifiers, as it is to be printed on the PIV Card according to [\[FIPS 201-](#)
415 [2\]](#). The <PrintedName> element is always included in the **PersonalInformationType**
416 complex type and only occurs once. The data is provided in an xs:string format.

417 <SSN>: This element may contain the Social Security Number of the subject of the
418 chain-of-trust enrollment record¹. The <SSN> element is optional, and may occur only
419 once if included in the **PersonalInformationType** complex type. The the data is
420 provided in an xs:string format.

421 <IsUSCitizen>: This element is required, occurs once in the **PersonalInformationType**
422 complex type and contains a boolean value. If the subject of the chain-of-trust enrollment
423 record is a US Citizen, then the value is set to true. If the subject of the chain-of-trust
424 enrollment record is not a US Citizen, then the value is set to false. The data is provided
425 in an xs:boolean format. If the <IsUSCitizen> element is false, then at least one country
426 is specified in <CitizenshipCountryCode>.

427 <CitizenshipCountryCode>: This element is optional and contains the countries of
428 citizenship of the subject of the chain-of-trust enrollment record. The country code is
429 formatted in an abbreviation (alpha-3 format), as documented in [\[ISO3166\]](#). The
430 <CitizenshipCountryCode> element may occur once for each citizenship the applicant
431 possesses. The data is provided in an xs:string format.

432 <CardUUID>: The <CardUUID > element is optional, and occurs once when included in
433 the **PersonalInformationType** complex type. It is envisioned that the <CardUUID> will
434 only be be used in the agency to service provider record exchange use case to transfer the
435 Card UUID to be stored on the PIV Card. The data is provided in an xs:string format.

436 <CHUID>: This element is optional and if used should occur once when included in the
437 **PersonalInformationType** complex type. It is envisioned that the <CHUID> will be
438 used in the agency to service provider use case only for the purpose to to transfer the
439 CHUID-specific details to be stored on the PIV Card. The data is provided in an xs:string
440 format.

441 **3.6 Complex Type AdjudicationInformationType**

442 The following schema fragment defines the **AdjudicationInformationType** complex

¹ To eliminate unnecessary use of the SSN, whenever possible, Department and Agencies should avoid using the <SSN> element. See the attachment to OMB M-07-16 [\[M-07-16\]](#), Section 2: "Reduce the Use of Social Security Numbers."

443 type:

```

444 <xs:complexType name="AdjudicationInformationType">
445   <xs:sequence>
446     <xs:element name="NACIAAdjudicationValue" minOccurs="1" maxOccurs="1">
447       <xs:simpleType>
448         <xs:restriction base="xs:string">
449           <xs:enumeration value="Approved"/>
450           <xs:enumeration value="Pending"/>
451         </xs:restriction>
452       </xs:simpleType>
453     </xs:element>
454     <xs:element name="NACIAAdjudicationEffDate" type="xs:date" minOccurs="0" maxOccurs="1"/>
455   </xs:sequence>
456 </xs:complexType>

```

457

458 The **AdjudicationInformationType** complex type contains two elements that describe
 459 the status of the PIV background investigation of the subject of the chain-of-trust
 460 enrollment record. Those elements are:

461 <NACIAAdjudicationValue>: This element is required, and occurs once in the
 462 **AdjudicationInformationType** complex type. The element indicates the status of the
 463 National Agency Check with Inquiries (NACI) (or equivalent or higher) or Tier 1 or
 464 higher federal background investigation the PIV cardholder underwent. There are two
 465 permitted values based on the progress of the background investigation. The element is
 466 set to ‘Approved’ or ‘Pending.’ ‘Approved’ indicates a NACI (or equivalent or higher) or
 467 Tier 1 or higher federal background investigation has been completed. ‘Pending’ status
 468 indicates the Federal Bureau of Investigation (FBI) National Criminal History Check (NCHC)
 469 portion of the background investigation is completed and that NACI background check is in
 470 process, but has not yet received final adjudication. The data is provided in an xs:string
 471 format.

472

473 <NACIAAdjudicationEffDate>: This element is optional, and occurs once when included
 474 in the **AdjudicationInformationType** complex type. The element indicates the date the
 475 current status of the <NACIAAdjudicationValue> element went into effect. The data is
 476 provided in an xs:date format.

477

478 3.7 Complex Type EnrollmentPackageType

479 The following schema fragment defines the **EnrollmentPackageType** complex type:

```

480 <xs:complexType name="EnrollmentPackageType">
481   <xs:sequence>
482     <xs:element name="EPBiographic" type="EPBiographicType" minOccurs="0" maxOccurs="1"/>
483     <xs:element name="EPBiometrics" type="EPBiometricsType" minOccurs="1" maxOccurs="1"/>
484     <xs:element name="EPDocument" type="EPDocumentType" minOccurs="2" maxOccurs="2"/>
485   </xs:sequence>
486 </xs:complexType>

```

487 The **EnrollmentPackageType** complex type contains three elements that identify the
 488 biographic and biometric properties of a PIV Card cardholder. The elements contained in
 489 the **EnrollmentPackageType** complex type are:

490 <EPBiographic>: This element is an instance of the **EPBiographicType** complex type,
 491 containing biographic information on the subject of the chain-of-trust enrollment record
 492 as described in [Section 3.8](#). The <EPBiographic> element is an optional element and if
 493 present, appears once in the **EnrollmentPackageType** complex type.

494 <EPBiometrics>: This element is an instance of the **EPBiometricsType** complex type,
 495 containing biometric information on the subject of the chain-of-trust enrollment record as
 496 described in [Section 3.9](#). The <EPBiometrics> element is a required element that appear
 497 once in the **EnrollmentPackageType** complex type.

498 <EPDocument>: This element is an instance of the **EPDocumentType** complex type as
 499 described in [Section 3.10](#). The <EPDocument > element is a mandatory element and
 500 appears twice in the **EnrollmentPackageType** complex type. One instance of the
 501 <EPDocument> element contains the primary identity source document as defined in
 502 [\[FIPS 201-2\]](#). The second instance of the <EPDocument> element complex type contains
 503 the secondary identity source document as defined in [\[FIPS 201-2\]](#).

504 3.8 Complex Type EPBiographicType

505 The following schema fragment defines the **EPBiographicType** complex type:

```

506 <xs:complexType name="EPBiographicType">
507   <xs:sequence>
508     <xs:element name="GenderCode" minOccurs="0" maxOccurs="1">
509       <xs:simpleType>
510         <xs:restriction base="xs:string">
511           <xs:enumeration value="Female"/>
512           <xs:enumeration value="Male"/>
513         </xs:restriction>
514       </xs:simpleType>
515     </xs:element>
516     <xs:element name="EyeColorCode" minOccurs="0" maxOccurs="1">
517       <xs:simpleType>
518         <xs:restriction base="xs:string">
519           <xs:enumeration value="Blue"/>
520           <xs:enumeration value="Brown"/>
521           <xs:enumeration value="Gray"/>
522           <xs:enumeration value="Green"/>
523         </xs:restriction>
524       </xs:simpleType>
525     </xs:element>
526     <xs:element name="HairColorCode" minOccurs="0" maxOccurs="1">
527       <xs:simpleType>
528         <xs:restriction base="xs:string">
529           <xs:enumeration value="Bald"/>
530           <xs:enumeration value="Black"/>
531           <xs:enumeration value="Blonde"/>
532           <xs:enumeration value="Brown"/>
533           <xs:enumeration value="Gray or Partially Gray"/>
534           <xs:enumeration value="Red or Auburn"/>
535         </xs:restriction>
536       </xs:simpleType>
537     </xs:element>
538     <xs:element name="Height" type="xs:string" minOccurs="0" maxOccurs="1"/>
539     <xs:element name="Weight" type="xs:integer" minOccurs="1" maxOccurs="1"/>
540     <xs:element name="EthnicityCode" minOccurs="0" maxOccurs="1">
541       <xs:simpleType>
542         <xs:restriction base="xs:string">
543           <xs:enumeration value="A"/>
544           <xs:enumeration value="B"/>

```

```

545         <xs:enumeration value="I"/>
546         <xs:enumeration value="U"/>
547         <xs:enumeration value="W"/>
548     </xs:restriction>
549 </xs:simpleType>
550 </xs:element>
551 <xs:element name="EnrollmentDate" type="xs:date" minOccurs="0" maxOccurs="1"/>
552 </xs:sequence>
553 </xs:complexType>

```

554 The **EPBiographicType** complex type contains six optional elements that describe the
555 biographical data of the subject of the chain-of-trust enrollment record. Values for
556 EPbiographicType complex type are based on the FBI's Electronic Biometric
557 Transmission specification [[EBTS](#)]. Those elements are:

558 <GenderCode>: This element contains the gender of the subject of the chain-of-trust
559 enrollment record. The <GenderCode> element is optional and occurs once when
560 included in the **EPBioGraphicType** complex type. The <GenderCode> element is set to
561 Female or Male. The data is provided in an xs:string format.

562 <EyeColorCode>: This element contains the eye color of the subject of the chain-of-trust
563 enrollment record. The <EyeColorCode> element is optional and occurs once when
564 included in the **EPBioGraphicType** complex type. The <EyeColorCode> element is
565 selected from the following values: Blue, Brown, Gray or Green. The data is provided in
566 an xs:string format.

567 <HairColorCode>: This element contains the hair color of the subject of the chain-of-
568 trust enrollment record. The <HairColorCode> element is optional and occurs once when
569 included in the **EPBioGraphicType** complex type. The <HairColorCode> element is
570 selected from the following values: Bald, Black, Blonde, Brown, Gray or Partially Gray,
571 Red or Auburn. The data is provided in an xs:string format.

572 <Height>: This element contains the physical height of the subject of the chain-of-trust
573 enrollment record. If reported in feet and inches, the first (leftmost) digit is used to show
574 feet while the two rightmost digits are used to show the inches between 00 and 11. If
575 reported in inches, then the leftmost character is 'N' followed by two digits. The
576 <Height> element is optional and occurs once when included in the **EPBioGraphicType**
577 complex type. The data is provided in an xs:string format.

578 <Weight>: This element contains the physical weight of the subject of the chain-of-trust
579 enrollment record. The subject's weight in pounds is entered. All weights in excess of
580 499 pounds will be set to 499. The <Weight> element is optional and occurs once when
581 included in the **EPBioGraphicType** complex type. The data is provided in an xs:string
582 format.

583 <EthnicityCode>: This element contains the ethnicity of the subject of the chain-of-trust
584 enrollment record. The <EthnicityCode> element is optional and occurs once when
585 included in the **EPBioGraphicType** complex type. The <EthnicityCode> element is
586 selected from the following values: A, B, I, U, or W.

587

Table 2: Ethnicity Codes

If Subject Is	Enter Code
Chinese, Japanese, Filipino, Korean, Polynesian, Indian, Indonesian, Asian Indian, Samoan, or any other Pacific Islander	A
A person having origins in any of the black racial groups of Africa	B
American Indian, Eskimo, or Alaskan native, or a person having origins in any of the 48 contiguous states of the United States or Alaska who maintains cultural identification through tribal affiliation or community recognition	I
Of indeterminable race	U
Caucasian, Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, Regardless of race	W

588

589 <EnrollmentDate>: This element contains the date the subject of the chain-of-trust
590 enrollment record enrolled for a PIV Card. The <EnrollmentDate> element is optional
591 and occurs once when included in the **EPBioGraphicType** complex type. The data is
592 provided in an xs:date format.

593

594 3.9 Complex Type EPBiometricsType

595 The following schema fragment defines the **EPBiometricsType** complex type:

```

596 <xs:complexType name="EPBiometricsType">
597   <xs:sequence>
598     <xs:element minOccurs="1" maxOccurs="1" name="Photo" type="xs:base64Binary"/>
599     <xs:element minOccurs="1" maxOccurs="1" name="FingerprintOffCardComparisonRepresentation"
600       type="xs:base64Binary"/>
601     <xs:element minOccurs="0" maxOccurs="1" name="FingerprintOnCardComparisonRepresentation"
602       type="xs:base64Binary"/>
603     <xs:element minOccurs="0" maxOccurs="1" name="IrisRepresentation" type="xs:base64Binary"/>
604   </xs:sequence>
605 </xs:complexType>
606

```

607 The **EPBiometrics** complex type contains information related to the biometric data of the
608 subject of the chain-of-trust enrollment record, as captured during PIV enrollment. The
609 four elements supported in the **EPBiometrics** complex type are:

610 <Photo>: This element is required. The <Photo> element contains the facial image
611 collected during the enrollment process, as documented in [\[SP800-76\]](#) Biometric
612 Specifications for Personal Identity Verification. The <Photo> element includes the
613 CBEFF Header, the INCITS 385 profile for PIV facial images, and the CBEFF signature.
614 The facial image can be used to both print the image on the card and as the digital
615 representation stored in the PIV Card. The data is provided in an xs:base64Binary format.

616 <FingerprintsOffCardComparisonRepresentation>: This element is mandatory and occurs
617 only once. The <FingerprintsOffCardComparisonRepresentation> element contains the
618 fingerprint data collected during the enrollment process and is used for off-card
619 comparison, as documented in [\[SP800-76\]](#). The
620 <FingerprintsOffCardComparisonRepresentation> element includes the CBEFF Header,
621 the INCITS 378 Minutiae, and the CBEFF signature. The data is provided in an

622 xs:base64Binary format.

623 <FingerprintsOnCardComparisonRepresentation>: This element is optional and if used
 624 occurs once. <FingerprintsOnCardComparisonRepresentation> element is only used if
 625 the <FingerprintsOnCardComparisonRepresentation> element uses different fingers
 626 representation than in <FingerprintsOffCardComparisonRepresentation> element. If the
 627 fingers for on-card and off-card comparison representation are identical, on-card
 628 comparison minutia templates representation can be created using the data stored in the
 629 <FingerprintsOffCardComparsionRepresentation> element. If used, the
 630 <FingerprintsOnCardComparisonRepresentation> includes the CBEFF Header, the
 631 ISO/IEC 19794-2:2011 minutiae, and the CBEFF signature, as documented in [[SP800-
 632 76](#)]. The data is provided in an xs:base64Binary format.

633 <IrisRepresentation>: This element is optional and if used occurs once. The
 634 <IrisRepresentation> element contains the iris image representation collected during the
 635 enrollment process, as documented in [[SP800-76](#)]. The <IrisRepresentation> element
 636 includes the CBEFF Header, ISO 19794-6 iris, and the CBEFF signature. The data is
 637 provided in an xs:base64Binary format.

638 3.10 Complex Type EPDocumentType

639 The following schema fragment defines the **EPDocumentType** complex type:

```

640 <xs:complexType name="EPDocumentType">
641   <xs:sequence>
642     <xs:element name="DocumentTypeIdentifier" minOccurs="1" maxOccurs="1">
643       <xs:simpleType>
644         <xs:restriction base="xs:string">
645           <xs:enumeration value="Primary identity source"/>
646           <xs:enumeration value="Secondary identity source"/>
647         </xs:restriction>
648       </xs:simpleType>
649     </xs:element>
650     <xs:element name="DocumentTypeCode" minOccurs="1" maxOccurs="1">
651       <xs:simpleType>
652         <xs:restriction base="xs:string">
653           <xs:enumeration value="U.S. Passport or a U.S. Passport Card"/>
654           <xs:enumeration value="Permanent Resident Card or an Alien Registration Receipt Card  

655 (Form I-551)"/>
656           <xs:enumeration value="Foreign Passport"/>
657           <xs:enumeration value="Employment Authorization Document that contains a photograph  

658 (Form I-766)"/>
659           <xs:enumeration value="Driver's license or an ID card issued by a state or possession of  

660 the United States provided it contains a photograph"/>
661           <xs:enumeration value="U.S. Military ID card"/>
662           <xs:enumeration value="U.S. Military dependent's ID card"/>
663           <xs:enumeration value="PIV Card"/>
664           <xs:enumeration value="U.S. Social Security Card issued by the Social Security  

665 Administration"/>
666           <xs:enumeration value="Original or certified copy of a birth certificate issued by a  

667 state, county, municipal authority, possession, or outlying possession of the United States  

668 bearing an official seal"/>
669           <xs:enumeration value="ID card issued by a federal, state, or local government agency or  

670 entity, provided it contains a photograph"/>
671           <xs:enumeration value="Voter's registration card"/>
672           <xs:enumeration value="U.S. Coast Guard Merchant Mariner Card"/>
673           <xs:enumeration value="Certificate of U.S. Citizenship (Form N-560 or N-561)"/>
674           <xs:enumeration value="Certificate of Naturalization (Form N-550 or N-570)"/>
675           <xs:enumeration value="U.S. Citizen ID Card (Form I-197)"/>

```

```

676     <xs:enumeration value="Identification Card for Use of Resident Citizen in the United
677 States (Form I-179)"/>
678     <xs:enumeration value=" Certification of Birth Abroad or Certification of Report of
679 Birth issued by the Department of State (Form FS-545 or Form DS-1350)"/>
680     <xs:enumeration value="Temporary Resident Card (Form I-688)"/>
681     <xs:enumeration value="Employment Authorization Card (Form I-688A)"/>
682     <xs:enumeration value="Reentry Permit (Form I-327)"/>
683     <xs:enumeration value="Refugee Travel Document (Form I-571)"/>
684     <xs:enumeration value="Employment authorization document issued by DHS"/>
685     <xs:enumeration value="Employment Authorization Document issued by DHS with photograph
686 (Form I-688B)"/>
687     <xs:enumeration value="Driver's license issued by a Canadian government entity"/>
688     <xs:enumeration value="Native American tribal document"/>
689   </xs:restriction>
690 </xs:simpleType>
691 </xs:element>
692 <xs:element name="DocumentNumber" type="xs:string" minOccurs="0" maxOccurs="1"/>
693 <xs:element name="SequenceNumber" type="xs:string" minOccurs="0" maxOccurs="1"/>
694 <xs:element name="CountryCode" type="xs:string" minOccurs="0" maxOccurs="1"/>
695 <xs:element name="StateCode" type="xs:string" minOccurs="0" maxOccurs="1"/>
696 <xs:element name="ExpiryDate" type="xs:date" minOccurs="0" maxOccurs="1"/>
697 <xs:element name="DocumentImageFront" type="xs:base64Binary" minOccurs="0" maxOccurs="1"/>
698 <xs:element name="DocumentImageBack" type="xs:base64Binary" minOccurs="0" maxOccurs="1"/>
699 <xs:element name="CollectionDate" type="xs:date" minOccurs="0" maxOccurs="1"/>
700 </xs:sequence>
701 </xs:complexType>
702

```

703 The **EPDocumentType** complex type contains information related to the identity source
704 document presented by the subject of the PIV chain-of-trust enrollment record during
705 enrollment process. There are two instances of the type to specify primary and secondary
706 identity source documents. The ten elements supported in each **EPDocumentType**
707 complex type are:

708 <DocumentTypeIdentifier>: This element is required and occurs once. The element
709 represents the identity source document presented during the [\[FIPS 201-2\]](#) identity
710 proofing process. The <DocumentTypeIdentifier> element indicates the either: Primary
711 identity source document or Secondary identity source document as the value. The data is
712 provided in an xs:string format.

713 <DocumentTypeCode>: This element is required and occurs once. The
714 <DocumentTypeCode> element indicates the type of document verified during the
715 enrollment of the PIV cardholder. The data is provided in an xs:string format. The
716 <DocumentTypeCode> element is selected from the following two bulleted lists of
717 permitted values, as documented in [\[FIPS 201-2\]](#):

718 For one of the **EPDocumentType** instances, the identity source document is a primary
719 identity source document and one of the following values should be used:

- 720 • U.S. Passport or a U.S. Passport Card
- 721 • Driver's license or an ID card issued by a state or possession of the United States
722 provided it contains a photograph
- 723 • Permanent Resident Card or an Alien Registration Receipt Card (Form I-551)
- 724 • Foreign passport
- 725 • Employment Authorization Document that contains a photograph (Form I-766)
- 726 • U.S. Military ID card

- 727 • U.S. Military dependent's ID card
- 728 • PIV Card

729 For the other **EPDocumentType** instance, the secondary identity source document is
 730 indicated and the following values should be used:

- 731 • U.S. Social Security Card issued by the Social Security Administration
- 732 • Original or certified copy of a birth certificate issued by a state, county, municipal
 733 authority, possession, or outlying possession of the United States bearing an
 734 official seal
- 735 • ID card issued by a federal, state, or local government agency or entity, provided
 736 it contains a photograph
- 737 • Voter's registration card
- 738 • U.S. Coast Guard Merchant Mariner Card
- 739 • Certificate of U.S. Citizenship (Form N-560 or N-561)
- 740 • Certificate of Naturalization (Form N-550 or N-570)
- 741 • U.S. Citizen ID Card (Form I-197)
- 742 • Identification Card for Use of Resident Citizen in the United States (Form I-179)
- 743 • Certification of Birth Abroad or Certification of Report of Birth issued by the
 744 Department of State (Form FS-545 or Form DS-1350)
- 745 • Temporary Resident Card (Form I-688)
- 746 • Employment Authorization Card (Form I-688A)
- 747 • Reentry Permit (Form I-327)
- 748 • Refugee Travel Document (Form I-571)
- 749 • Employment authorization document issued by DHS
- 750 • Employment Authorization Document issued by DHS with photograph (Form I-
 751 688B)
- 752 • Driver's license issued by a Canadian government entity
- 753 • Native American tribal document

754 <DocumentNumber>: This element is optional, and if used occurs once. The element
 755 indicates the document number from the identity source document verified during
 756 enrollment. The data is provided in an xs:string format.

757 <SequenceNumber>: This element is optional, and if used occurs once. The element
 758 indicates the sequence number from the identity source document verified during
 759 enrollment. The data is provided in an xs:string format.

760 <CountryCode>: This element is optional and if used occurs once. The element indicates
 761 the country that issued the identity source document verified during the PIV enrollment
 762 process. The country code is formatted in an abbreviation (alpha-3 format), as
 763 documented in [[ISO3166](#)]. The data is provided in an xs:string format.

764 <StateCode>: This element is optional and if used occurs once. The element indicates the
 765 US state that provided the identity source document verified during enrollment. The state
 766 name is formatted as a two letter abbreviation, as documented by the United States Postal

767 Service [\[USPS-Appendix B\]](#). The data is provided in an xs:string format.

768 <ExpiryDate>: This element is optional and if used occurs only once. The element
769 indicates the date the identity source document verified during enrollment is set to expire.
770 The data is provided in an xs:date format.

771 <DocumentImageFront>: This element is optional and if used occurs only once. The
772 <DocumentImageFront> element contains a scanned JPEG image of the front of the
773 identity source document verified during enrollment. The data is provided in an
774 xs:base64Binary format.

775 <DocumentImageBack>: This element is optional and if used occurs only once. The
776 <DocumentImageBack> element contains a scanned JPEG image of the back of the
777 identity source document verified during enrollment. The data is provided in an
778 xs:base64Binary format.

779 <CollectionDate>: This element is optional and if used occurs only once. The element
780 indicates the date the identity source document was collected and verified by an
781 enrollment official. The data is provided in an xs:date format.

782 3.11 Complex Type PIVCardTopographyType

783 The following schema fragment defines the **PIVCardTopographyType** complex type:

```

784 <xs:complexType name="PIVCardTopographyType">
785   <xs:sequence>
786     <xs:element name="EmployeeAffiliation" type="xs:string" minOccurs="0" maxOccurs="1"/>
787     <xs:element name="AgencyDepartmentOrOrganization" type="xs:string" minOccurs="0"
788       maxOccurs="1"/>
789     <xs:element name="CardExpirationDate" type="xs:date" minOccurs="0" maxOccurs="1"/>
790     <xs:element name="AffiliationColorCode" minOccurs="0" maxOccurs="1">
791       <xs:simpleType>
792         <xs:restriction base="xs:string">
793           <xs:enumeration value="B"/>
794           <xs:enumeration value="G"/>
795           <xs:enumeration value="W"/>
796         </xs:restriction>
797       </xs:simpleType>
798     </xs:element>
799     <xs:element name="AgencyCardSerialNumber" type="xs:string" minOccurs="0" maxOccurs="1"/>
800     <xs:element name="IssuerIdentificationNumber" type="xs:string" minOccurs="0" maxOccurs="1"/>
801     <xs:element name="Signature" type="xs:base64Binary" minOccurs="0" maxOccurs="1"/>
802     <xs:element name="AgencySpecificText4F" type="xs:string" minOccurs="0" maxOccurs="1"/>
803     <xs:element name="Rank" type="xs:string" minOccurs="0" maxOccurs="1"/>
804     <xs:element name="PDFBarcode" type="xs:base64Binary" minOccurs="0" maxOccurs="1"/>
805     <xs:element name="Header" type="xs:string" minOccurs="0" maxOccurs="1"/>
806     <xs:element name="AgencySeal" type="xs:base64Binary" minOccurs="0" maxOccurs="1"/>
807     <xs:element name="Footer" type="xs:string" minOccurs="0" maxOccurs="1"/>
808     <xs:element name="PhotoBorder" type="xs:base64Binary" minOccurs="0" maxOccurs="1"/>
809     <xs:element name="AgencySpecificData" type="xs:string" minOccurs="0" maxOccurs="1"/>
810     <xs:element name="OrganizationalAffiliationAbbreviation" type="xs:string" minOccurs="0"
811       maxOccurs="1"/>
812     <xs:element name="RidgingOrNotchedTactileMarker" minOccurs="0" maxOccurs="1">
813       <xs:simpleType>
814         <xs:restriction base="xs:string">
815           <xs:enumeration value="Ridging"/>
816           <xs:enumeration value="Notched Corner"/>
817         </xs:restriction>
818       </xs:simpleType>

```



```

819     </xs:element>
820     <xs:element name="LaserEngraving" type="xs:boolean" minOccurs="0" maxOccurs="1"/>
821     <xs:element name="ReturnAddress" type="xs:string" minOccurs="0" maxOccurs="1"/>
822     <xs:element name="AdditionalLanguageForEmergencyResponseOfficials" type="xs:string"
823         minOccurs="0" maxOccurs="1"/>
824     <xs:element name="StandardSection499Title18" type="xs:string" minOccurs="0" maxOccurs="1"/>
825     <xs:element name="AgencySpecificText9B" type="xs:string" minOccurs="0" maxOccurs="1"/>
826     <xs:element name="AgencySpecificText10B" type="xs:string" minOccurs="0" maxOccurs="1"/>
827 </xs:sequence>
828 </xs:complexType>
829

```

830 The **PIVCardTopography** complex type contains information used for printing the front
831 and back of the PIV Card as described in [\[FIPS 201-2\]](#). The twenty three elements
832 supported in the **PIVCardTopography** complex type are:

833 <EmployeeAffiliation>: This element is optional and if used occurs only once. The
834 element contains the employee affiliation to be printed on the card. Some examples of
835 employee affiliation are “Employee,” “Contractor,” “Active Duty,” and “Civilian.” The
836 <EmployeeAffiliation> element is the value for Zone 8F on the front of the PIV Card.
837 The data is provided in an xs:string format.

838 <AgencyDepartmentOrOrganization>: This element is optional and if used occurs only
839 once. The element contains the organizational affiliation of the cardholder. The
840 <AgencyDepartmentOrOrganization> element is the value for Zone 10F on the front of
841 the PIV Card. The data is provided in an xs:string format.

842 <CardExpirationDate>: This element optional and if used occurs only once. The element
843 contains the date the PIV Card is set to expire. The <CardExpirationDate> element is the
844 value for Zone 14F on the front of the PIV Card. The data is provided in an xs:date
845 format.

846 <AffiliationColorCode>: This element is optional and if used occurs only once. The
847 <AffiliationColorCode> element is the value for Zone 18F on the front of the PIV Card.
848 This value also indicates the color that is to be used in Zone 15F and as a background
849 color for Zone 2F (name). The <AffiliationColorCode> element is selected from the
850 following values: B, G, or W. B indicates Blue for Foreign National, G indicates Green
851 for Contractors, and W indicates White for Government Employee. The data is provided
852 in an xs:string format.

853
854 <AgencyCardSerialNumber>: This element is optional and if used occurs only once. The
855 element contains the unique serial number from the issuing department or agency. The
856 format shall be at the discretion of the issuing department or agency. The
857 <AgencyCardSerialNumber> element is the value for Zone 1B on the back of the PIV
858 Card. The data is provided in an xs:string format.

859
860 <IssuerIdentificationNumber>: This element is optional and if used occurs only once.
861 The element consist of six characters for the department code, four characters for the
862 agency code, and a five-digit number that uniquely identifies the issuing facility within
863 the department or agency. The <IssuerIdentificationNumber> element is the value for
864 Zone 2B on the back of the PIV Card. The data is provided in an xs:string format.

865
866 <Signature>: This element is optional and if used occurs only once. The element contains
867 a JPEG image of the cardholder’s signature. The <Signature> element is the value for
868 Zone 3F on the front of the PIV Card. The data is provided in an xs:base64Binary format.
869

870 <AgencySpecificText4F>: This element is optional and if used occurs only once. The
871 element contains text for printing agency specific requirements on the PIV Card, such as
872 employee status. The <AgencySpecificText4F> element is the value for Zone 4F on the
873 front of the PIV Card. The data is provided in an xs:string format.
874

875 <Rank>: This element is optional and if used occurs only once. The element contains text
876 for the cardholder’s rank. The format of the text is at the department or agency’s
877 discretion. The <Rank> element is the value for Zone 5F on the front of the PIV Card.
878 The data is provided in an xs:string format.
879

880 <PDFBarcode>: This element is optional and if used occurs only once. The element
881 contains a Portable Data File (PDF) Two-Dimensional Bar Code JPEG image. The
882 <PDFBarcode > element is the value for Zone 6F on the front of the PIV Card. The data
883 is provided in an xs:base64Binary format.
884

885 <Header>: This element is optional and if used occurs only once. If used the element
886 should contain either the text “United States Government”, or departments and agencies
887 may also choose to use this text for other department or agency-specific information,
888 such as identifying a federal emergency responder role. The <Header> element is the
889 value for Zone 9F on the front of the PIV Card. The data is provided in an xs:string
890 format.
891

892 <AgencySeal>: This element is optional and if used occurs only once. The element
893 contains a JPEG image of the seal selected by the issuing department, agency, or
894 organization for printing on the PIV Card. The <AgencySeal> element is the value for
895 Zone 11F on the front of the PIV Card. The data is provided in an xs:base64Binary
896 format.
897

898 <Footer>: This element is optional and if used occurs only once. If used the element
899 should contain the location label for the Federal Emergency Response Official (FERO)
900 identification. A department or agency may print “Federal Emergency Response
901 Official”, preferably in white lettering on a red background on the PIV Card.
902 Departments and agencies may also use the <Footer> element to further identify the
903 federal emergency respondent’s official role. Some examples of official roles are “Law
904 Enforcement,” “Fire Fighter,” and “Emergency Response Team (ERT).” When Zone
905 15F indicates foreign national affiliation and the department or agency does not need to
906 highlight emergency response official status, the <Footer> element may be used to denote
907 the country or countries of citizenship. If so used, the department or agency shall print the
908 country name or the three-letter country abbreviation (alpha-3 format) in accordance with
909 ISO 3166-1, Country Codes [[ISO3166](#)]. The <Footer> element is the value for Zone 12F
910 on the front of the PIV Card. The data is provided in an xs:string format.

911

912 <PhotoBorderPattern>: This element is optional and if used occurs only once. The
913 element contains a JPEG image of the photo border. A border may be used with the photo
914 to further identify employee affiliation. This border may be used in conjunction with
915 Zone 15F to enable departments and agencies to develop various employee categories.
916 The photo border shall not obscure the photo. The border may be a solid or patterned line.
917 For solid and patterned lines, red shall be reserved for emergency response officials, blue
918 for foreign nationals, and green for contractors. All other colors may be used at the
919 department or agency's discretion. The <PhotoBorderPattern> element is the value for
920 Zone 16F on the front of the PIV Card. The data is provided in an xs:base64Binary
921 format.

922

923 <AgencySpecificData>: This element is optional and if used occurs only once. In cases in
924 which other defined optional elements are not used, the <AgencySpecificData> element
925 may be used for other department or agency-specific information and is set to the value
926 of Zone 17F on the front of the PIV Card. The data is provided in an xs:string format.

927

928 <OrganizationalAffiliationAbbreviation>: This element is optional and if used occurs
929 only once. The element contains the organizational affiliation abbreviation for printing on
930 the PIV Card. The <OrganizationalAffiliationAbbreviation> element is the value for
931 Zone 20F on the front of the PIV Card. The data is provided in an xs:string format.

932

933 <RidgingOrNotchedTactileMarker>: This element is optional and if used occurs only
934 once. The element indicates if the PIV Card should incorporate edge ridging or a notched
935 corner to indicate card orientation. The <RidgingOrNotchedTactileMarker> element is
936 selected from the following values: "Ridging" or Notched Corner". The
937 <RidgingOrNotchedTactileMarker> element is the value for Zone 21F on the front of the
938 PIV Card. The data is provided in an xs:string format.

939

940 <LaserEngraving>: This element is optional and if used occurs only once. The element
941 indicates if the PIV Card should include tactilely discernible marks created using laser
942 engraving to indicate card orientation. The <LaserEngraving> element is set to true if
943 laser engraving should be applied to the PIV Card and set to false if laser engraving
944 should not be applied to the PIV Card. The <LaserEngraving> element is the value for
945 Zone 22F on the front of the PIV Card. The data is provided in an xs:boolean format.

946

947 <ReturnAddress>: This element is optional and if used occurs only once. The element
948 contains the "return if lost" language placed on the back of the PIV Card. The
949 <ReturnAddress> element is the value for Zone 4B on the back of the PIV Card. The data
950 is provided in an xs:string format.

951

952 <AdditionalLanguageForEmergencyResponseOfficials>: This element is optional and if
953 used occurs only once. The element contains text if the departments and agencies choose
954 to provide additional information to identify emergency response officials or to better
955 identify the cardholder's authorized access. The

956 <AdditionalLanguageForEmergencyResponseOfficials> element is the value for Zone 6B
957 on the back of the PIV Card. The data is provided in an xs:string format.

958

959 <StandardSection499Title18>: This element is optional and if used occurs only once. The
960 element contains the text for the standard Section 499, Title 18, language warning against
961 counterfeiting, altering, or misusing the PIV Card. The <StandardSection499Title18>
962 element is the value for Zone 7B on the back of the PIV Card. The data is provided in an
963 xs:string format.

964

965 <AgencySpecificText9B>: This element is optional and if used occurs only once. The
966 element contains text for printing agency specific requirements on the PIV Card.
967 Departments and agencies are encouraged to use this area prudently and minimize printed
968 text to that which is absolutely necessary. The <AgencySpecificText9B> element is the
969 value for Zone 9B on the back of the PIV Card. The data is provided in an xs:string
970 format.

971

972 <AgencySpecificText10B>: This element is optional and if used occurs only once. The
973 element contains text for printing agency specific requirements on the PIV Card.
974 Departments and agencies are encouraged to use this area prudently and minimize printed
975 text to that which is absolutely necessary. The <AgencySpecificText10B> element is the
976 value for Zone 10B on the back of the PIV Card. The data is provided in an xs:string
977 format.

4 Chain-of-trust Record Encryption in Transit

979 The confidentiality of the chain-of-trust record is to be protected at all times by both the
980 producing and consuming organizations. In addition to encrypting the chain-of-trust
981 record in accordance with XML encryption, as documented in section 3.3 titled
982 PIVChainOfTrustType, the chain-of-trust records should be encrypted in transit between
983 the chain-of-trust producer and the chain-of-trust consumer. Some example mechanisms
984 for chain-of-trust transmission include but are not limited to: FTPS, HTTPS secured web
985 services, and out of band mechanisms such as S/MIME secure email. The encryption
986 used should be compliant with the [\[FIPS 140\]](#) standard.

987

5 Log and Historical Data

988 Logs and historical data are maintained by the original issuer and are not transfer when
989 exchanging PIV Card enrollment records. These log and historical data were created by
990 the original issuer and are part of the chain-of-trust record. Log and historical data
991 contain information that correlates the subject of a chain-of-trust record to logs of identity
992 proofing, registration (enrollment) and maintenance activities of a cardholder. This
993 includes information about the officer who took the action, what action was taken, and
994 when and where the action occurred. Some examples of log activities the chain-of-trust
995 record log maintains are: initial PIV Cardholder registration, enrollment, and issuance,
996 change of name and subsequent re-issuance, loss of card and subsequent reissuance.

997

Appendix A—XML Schema

```

998 <?xml version="1.0" encoding="utf-8"?>
999
1000 <xs:schema elementFormDefault="qualified" xmlns:xs="http://www.w3.org/2001/XMLSchema"
1001 targetNamespace="http://csrc.nist.gov/ns/piv/chain-of-trust/1.0" xmlns="http://csrc.nist.gov/ns/piv/chain-of-trust/1.0"
1002 xmlns:ds="http://www.w3.org/2000/09/xmldsig#" xmlns:xenc="http://www.w3.org/2001/04/xmlenc#">
1003
1004 <xs:import namespace="http://www.w3.org/2000/09/xmldsig#" schemaLocation="http://www.w3.org/TR/2002/REC-xmldsig-core-20020212/xmldsig-
1005 core-schema.xsd"/>
1006 <xs:import namespace="http://www.w3.org/2001/04/xmlenc#" schemaLocation="http://www.w3.org/TR/2002/REC-xmlenc-core-20021210/xenc-
1007 schema.xsd"/>
1008
1009     <xs:element name="PIVChainOfTrust" type="PIVChainOfTrustType"/>
1010
1011     <xs:complexType name="PIVChainOfTrustType">
1012         <xs:sequence>
1013             <xs:choice>
1014                 <xs:sequence>
1015                     <xs:element ref="xenc:EncryptedData" minOccurs="1" maxOccurs="1"/>
1016                     <xs:element ref="xenc:EncryptedKey" minOccurs="1" maxOccurs="unbounded"/>
1017                 </xs:sequence>
1018                 <xs:sequence>
1019                     <xs:element name="EnrollmentRecord" type="EnrollmentRecordType" minOccurs="1"
1020 maxOccurs="unbounded"/>
1021                     <xs:element ref="ds:Signature" minOccurs="1" maxOccurs="1"/>
1022                 </xs:sequence>
1023             </xs:choice>
1024         </xs:sequence>
1025     </xs:complexType>
1026     <xs:complexType name="EnrollmentRecordType">
1027         <xs:sequence>
1028             <xs:element name="PersonalInformation" type="PersonalInformationType" minOccurs="1" maxOccurs="1"/>
1029             <xs:element name="AdjudicationInformation" type="AdjudicationInformationType" minOccurs="1" maxOccurs="1"/>
1030             <xs:element name="EnrollmentPackage" type="EnrollmentPackageType" minOccurs="1" maxOccurs="1"/>
1031             <xs:element name="PIVCardTopography" type="PIVCardTopographyType" minOccurs="0" maxOccurs="1"/>
1032         </xs:sequence>
1033     </xs:complexType>
1034     <xs:complexType name="PersonalInformationType">
1035         <xs:sequence>
1036             <xs:element name="PrimaryIdentifier" type="xs:string" minOccurs="1" maxOccurs="1"/>
1037             <xs:element name="SecondaryIdentifier" type="xs:string" minOccurs="1" maxOccurs="1"/>
1038             <xs:element name="PrintedName" type="xs:string" minOccurs="1" maxOccurs="1"/>
1039             <xs:element name="SSN" type="xs:string" minOccurs="0" maxOccurs="1"/>
1040             <xs:element name="IsUSCitizen" type="xs:boolean" minOccurs="1" maxOccurs="1"/>
1041             <xs:element name="CitizenshipCountryCode" type="xs:string" minOccurs="1" maxOccurs="unbounded"/>

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1042     <xs:element name="CardHolderUUID" type="xs:string" minOccurs="0" maxOccurs="1"/>
1043     <xs:element name="CardUUID" type="xs:string" minOccurs="0" maxOccurs="1"/>
1044     <xs:element name="CHUID" type="xs:string" minOccurs="0" maxOccurs="1"/>
1045   </xs:sequence>
1046 </xs:complexType>
1047 <xs:complexType name="AdjudicationInformationType">
1048   <xs:sequence>
1049     <xs:element name="NACIAdjudicationValue" minOccurs="1" maxOccurs="1">
1050       <xs:simpleType>
1051         <xs:restriction base="xs:string">
1052           <xs:enumeration value="Approved"/>
1053           <xs:enumeration value="Pending"/>
1054         </xs:restriction>
1055       </xs:simpleType>
1056     </xs:element>
1057     <xs:element name="NACIAdjudicationEffDate" type="xs:date" minOccurs="0" maxOccurs="1"/>
1058   </xs:sequence>
1059 </xs:complexType>
1060 <xs:complexType name="EnrollmentPackageType">
1061   <xs:sequence>
1062     <xs:element name="EPBiographic" type="EPBiographicType" minOccurs="0" maxOccurs="1"/>
1063     <xs:element name="EPBiometrics" type="EPBiometricsType" minOccurs="1" maxOccurs="1"/>
1064     <xs:element name="EPDocument" type="EPDocumentType" minOccurs="2" maxOccurs="2"/>
1065   </xs:sequence>
1066 </xs:complexType>
1067 <xs:complexType name="EPBiographicType">
1068   <xs:sequence>
1069     <xs:element name="GenderCode" minOccurs="0" maxOccurs="1">
1070       <xs:simpleType>
1071         <xs:restriction base="xs:string">
1072           <xs:enumeration value="Female"/>
1073           <xs:enumeration value="Male"/>
1074           <xs:enumeration value="Other"/>
1075         </xs:restriction>
1076       </xs:simpleType>
1077     </xs:element>
1078     <xs:element name="EyeColorCode" minOccurs="0" maxOccurs="1">
1079       <xs:simpleType>
1080         <xs:restriction base="xs:string">
1081           <xs:enumeration value="Black"/>
1082           <xs:enumeration value="Blue"/>
1083           <xs:enumeration value="Brown"/>
1084           <xs:enumeration value="Gray"/>
1085           <xs:enumeration value="Green"/>
1086           <xs:enumeration value="Hazel"/>
1087           <xs:enumeration value="Maroon"/>
1088           <xs:enumeration value="Multicolored"/>

```



```

1089         <xs:enumeration value="Pink"/>
1090     </xs:restriction>
1091 </xs:simpleType>
1092 </xs:element>
1093 <xs:element name="HairColorCode" minOccurs="0" maxOccurs="1">
1094     <xs:simpleType>
1095         <xs:restriction base="xs:string">
1096             <xs:enumeration value="Bald"/>
1097             <xs:enumeration value="Black"/>
1098             <xs:enumeration value="Blonde or Strawberry"/>
1099             <xs:enumeration value="Blue"/>
1100             <xs:enumeration value="Brown"/>
1101             <xs:enumeration value="Gray or Partially Gray"/>
1102             <xs:enumeration value="Green"/>
1103             <xs:enumeration value="Orange"/>
1104             <xs:enumeration value="Pink"/>
1105             <xs:enumeration value="Purple"/>
1106             <xs:enumeration value="Red or Auburn"/>
1107             <xs:enumeration value="Sandy"/>
1108             <xs:enumeration value="White"/>
1109         </xs:restriction>
1110     </xs:simpleType>
1111 </xs:element>
1112 <xs:element name="Height" type="xs:string" minOccurs="0" maxOccurs="1"/>
1113 <xs:element name="Weight" type="xs:integer" minOccurs="0" maxOccurs="1"/>
1114 <xs:element name="EthnicityCode" minOccurs="0" maxOccurs="1">
1115     <xs:simpleType>
1116         <xs:restriction base="xs:string">
1117             <xs:enumeration value="A"/>
1118             <xs:enumeration value="B"/>
1119             <xs:enumeration value="I"/>
1120             <xs:enumeration value="U"/>
1121             <xs:enumeration value="W"/>
1122         </xs:restriction>
1123     </xs:simpleType>
1124 </xs:element>
1125 <xs:element name="EnrollmentDate" type="xs:date" minOccurs="0" maxOccurs="1"/>
1126 </xs:sequence>
1127 </xs:complexType>
1128 <xs:complexType name="EPBiometricsType">
1129     <xs:sequence>
1130         <xs:element name="Photo" type="xs:base64Binary" minOccurs="1" maxOccurs="1"/>
1131         <xs:element name="FingerprintsOffCardComparisonRepresentation" type="xs:base64Binary" minOccurs="1"
1132 maxOccurs="1"/>
1133         <xs:element name="FingerprintOnCardComparisonRepresentation" type="xs:base64Binary" minOccurs="0"
1134 maxOccurs="1"/>
1135         <xs:element name="IrisRepresentation" type="xs:base64Binary" minOccurs="0" maxOccurs="1"/>

```

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1136     </xs:sequence>
1137 </xs:complexType>
1138 <xs:complexType name="EPDocumentType">
1139   <xs:sequence>
1140     <xs:element name="DocumentTypeIdentifier" minOccurs="1" maxOccurs="1">
1141       <xs:simpleType>
1142         <xs:restriction base="xs:string">
1143           <xs:enumeration value="Primary identity source"/>
1144           <xs:enumeration value="Secondary identity source"/>
1145         </xs:restriction>
1146       </xs:simpleType>
1147     </xs:element>
1148     <xs:element name="DocumentTypeCode" minOccurs="1" maxOccurs="1">
1149       <xs:simpleType>
1150         <xs:restriction base="xs:string">
1151           <xs:enumeration value="U.S. Passport or a U.S. Passport Card"/>
1152           <xs:enumeration value="Permanent Resident Card or an Alien Registration Receipt Card
1153 (Form I-551)"/>
1154           <xs:enumeration value="Foreign passport"/>
1155           <xs:enumeration value="Employment Authorization Document that contains a photograph (Form
1156 I-766)"/>
1157           <xs:enumeration value="Driver's license or an ID card issued by a state or possession of
1158 the United States provided it contains a photograph"/>
1159           <xs:enumeration value="U.S. Military ID card"/>
1160           <xs:enumeration value="U.S. Military dependent's ID card"/>
1161           <xs:enumeration value="PIV Card"/>
1162           <xs:enumeration value="U.S. Social Security Card issued by the Social Security
1163 Administration"/>
1164           <xs:enumeration value="Original or certified copy of a birth certificate issued by a
1165 state, county, municipal authority, possession, or outlying possession of the United States bearing an official seal"/>
1166           <xs:enumeration value="ID card issued by a federal, state, or local government agency or
1167 entity, provided it contains a photograph"/>
1168           <xs:enumeration value="Voter's registration card"/>
1169           <xs:enumeration value="U.S. Coast Guard Merchant Mariner Card"/>
1170           <xs:enumeration value="Certificate of U.S. Citizenship (Form N-560 or N-561)"/>
1171           <xs:enumeration value="Certificate of Naturalization (Form N-550 or N-570)"/>
1172           <xs:enumeration value="U.S. Citizen ID Card (Form I-197)"/>
1173           <xs:enumeration value="Identification Card for Use of Resident Citizen in the United
1174 States (Form I-179)"/>
1175           <xs:enumeration value=" Certification of Birth Abroad or Certification of Report of Birth
1176 issued by the Department of State (Form FS-545 or Form DS-1350)"/>
1177           <xs:enumeration value="Temporary Resident Card (Form I-688)"/>
1178           <xs:enumeration value="Employment Authorization Card (Form I-688A)"/>
1179           <xs:enumeration value="Reentry Permit (Form I-327)"/>
1180           <xs:enumeration value="Refugee Travel Document (Form I-571)"/>
1181           <xs:enumeration value="Employment authorization document issued by DHS"/>

```

```

1182                                     <xs:enumeration value="Employment Authorization Document issued by DHS with photograph
1183 (Form I-688B)"/>
1184                                     <xs:enumeration value="Driver's license issued by a Canadian government entity"/>
1185                                     <xs:enumeration value="Native American tribal document"/>
1186                                 </xs:restriction>
1187                             </xs:simpleType>
1188                         </xs:element>
1189                         <xs:element name="DocumentNumber" type="xs:string" minOccurs="1" maxOccurs="1"/>
1190                         <xs:element name="SequenceNumber" type="xs:string" minOccurs="0" maxOccurs="1"/>
1191                         <xs:element name="CountryCode" type="xs:string" minOccurs="0" maxOccurs="1"/>
1192                         <xs:element name="StateCode" type="xs:string" minOccurs="0" maxOccurs="1"/>
1193                         <xs:element name="ExpiryDate" type="xs:date" minOccurs="0" maxOccurs="1"/>
1194                         <xs:element name="DocumentImageFront" type="xs:base64Binary" minOccurs="0" maxOccurs="1"/>
1195                         <xs:element name="DocumentImageBack" type="xs:base64Binary" minOccurs="0" maxOccurs="1"/>
1196                         <xs:element name="CollectionDate" type="xs:date" minOccurs="0" maxOccurs="1"/>
1197                     </xs:sequence>
1198 </xs:complexType>
1199 <xs:complexType name="PIVCardTopographyType">
1200     <xs:sequence>
1201         <xs:element name="EmployeeAffiliation" type="xs:string" minOccurs="1" maxOccurs="1"/>
1202         <xs:element name="AgencyDepartmentOrOrganization" type="xs:string" minOccurs="1" maxOccurs="1"/>
1203         <xs:element name="CardExpirationDate" type="xs:date" minOccurs="1" maxOccurs="1"/>
1204         <xs:element name="AffiliationColorCode" minOccurs="1" maxOccurs="1">
1205             <xs:simpleType>
1206                 <xs:restriction base="xs:string">
1207                     <xs:enumeration value="B"/>
1208                     <xs:enumeration value="G"/>
1209                     <xs:enumeration value="W"/>
1210                 </xs:restriction>
1211             </xs:simpleType>
1212         </xs:element>
1213         <xs:element name="AgencyCardSerialNumber" type="xs:string" minOccurs="1" maxOccurs="1"/>
1214         <xs:element name="IssuerIdentificationNumber" type="xs:string" minOccurs="1" maxOccurs="1"/>
1215         <xs:element name="Signature" type="xs:base64Binary" minOccurs="0" maxOccurs="1"/>
1216         <xs:element name="AgencySpecificText4F" type="xs:string" minOccurs="0" maxOccurs="1"/>
1217         <xs:element name="Rank" type="xs:string" minOccurs="0" maxOccurs="1"/>
1218         <xs:element name="PDFBarcode" type="xs:base64Binary" minOccurs="0" maxOccurs="1"/>
1219         <xs:element name="Header" type="xs:string" minOccurs="0" maxOccurs="1"/>
1220         <xs:element name="AgencySeal" type="xs:base64Binary" minOccurs="0" maxOccurs="1"/>
1221         <xs:element name="Footer" type="xs:string" minOccurs="0" maxOccurs="1"/>
1222         <xs:element name="PhotoBorder" type="xs:base64Binary" minOccurs="0" maxOccurs="1"/>
1223         <xs:element name="AgencySpecificData" type="xs:string" minOccurs="0" maxOccurs="1"/>
1224         <xs:element name="OrganizationalAffiliationAbbreviation" type="xs:string" minOccurs="0" maxOccurs="1"/>
1225         <xs:element name="RidgingOrNotchedTactileMarker" minOccurs="0" maxOccurs="1">
1226             <xs:simpleType>
1227                 <xs:restriction base="xs:string">
1228                     <xs:enumeration value="Ridging"/>

```

```
1229         <xs:enumeration value="Notched Corner"/>
1230     </xs:restriction>
1231     </xs:simpleType>
1232 </xs:element>
1233 <xs:element name="LaserEngraving" type="xs:boolean" minOccurs="0" maxOccurs="1"/>
1234 <xs:element name="ReturnAddress" type="xs:string" minOccurs="0" maxOccurs="1"/>
1235 <xs:element name="AdditionalLanguageForEmergencyResponseOfficials" type="xs:string" minOccurs="0"
1236 maxOccurs="1"/>
1237 <xs:element name="StandardSection499Title18" type="xs:string" minOccurs="0" maxOccurs="1"/>
1238 <xs:element name="AgencySpecificText9B" type="xs:string" minOccurs="0" maxOccurs="1"/>
1239 <xs:element name="AgencySpecificText10B" type="xs:string" minOccurs="0" maxOccurs="1"/>
1240 </xs:sequence>
1241 </xs:complexType>
1242 </xs:schema>
```

1243

Appendix B—XML Sample PIVChainOfTrust Record

1244
1245
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```

<?xml version="1.0" encoding="utf-8"?>
<nist:PIVChainOfTrust xmlns:nist="http://csrc.nist.gov/ns/piv/chain-of-trust/1.0">
  <nist:EnrollmentRecord>
    <nist:PersonalInformation>
      <nist:PrimaryIdentifier>Doe</nist:PrimaryIdentifier>
      <nist:SecondaryIdentifier>Jane</nist:SecondaryIdentifier>
      <nist:PrintedName>Jane Doe</nist:PrintedName>
      <nist:SSN>123-12-1234</nist:SSN>
      <nist:IsUSCitizen>true</nist:IsUSCitizen>
      <nist:CitizenshipCountryCode>US</nist:CitizenshipCountryCode>
      <nist:CardUUID>bb3618a0-4d26-11e5-885d-feff819cdc9f</nist:CardUUID>

      <nist:CHUID>538206493019D4F81oD901156010020285836oDRB4BC32D14F8184388E13FC34183030303830303038303030303830303538323031313B333
B343E82068D30820689060929864886F7BD8187829082SFR308205F68201033189300786052BBEB30219388906086386488165030601908284233082841F3882038890
03020102020219E13000068929864886F7BD010105050030503103388906035584861302555331183816860355048913oF552E532E28476F7665726E6D656E74318038
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1307 States provided it contains a photograph</nist:DocumentTypeCode>
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1348 20528</nist:ReturnAddress>
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1350 1</nist:AdditionalLanguageForEmergencyResponseOfficials>
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1389     </X509Data>
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1391 </ds:Signature>
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Appendix D—Glossary of Terms

Biometric	The stored electronic information pertaining to a biometric. This information can be in terms of compressed pixels or in terms of some characteristic (e.g., patterns).
Cardholder	An individual possessing an issued PIV Card.
Chain-of-trust	The chain-of-trust is a sequence of related enrollment data sets that is created and maintained by PIV Card issuers
FASC-N	Federal Agency Smart Credential Number (FASC-N): As required by FIPS 201, one of the primary identifiers on the PIV Card. The FASC-N is a fixed length (25 byte) data object, specified in [SP 800-73], and included in several data objects on a PIV Card.
Issuer	An agency or service provider that issues PIV credentials in accordance with FIPS 201 and NIST SP 800-79.
Off-Card	A cardholder's biometric reference data stored on the PIV Card that is matched against the cardholder's life-scan biometrics Off-Card during authentication. .
On-Card	A cardholder's biometric reference data stored on the PIV Card that is matched against the cardholder's life-scan biometrics On-Card during authentication.

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Appendix E—Acronyms

CHUID	Card Holder Unique Identifier
DN	Distinguished Name
EVSSL	Extended Validation Secure Sockets Layer
FASC-N	Federal Agency Smart Credential Number
FBCA	Federal Bridge Certificate Authority
FIPS	Federal Information Processing Standards
FISMA	Federal Information Security Modernization Act
FTPS	File Transfer Protocol Secure
HTTP	Hypertext Transfer Protocol
HTTPS	Hypertext Transfer Protocol Secure
HSPD	Homeland Security Presidential Directive
ITL	Information Technology Laboratory
NAC	National Agency Check
NACI	National Agency Check with Inquiries
NIST	National Institute of Standards and Technology
OCC	On-Card Comparison
OMB	Office of Management and Budget
PDF	Portable Data File
PII	Personally Identifiable Information
PIV	Personal Identity Verification
RFC	Request for Comment
S/MIME	Secure/Multipurpose Internet Mail Extensions
USPS	United States Postal Service
UUID	Universally Unique Identifier

W3C World Wide Web Consortium

XML Extensible Markup Language

1398