



Election Markup Language (EML) Version 5.0

Schema Descriptions

OASIS Standard

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See also:

- [EML Process and Data Requirements](#)
- [EML Data Dictionary](#)

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urn:oasis:names:tc:evs:schema:eml

Abstract:

This document contains the descriptions of the schemas used in EML v5.0. This document provides an explanation of the core schemas used throughout, definitions of the simple and complex datatypes, plus the EML schemas themselves. It also covers the conventions used in

the specification and the use of namespaces, as well as the guidance on the constraints, extendibility, and splitting of messages.

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1 Introduction

This document describes the OASIS Election Mark-up Language (EML) version 5.0 schemas. The messages that form part of EML are intended for transfer between systems. It is not intended that all outputs of a registration or election system will have a corresponding schema. This document and its accompanying set of schemas do not claim to satisfy the final requirements of a registration or election system. It is incumbent on the users of this document to identify any mistakes, inconsistencies or missing data and to propose corrections to the OASIS Election and Voter Services Technical Committee.

1.1 Terminology

The key words “MUST”, “MUST NOT”, “REQUIRED”, “SHALL”, “SHALL NOT”, “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, “MAY”, and “OPTIONAL” in this document are to be interpreted as described in [RFC2119].

1.2 Normative References

[RFC2119] S. Bradner, *Key words for use in RFCs to Indicate Requirement Levels*, <http://www.ietf.org/rfc/rfc2119.txt>, IETF RFC 2119, March 1997.

1.3 Non-Normative References

[MIME PART 2] Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types IETF <http://www.ietf.org/rfc/rfc2046.txt>

[MIME] MIME Media Types IANA <http://www.iana.org/assignments/media-types/>

[XMLDSig] XML-Signature Syntax and Processing W3C <http://www.w3.org/TR/xmlsig-core/>

[XPATH] XML Path Language (XPath) Version 1.0 W3C <http://www.w3.org/TR/xpath>

22 2 The EML Schemas

23 2.1 Background

24 The following is the Executive Summary of the “EML Process and Data Requirements”:

25 OASIS, the XML interoperability consortium, formed the Election and Voter Services Technical
26 Committee in the spring of 2001 to develop standards for election and voter services information using
27 XML. The committee’s mission statement is, in part, to:

28 *“Develop a standard for the structured interchange among hardware, software, and service providers who*
29 *engage in any aspect of providing election or voter services to public or private organizations...”*

30 The objective is to introduce a uniform and reliable way to allow systems involved in the election process
31 to interact. The overall effort attempts to address the challenges of developing a standard that is:

- 32 • **Multinational:** Our aim is to have these standards adopted globally.
- 33 • **Flexible:** Effective across the different voting regimes (e.g. proportional representation or 'first past
34 the post') and voting channels (e.g. Internet, SMS, postal or traditional paper ballot).
- 35 • **Multilingual:** Flexible enough to accommodate the various languages and dialects and vocabularies.
- 36 • **Adaptable:** Resilient enough to support elections in both the private and public sectors.
- 37 • **Secure:** Able to secure the relevant data and interfaces from any attempt at corruption, as
38 appropriate to the different requirements of varying election rules.

39 The primary deliverable of the committee is the Election Markup Language (EML). This is a set of data
40 and message definitions described as XML schemas. At present EML includes specifications for:

- 41 • Candidate Nomination, Response to Nomination and Approved Candidate Lists
- 42 • Referendum Options Nomination, Response to Nomination and Approved Options Lists
- 43 • Voter Registration information, including eligible voter lists
- 44 • Various communications between voters and election officials, such as polling information, election
45 notices, etc.
- 46 • Ballot information (races, contests, candidates, etc.)
- 47 • Voter Authentication
- 48 • Vote Casting and Vote Confirmation
- 49 • Election counts and results
- 50 • Audit information pertinent to some of the other defined data and interfaces
- 51 • EML is flexible enough to be used for elections and referendums that are primarily paper-based or
52 that are fully e-enabled.

53 As an international specification, EML is generic in nature, and so needs to be tailored for specific
54 scenarios. Some aspects of the language are indicated in EML as required for all scenarios and so can
55 be used unchanged. Some aspects (such as the ability to identify a voter easily from their vote) are
56 required in some scenarios but prohibited in others, so EML defines them as optional. Where they are
57 prohibited, their use must be changed from an optional to prohibited classification, and where they are
58 mandatory, their use must be changed from an optional to required classification.

59 2.2 Viewing Schemas

60 EML schemas are supplied as text documents. For viewing the structure of the schemas, we recommend
61 use of one of the many schema development tools available. Many of these provide graphical displays.

62 The Schematron schemas are mainly short and simple to understand as text documents for those with a
 63 working knowledge of Xpath.

64 2.3 Schema Diagrams in this Document

65 The schema diagrams in this document were created using XML Spy 2007. The following is a guide to
 66 their interpretation.

67 In this section, terms with specific meanings in XML or XML Schema are shown in italics, e.g. sequence.
 68 Note that the diagrams in this document do not use the default diagramming options of XML Spy, but
 69 have additional information. The additional information to be shown can be set using the menu selections
 70 Schema Design | View Config.

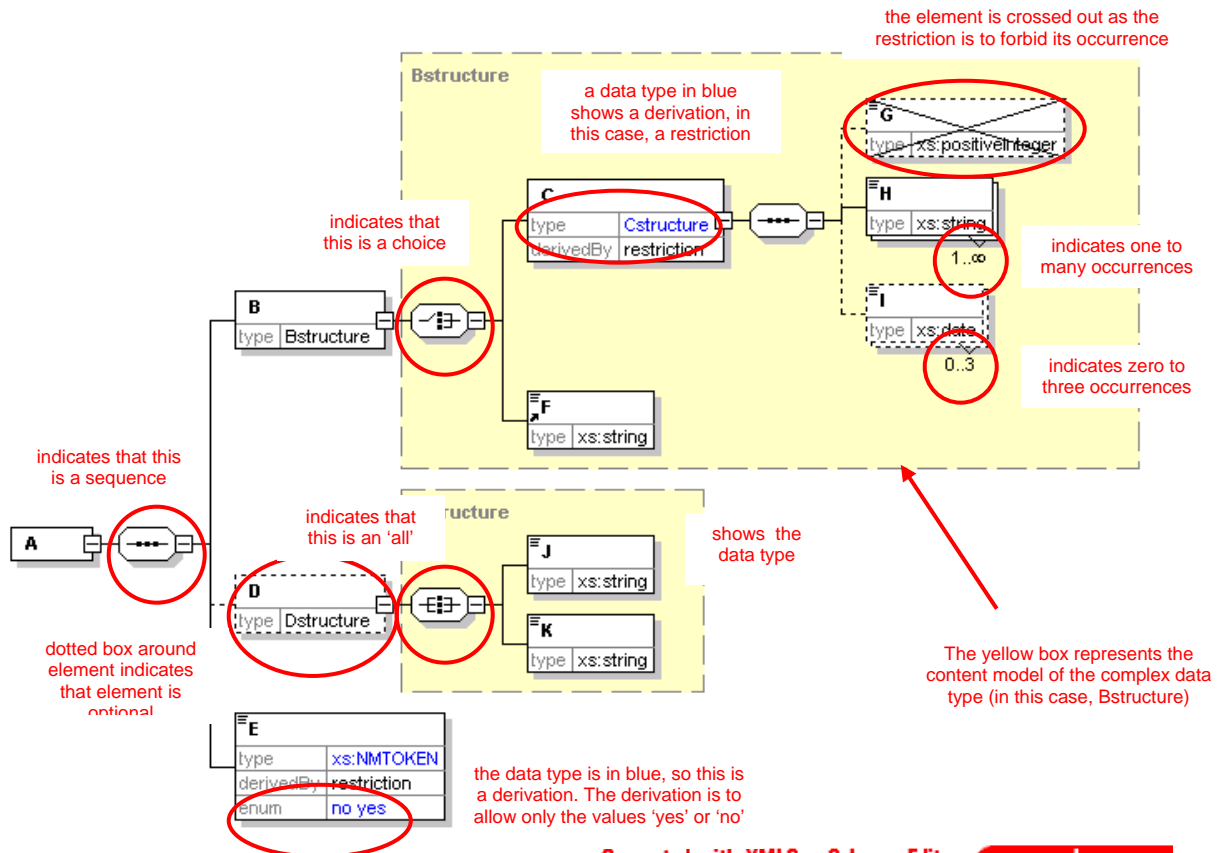
71 In this section, and throughout this document, the prefix "xs" denotes the XML schema namespace
 72 <http://www.w3.org/2001/XMLSchema>.

73 The diagram below represents a simple schema. The *root element* of an *instance* described by this
 74 schema is the *element* A. The *content model* of this element is a *sequence* of the elements B, D and E.
 75 The *element* B is of *complex data type* Bstructure. This contains a *choice* of either *element* C or
 76 *element* F. *Element* C is a *restriction* of another *complex data type* Cstructure. In this case, the
 77 restriction is to forbid the use of the *element* G (which is defined in Cstructure as optional). The other
 78 *elements* allowed are H, which can appear any number of times (but must appear at least once), and I,
 79 which can appear up to three times (or not at all). *Element* D is optional, and of *data type* Dstructure.
 80 This has a *content model* requiring *all* of *elements* J and K, which are both of *type* xs:string. Finally,
 81 *element* E is of *simple data type* Etype, which is *restricted* from the xs:NMTOKEN *data type* by only
 82 allowing the values 'yes' and 'no'.

83 It is important to remember that these diagrams do not include any *attributes*. In this document, these are
 84 shown in tables below the diagrams.

85 The full schema is shown below the diagram.

86



87

```

88 <?xml version="1.0" encoding="UTF-8"?>
89 <!-- edited with XMLSPY v2004 rel. 2 U (http://www.xmlspy.com) by Paul Spencer
90 (Boynings Consulting) -->
91 <xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
92 elementFormDefault="qualified" attributeFormDefault="unqualified">
93   <xs:element name="A">
94     <xs:complexType>
95       <xs:sequence>
96         <xs:element name="B" type="Bstructure"/>
97         <xs:element name="D" type="Dstructure" minOccurs="0"/>
98         <xs:element name="E">
99           <xs:simpleType>
100             <xs:restriction base="xs:NMTOKEN">
101               <xs:enumeration value="no"/>
102               <xs:enumeration value="yes"/>
103             </xs:restriction>
104           </xs:simpleType>
105         </xs:element>
106       </xs:sequence>
107     </xs:complexType>
108   </xs:element>
109   <xs:complexType name="Bstructure">
110     <xs:choice>
111       <xs:element name="C">
112         <xs:complexType>
113           <xs:complexContent>
114             <xs:restriction base="Cstructure">
115               <xs:sequence>
116                 <xs:element name="G" type="xs:positiveInteger" minOccurs="0"
117 maxOccurs="0"/>
118                 <xs:element name="H" type="xs:string" maxOccurs="unbounded"/>
119                 <xs:element name="I" type="xs:date" minOccurs="0"
120 maxOccurs="3"/>
121               </xs:sequence>
122             </xs:restriction>
123           </xs:complexContent>
124         </xs:complexType>
125       </xs:element>
126       <xs:element ref="F"/>
127     </xs:choice>
128   </xs:complexType>
129   <xs:complexType name="Cstructure">
130     <xs:sequence>
131       <xs:element name="G" type="xs:positiveInteger" minOccurs="0"/>
132       <xs:element name="H" type="xs:string" maxOccurs="unbounded"/>
133       <xs:element name="I" type="xs:date" minOccurs="0" maxOccurs="3"/>
134     </xs:sequence>
135   </xs:complexType>
136   <xs:complexType name="Dstructure">
137     <xs:all>
138       <xs:element name="J" type="xs:string"/>
139       <xs:element name="K" type="xs:string"/>
140     </xs:all>
141   </xs:complexType>
142   <xs:element name="F" type="xs:string"/>
143 </xs:schema>

```

144

145 2.4 EML Message Validation

146 It is up to each specific system implementation whether it uses these schemas for validation of EML
147 messages for either testing or live use. The recommended approach is to validate incoming messages

148 against the EML schemas (with the application-specific EML externals schema), then further validate
149 against the relevant Schematron schema. The first stage requires the use of an XML processor (parser)
150 that conforms to W3C XML Schema. The second stage requires either an XSLT processor or a dedicated
151 Schematron processor.

152 However, an implementation may choose to:

- 153 • modify the EML schemas to incorporate those application-specific constraints that can be
154 represented in W3C XML Schema;
- 155 • not validate the rules that are encoded as Schematron schemas;
- 156 • not perform any validation; or
- 157 • develop some alternative validation.

158 **2.5 Namespaces**

159 The message schemas and the core schema are associated with the namespace
160 `urn:oasis:names:tc:evs:schema:eml`. This is defined using the prefix `eml`. The XML Schema
161 namespace `http://www.w3c.org/2001/XMLSchema` is identified by the prefix `xs` and the XML
162 Schema Instance namespace `http://www.w3.org/2001/XMLSchema-instance` by the prefix `xsi`.

163 Use is also made of namespaces for the Extensible Name and Address Language (xNAL). The
164 Extensible Name Language namespace `urn:oasis:tc:ciq:xsd:schema:xNL:2.0` is identified by the
165 prefix `xNL`, and the Extensible Language namespace
166 `urn:oasis:names:tc:ciq:xsd:schema:xAL:2.0` by the prefix `xAL`.

167 **2.6 Extensibility**

168 Various elements allow extensibility through the use of the `xs:any` element. This is used both for display
169 information (for example, allowing the sending of HTML in a message) and for local extensibility. Note
170 that careless use of this extensibility mechanism could reduce interoperability.

171 **2.7 Additional Constraints**

172 The EML schemas provide a set of constraints common to most types of elections worldwide. Each
173 specific election type will require additional constraints, for example, to enforce the use of a seal or to
174 ensure that a cast vote is anonymous. It is recommended that these additional constraints be expressed
175 using the Schematron language although other validators, eg OASIS CAM, can be used. This allows
176 additional constraints to be described without altering or interacting with the EML schemas. Any
177 document that is valid to a localization expressed in Schematron must also be a valid EML document.

178 **2.8 Conventions**

179 Within this specification, the following conventions are used throughout:

- 180 • Diagrams are shown as generated by XML Spy 2007 which was also used to generate the schemas
181 and samples. These diagrams show element content, but not attributes
- 182 • Elements and attributes in schemas are identified by partial XPath expressions. Enough of a path is
183 used to identify the item without putting in a full path.

184 **2.9 Metadata**

185 Some messages need information relating to the issuing of them, such as the issue date, who issued
186 them etc. This is most likely to be a requirement for the 330 message but is equally applicable to 120,
187 130, 230, 350a and several others. For that reason, it is useful to make this optional information available
188 in the header. The information usually consists of: managing authority, date of issue, start of list period
189 (used for changes to the list to indicate the start of the period for which changes are being shown), end of
190 list period (i.e. the date of the snapshot of the list).

191

3 Processing using Schematron

192
193
194

This section gives a short introduction to how validation can be achieved using Schematron schemas and an XSLT processor. Alternatively, direct validation using the Schematron schemas can be achieved using a dedicated Schematron processor.

195

3.1 Validation using Schematron Schemas

196
197
198
199
200

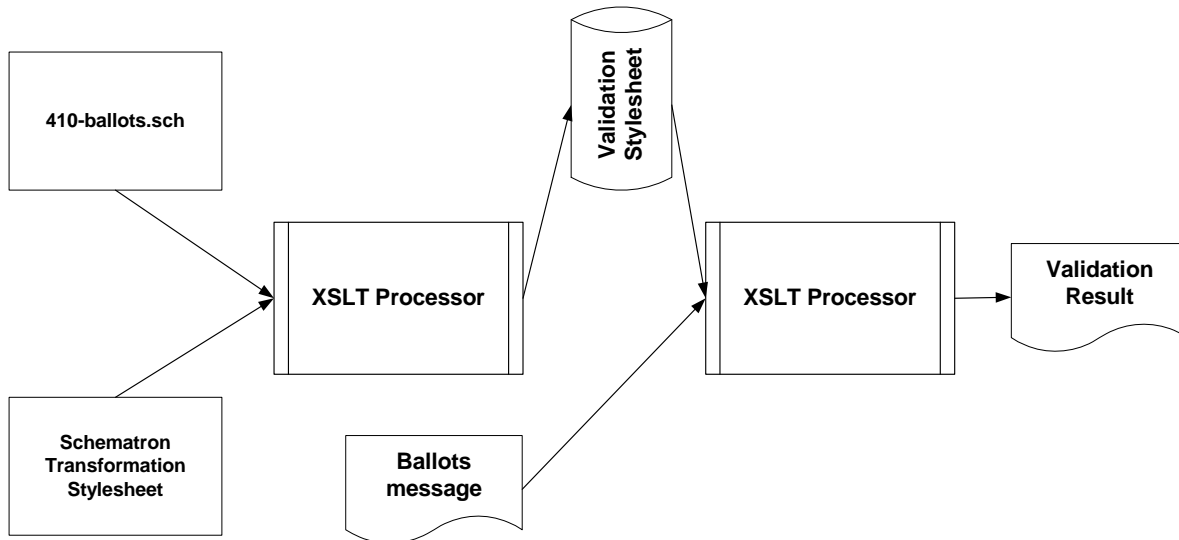
A Schematron schema is an XML document that can be converted to XSLT using an XSLT stylesheet. There is a published stylesheet (skeleton1-5.xslt) that can be used to achieve this. This produces an HTML output from the validation. A separate stylesheet can be produced that will create an output to the specification below. This stylesheet can import the skeleton and just over-ride those aspects where changes are required.

201
202
203

This stylesheet can be used once on each Schematron schema to produce the XSLT file that will be used for validating a specific message type. This stylesheet is then used to transform the incoming EML message into an error report based on the additional constraints.

204

The process is shown in the diagram below.



205

206 4 Splitting of Messages

207 There is sometimes a need to split long messages into several parts. By their nature, each of these
208 messages will contain a small amount of background information and a single element type that is
209 repeated many times. For example, the 330-electionlist message can have many VoterDetails elements.

210 When a message is split, each part must be a complete, valid EML document. This will contain all the
211 elements required by EML and the specific application. Those parts outside the repeated element that
212 relate to the message as a whole, such as the TransactionId, must have the same values in each part
213 message. The values of those elements and attributes that relate to an individual part message, such as
214 the SequenceNumber, may vary between the individual part messages. Information in the EML element
215 indicates the sequence number of the message and the number of messages in the sequence. Each
216 message in the sequence must contain the same TransactionId, and must indicate the repeated element
217 according to the table below. Only the messages shown in the table may be split in this way.\

Message	Repeated Element
330-electionlist	VoterDetails
340-pollinginformation	Polling
410-ballots	Ballot
460-votes	CastVote
470-vtokenlog	VTokens
480-auditlog	LoggedSeal

218 For ease of implementation, a message that can be split may contain the elements used for splitting even
219 if the entire message is sent in one piece. In this case, the values of SequenceNumber and
220 NumberInSequence will both be "1".

221 5 Error Messages

222 The 130 schema is used to define a message for reporting errors in EML messages.

223 Error messages are given codes. These fall into one of five series:

1000	XML well-formedness or Schema validation error
2000	Seal error
3000	EML rule error
4000	Localization rule error
5000	System specific error

224 If the error type is not message-specific (or is a general rule applying to several schemas), the series
225 reference above is used. If it is message-specific, the last three digits of the error series (and possibly a
226 final alpha character) reflect the message type. A three digit error code is appended to the series code,
227 separated by a hyphen.

228 An error code relating to a localisation applicable to all message types could therefore be 4000-001. One
229 specific to the localization of schema 110 could be 4110-002.

230 5.1 All Schemas

231 5.1.1 XML well-formedness or Schema validation error

Error code	Error Description
1000-001	Message is not well-formed
1000-002	Message is not valid

232 5.1.2 Seal Errors

Error code	Error Description
2000-001	The Seal does not match the data

233 5.1.3 EML Additional Rules

234 The following rules apply to messages regardless of localization. One of the two rules on splitting will
235 apply to each message type as described in the table below.

Error Code	Error Description
3000-001	If there are processing units in the <code>AuditInformation</code> , one must have the role of sender
3000-002	If there are processing units in the <code>AuditInformation</code> , one must have the role of receiver
3000-003	This message must not contain the elements used for splitting
3000-004	The value of the <code>Id</code> attribute of the EML element is incorrect
3000-005	The message type must match the <code>Id</code> attribute of the <code>EML</code> element

3000-006	All messages that are split must include the correct sequenced element name.
----------	--

236

	3000-003	3000-006
110	✓	
120	✓	
130	✓	
210	✓	
220	✓	
230	✓	
310	✓	
330		✓
340		✓
350 a	✓	
350 b	✓	
350 c	✓	
360 a	✓	
360 b	✓	
410		✓
420	✓	
430	✓	
440	✓	
445	✓	
450		✓
460		✓
470		✓
480		✓
510	✓	
520	✓	
610	✓	
620	✓	
630	✓	

237

238

6 EML Core Components

239 The EML Core schema contains elements and data types that are used throughout the e-voting schemas.

240 To help message schema diagrams fit on the page, these elements and data types are not expanded
241 each time they appear in other diagrams.

242 The following schema components are defined in the EML Core:

Elements	Complex Data Types	Simple Data Types
Accepted	AffiliationIdentifierStructure	ConfirmationReferenceType
Affiliation	AffiliationStructure	CountingAlgorithmType
AffiliationIdentifier	AgentIdentifierStructure	DateType
Agent	AgentStructure	EmailType
AgentIdentifier	AreaStructure	ErrorCodeType
Area	AuditInformationStructure	GenderType
AuditInformation	AuthorityIdentifierStructure	LanguageType
AuthorityIdentifier	BallotIdentifierRangeStructure	MessageTypeType
BallotIdentifier	BallotIdentifierStructure	SealUsageType
BallotIdentifierRange	BinaryStructure	ShortCodeType
Candidate	CandidateIdentifierStructure	TelephoneNumberType
CandidateIdentifier	CandidateStructure	VotingChannelType
ContactDetails	ChannelStructure	VotingMethodType
ContestIdentifier	ComplexDateRangeStructure	VotingValueType
CountQualifier	ContactDetailsStructure	WriteInType
CountingAlgorithm	ContestIdentifierStructure	YesNoType
DocumentIdentifier	CountMetricStructure	
ElectionIdentifier	CountQualifierStructure	
ElectionStatement	DocumentIdentifierStructure	
EventIdentifier	ElectionGroupStructure	
EventQualifier	ElectionIdentifierStructure	
Gender	EmailStructure	
Logo	EMLStructure	
ManagingAuthority	Endorsement	
MaxVotes	EventIdentifierStructure	
MessageType	EventQualifierStructure	
MinVotes	IncomingGenericCommunicationStructure	
NominatingOfficer	InternalGenericCommunicationStructure	
NumberInSequence	LogoStructure	
NumberOfPositions	ManagingAuthorityStructure	
Period	MessagesStructure	
PersonName	NominatingOfficerStructure	
PollingDistrict	OutgoingGenericCommunicationStructure	
PollingPlace		

Elements	Complex Data Types	Simple Data Types
Position	PeriodStructure	
PreferredChannel	PictureDataStructure	
PreviousElectoralAddress	PollingDistrictStructure	
Profile	PollingPlaceStructure	
Proposal	PositionStructure	
ProposalIdentifier	ProcessingUnitStructure	
Proposer	ProposalIdentifierStructure	
Proxy	ProposalStructure	
ReferendumOptionIdentifier	ProposerStructure	
ReportingUnitIdentifier	ProxyStructure	
ResponsibleOfficer	ReferendumOptionIdentifierStructure	
ScrutinyRequirement	ReportingUnitIdentifierStructure	
Seal	ResponsibleOfficerStructure	
SequenceNumber	ResultsReportingStructure	
TransactionId	ScrutinyRequirementStructure	
VoterId	SealStructure	
VoterName	SimpleDateRangeStructure	
VotingChannel	TelephoneStructure	
VotingMethod	VoterIdentificationStructure	
VToken	VoterInformationStructure	
VTokenQualified	VTokenStructure	
	VTokenQualifiedStructure	

243

244 **6.1 Simple Data Types**

245 The simple data types are included here with their base data types and any restrictions applied.

246 **6.1.1 ConfirmationReferenceType**

247 xs:token.

248 The reference generated once the confirmation of a vote has been completed.

249 **6.1.2 CountingAlgorithmType**

250 xs:token

251 The method of counting used for more complex forms of election.

252 **6.1.3 DateType**

253 Union of xs:date and xs:dateTime

254 There are several possible dates associated with an election. Some of these can be either just a date or
 255 have a time associated with them. These can use this data type.

256 **6.1.4 EmailType**

257 xs:token with restrictions.

258

259 Restrictions: `xs:maxLength: 129`

260 `xs:pattern: [^@]+@[^@]+`

261 This type is a simple definition of an email address, pending a more complete description that is widely
262 accepted in industry and government. It allows any characters except the @ symbol, followed by an @
263 symbol and another set of characters excluding this symbol.

264 **6.1.5 ErrorCodeType**

265 `xs:token`

266 One of a pre-defined set of error codes as described in the section "Error Messages".

267 **6.1.6 GenderType**

268 `xs:token` with restrictions.

269 Restrictions: `xs:enumeration: male, female, unknown`

270 The gender of a voter or candidate. Options are male, female or unknown (unknown is not allowed in all
271 contexts).

272 **6.1.7 LanguageType**

273 `xs:language`

274 Declaration of the type of language used in the election.

275 **6.1.8 MessageType**

276 `xs:NMTOKEN`

277 This is the alphanumeric type of the message (e.g. 440 or 350a). This may be required for audit
278 purposes.

279 **6.1.9 SealUsageType**

280 `xs:NMTOKEN` with restrictions.

281 Restrictions: `xs:enumeration: receiver, sender`

282 Indicates whether a device logging a seal was the sender or receiver of the seal.

283 **6.1.10 ShortCodeType**

284 `xs:NMTOKEN`

285 This identifies an aspect of the election (such as a contest or candidate) when voting using SMS or other
286 voting mechanisms where a short identifier is required.

287 **6.1.11 TelephoneNumberType**

288 `xs:token` with restrictions.

289 Restrictions: `xs:maxLength: 35`

290 `xs:minLength: 1`

291 `xs:pattern: \+?[0-9(\)\-\s]{1,35}`

292 Since this must allow for various styles of international telephone number, the pattern has been kept
293 simple. This allows an optional plus sign, then between 1 and 35 characters with a combination of digits,
294 brackets, the dash symbol and white space. If a more complete definition becomes widely accepted in
295 industry and government, this will be adopted.

296 **6.1.12 VotingChannelType**

297 xs:token with restrictions.

298 Restrictions: `xs:enumeration: SMS, WAP, digitalTV, internet, kiosk, polling, postal, telephone, other`

299 This type exists to hold the possible enumerations for the channel through which a vote is cast.

300 SMS is the Short Message Service (text message). WAP is the Wireless Access Protocol.

301 If other is used, it is assumed that those managing the election will have a common understanding of the
302 channel in use.

303 **6.1.13 VotingMethodType**

304 xs:token with restrictions.

305 Restrictions: `xs:enumeration: AMS, FPP, IRV, OPV, RCV, SPV, STV, NOR, cumulative, approval,`
306 `block, partylist, partisan, supplementaryvote, other`

307 The VotingMethod type holds the enumerated values for the type of election (such as first past the post or
308 single transferable vote). The meanings of the acronyms are:

309 AMS – Additional Member System

310 FPP - First Past the Post

311 IRV - Instant Runoff Voting

312 NOR – Norwegian Voting

313 OPV - Optional Preferential Voting

314 RCV - Ranked Choice Voting

315 SPV - Single Preferential Vote

316 STV - Single Transferable Vote

317 **6.1.14 VotingValueType**

318 xs:positiveInteger.

319 Indicates a value assigned when voting for a candidate or referendum option. This might be a weight or
320 preference order depending on the election type.

321 **6.1.15 WriteInType**

322 xs:token

323 Indicates the type of Write-ins allowed, eg allowed, strikeout, none.

324 **6.1.16 YesNoType**

325 xs:token with restrictions.

326 Restrictions: `xs:enumeration: no, yes`

327 This is a simple enumeration of yes and no and is used for elements and attributes that can only take
328 these binary values.

329 **6.2 Complex Data Types**

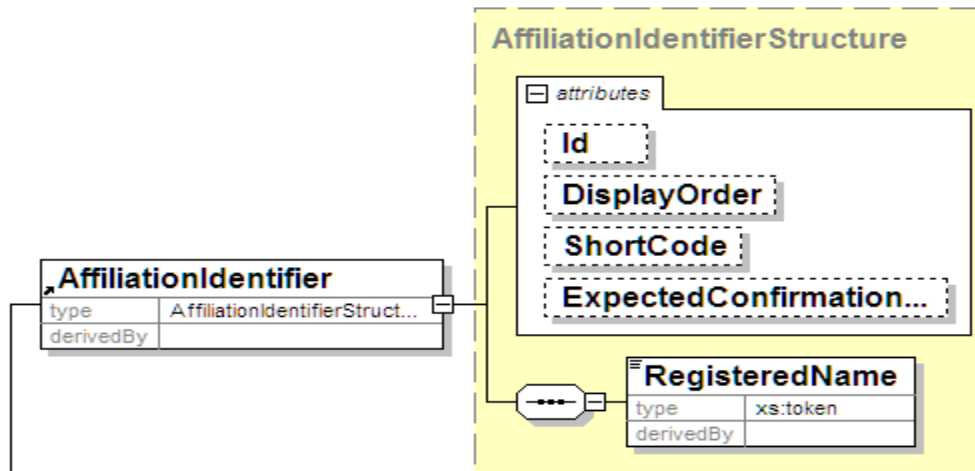
330 The choice between defining an element or a data type for a reusable message component is a
331 significant design issue. It is widely accepted as good practice to use element declarations when there is
332 good reason to always refer to an element by the same name and there is no expectation of a need to
333 derive new definitions. In all other cases, data type declarations are preferable. The term schema
334 component is used to refer to elements and data types collectively.

335 When defining a complete mark-up language, limiting the use of elements and types can restrict further
 336 development of the language. For that reason, both data types and elements are defined in EML. Only
 337 where an element is an example of a primitive or derived data type defined in XML Schema Descriptions
 338 is no explicit data type defined within EML.

339 In use, it is expected that, for example:

- 340 • A voting token will always have an element name VToken and so will use the element name.
- 341 • A logo or a map have similar definitions, so both use the PictureDataStructure. There is no
 342 PictureData element.
- 343 • Within voter identification, some elements will usually need to be made mandatory and so a schema
 344 will specify a new element based on the VoterIdentificationStructure data type.

345 6.2.1 AffiliationIdentifierStructure

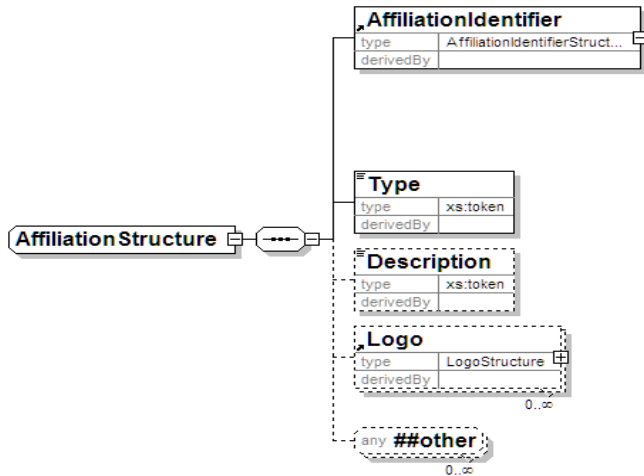


346
 347

Element	Attribute	Type	Use	Comment
AffiliationIdentifierStructure	Id	xs:NMTOKEN	optional	
	DisplayOrder	xs:positiveInteger	optional	
	ShortCode	ShortCodeType	optional	
	ExpectedConfirmationReference	ConfirmationReferenceType	optional	

348 This data type is used to identify an affiliation, such as a political party. The identifier indicates the official
 349 name and ID of the organization. It supports use of a short code for voting systems such as SMS, and an
 350 expected confirmation reference for security systems that require this.

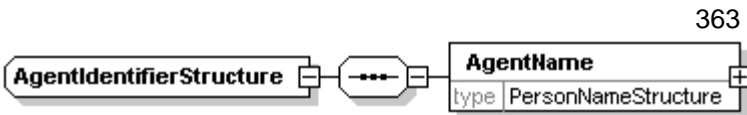
351 **6.2.2 AffiliationStructure**



352
 353 AffiliationStructure data type indicates membership of some organization such as a political party. The
 354 description will normally be used to indicate the name usually associated with the organization, and so is
 355 the value that will usually be shown on a ballot. An organization may indicate several logos, each with a
 356 role. For example, one role might indicate that the logo should be used on a ballot paper. Each logo can
 357 be identified by a URL or sent as a Base64 encoded binary value. In the latter case, the format of the logo
 358 (BMP, TIFF, PNG, GIF or JPEG) must be indicated.

359 The Affiliation Type allows for a number of different types of affiliations and endorsements to be recorded.
 360 For example which political party specifically endorses a candidate or which party(ies) or other
 361 organisations the candidate says he/she is affiliated to.

362 **6.2.3 AgentIdentifierStructure**

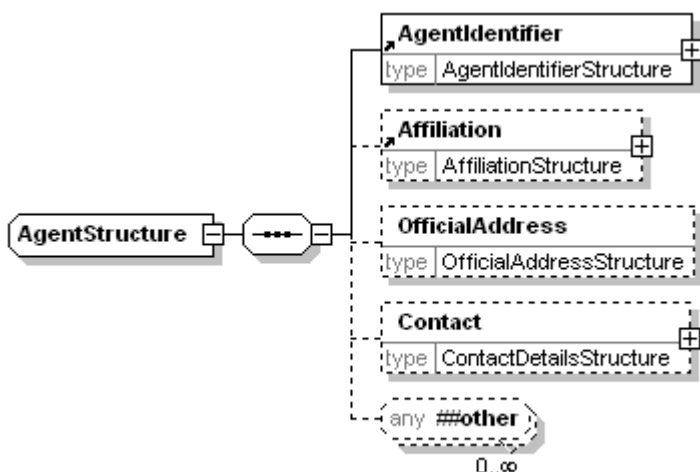


363
 364
 365
 366
 367
 368

Element	Attribute	Type	Use	Comment
AgentIdentifierStructure	Id	xs:NMTOKEN	optional	
	DisplayOrder	xs:positiveInteger	optional	

369 The agent identifier contains a name and ID. The data type for the name is localized using the EML
 370 externals schema.

371 **6.2.4 AgentStructure**



372

Element	Attribute	Type	Use	Comment
AgentStructure	Id	xs:NMTOKEN	optional	
	DisplayOrder	xs:positiveInteger	optional	
	Role	xs:token	optional	

373 A candidate in an election can have one or more agents, each agent having a specific role, identified by
 374 the Role attribute. For example, an agent may be allowed access to the count, but not to amend details of
 375 the candidate.

376 The agent has an identifier, comprising a name and ID, and an affiliation. He or she also has an official
 377 address and a standard set of contact details.

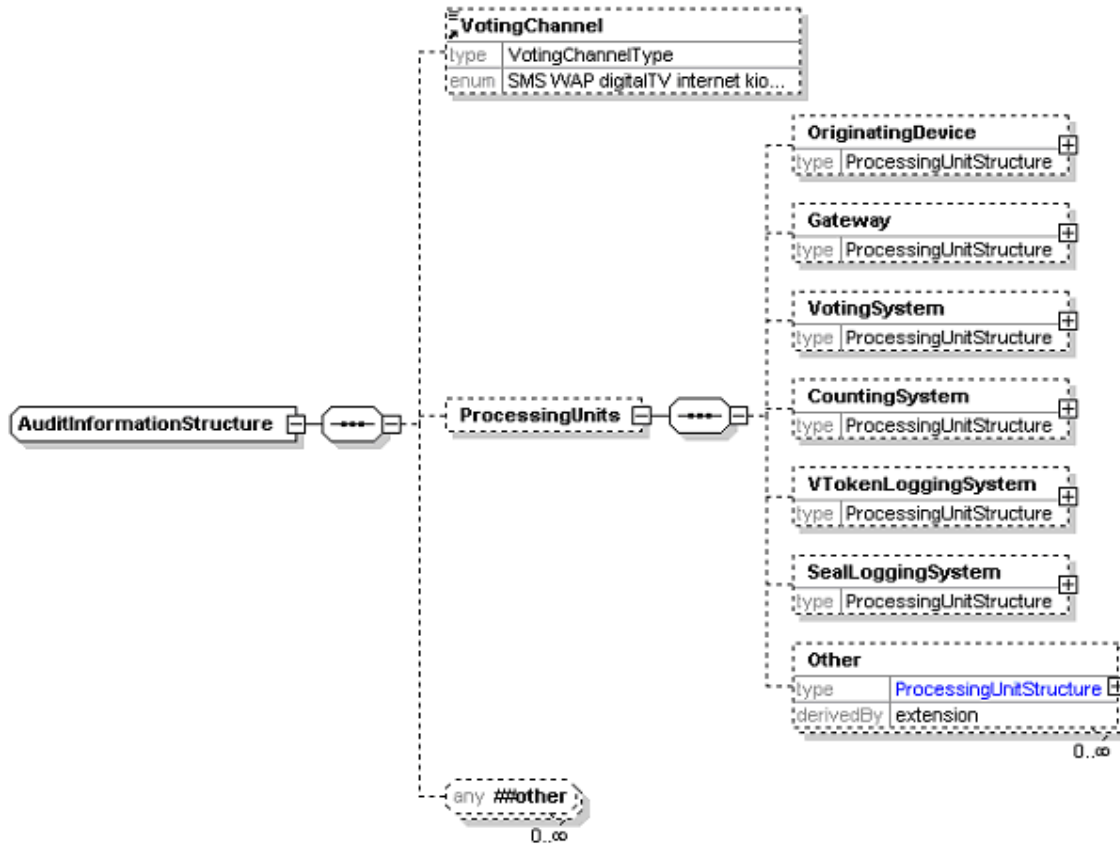
378 **6.2.5 AreaStructure**

379 The AreaStructure is an extension of xs:token to add the following attributes:

Element	Attribute	Type	Use	Comment
AreaStructure	Id	xs:NMTOKEN	optional	
	DisplayOrder	xs:positiveInteger	optional	
	Type	xs:token	optional	

380 This data type is used to define elements defining the geographical area covered by a contest. The Type
 381 attribute is used to indicate the type of area, such as "county".

382 **6.2.6 AuditInformationStructure**



383

Element	Attribute	Type	Use	Comment
Other	Role	xs:token (restricted)	required	Standard attribute for a ProcessingUnitStructure
	Type	xs:token	required	Additional attribute for this element

384 The AuditInformationStructure is used to define an element to provide information for audit purposes. It
 385 allows the voting channel in use to be described, with the identities of those devices that have
 386 participated in the message being sent. Each device has an attribute to describe its role (see
 387 ProcessingUnitStructure).

388 Where a device does not fit any of the categories here, it can be described as Other with the addition of a
 389 Type attribute.

390 **6.2.7 AuthorityIdentifierStructure**

391 The AuthorityIdentifierStructure is an extension of xs:token to add the following attributes:

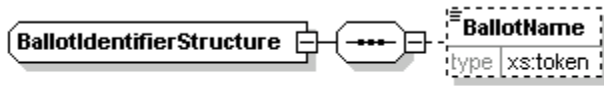
Element	Attribute	Type	Use	Comment
AuthorityIdentifierStructure	Id	xs:NMTOKEN	optional	
	DisplayOrder	xs:positiveInteger	optional	

392 This data type defines information to identify an election authority. This may include a system ID and text
 393 description.

394
 395
 396

397 **6.2.8 BallotIdentifierStructure**

398



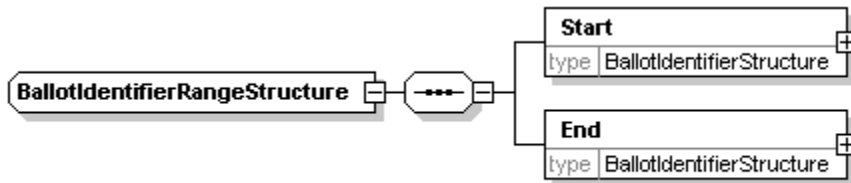
402

Element	Attribute	Type	Use	Comment
BallotIdentifierStructure	Id	xs:NMTOKEN	required	
	DisplayOrder	xs:positiveInteger	optional	

403 This data type is used to define an element that is an identifier for a ballot. This will usually use the Id
 404 attribute as the identifier, but might use a name to indicate a set of identical ballots. Elements using this
 405 data type will usually only be used for paper ballots.

406 **6.2.9 BallotIdentifierRangeStructure**

407

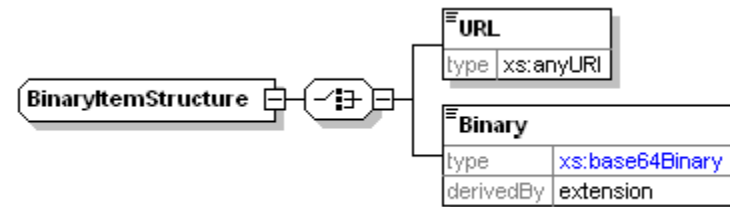


413

Element	Attribute	Type	Use	Comment
BallotIdentifierRangeStructure	Colour	xs:token	optional	

414 This data type is used to define an element that identifies a range of ballots. This might be used, for
 415 example, to assign ranges of ballot identifiers to different reporting units for a contest. It is unlikely that the
 416 ballot name would be used when defining range, the Id attribute being used instead. Elements using this
 417 data type will usually only be used for paper ballots.

418 **6.2.10 BinaryItemStructure**

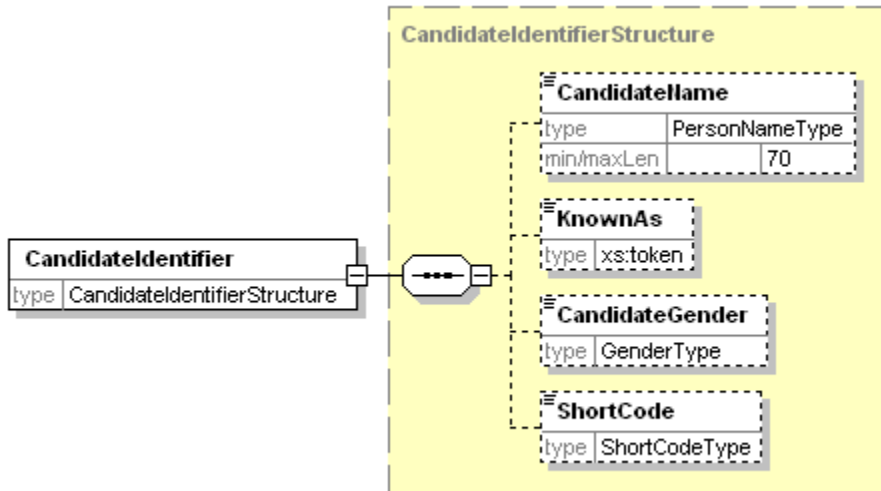


419

Element	Attribute	Type	Use	Comment
BinaryItemStructure	Id	xs:NMTOKEN	optional	
	DisplayOrder	xs:positiveInteger	optional	
	ItemType	Xs:token	optional	
	Verified	YesNoType	optional	
	Problem	YesNoType	optional	
	Notes	Xs:string	optional	
	Role	Xs:token		
Binary	Format	xs:NMTOKEN (restricted)	required	

420 Where a binary (fingerprint, logo, map, photo,) is provided, it may be given as either a link or as Base64
 421 encoded binary data. In the latter case, the format of the binary (bmp, gif, jpeg, png or tiff) must be
 422 indicated using the Format attribute of the Binary element.

423 **6.2.11 CandidateIdentifierStructure**

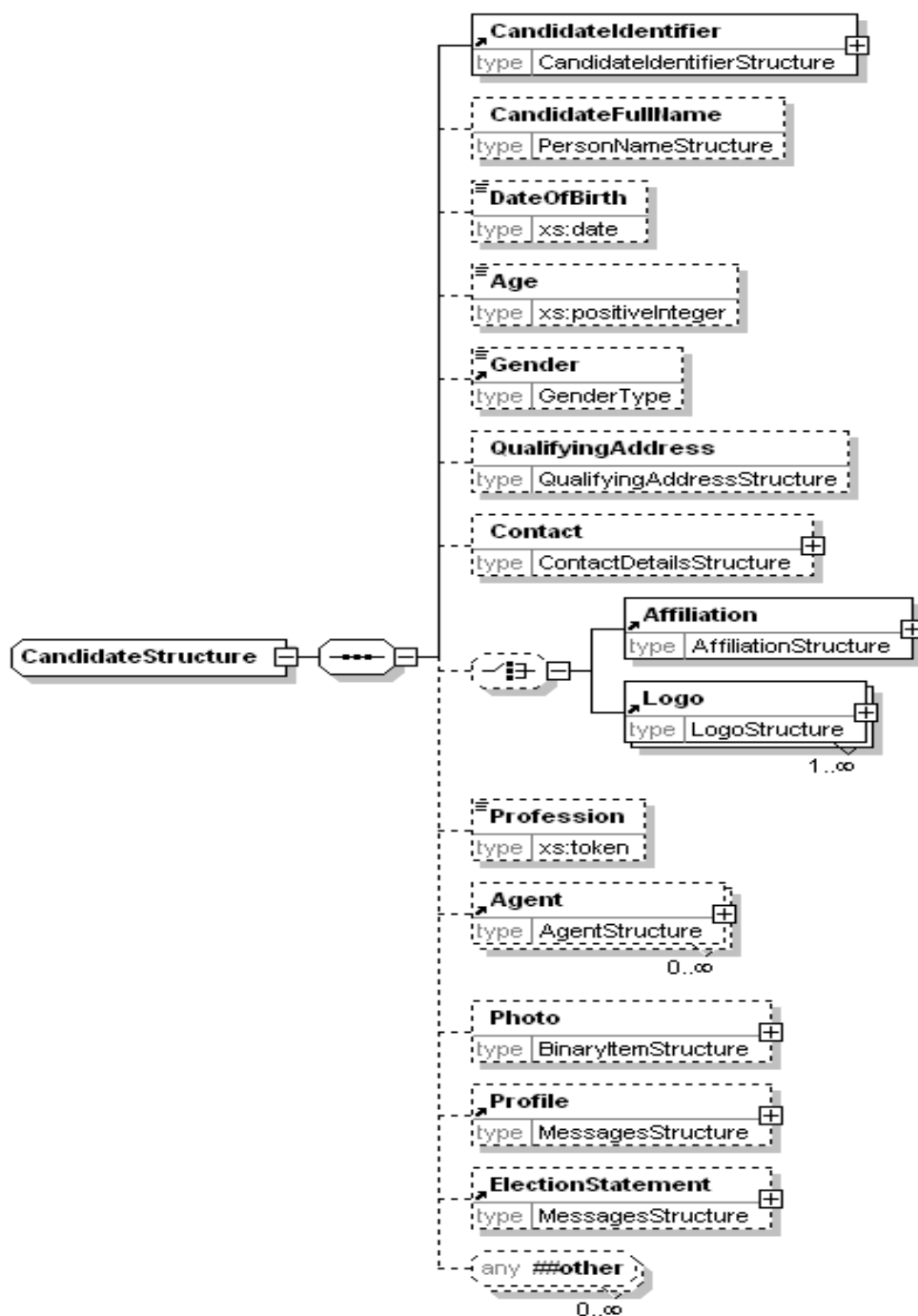


424

Element	Attribute	Type	Use	Comment
CandidateIdentifierStructure	Id	xs:NMTOKEN	required	
	DisplayOrder	xs:positiveInteger	optional	
	ShortCode	ShortCodeType	optional	
	ExpectedConfirmationReference	ConfirmationReferenceType	optional	

425 The candidate identifier indicates a system ID for the candidate and the candidate's name as it will appear
 426 in a ballot. Sometimes an additional line is required on the ballot to help identify the candidate. This will
 427 use the KnownAs element of the candidate identifier. A short code can also be included, either for SMS
 428 voting or where the security mechanism in place requires it. An ExpectedConfirmationReference
 429 attribute also allows for security mechanisms where the confirmation reference may be different for each
 430 combination of voter and candidate.

431 **6.2.12 CandidateStructure**



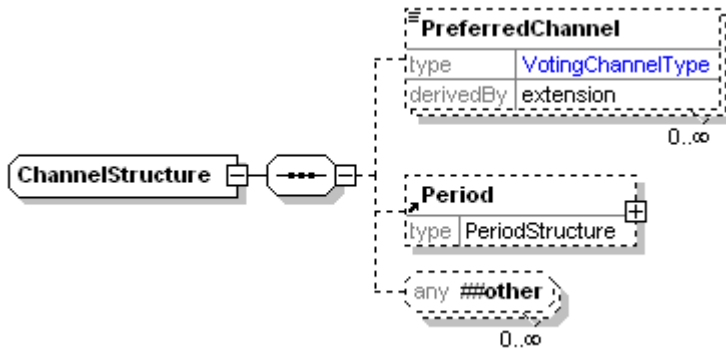
432

Element	Attribute	Type	Use	Comment
CandidateStructure	Independent	YesNoType	optional	
	DisplayOrder	xs:positiveInteger	optional	

433 The candidate description includes all the information required about the candidate. In different
 434 messages, the amount of information is reduced, either by restricting the information in EML or as part of
 435 a localisation.

436 The candidate has an identifier. The full name of the candidate may also be provided, and whether the
 437 candidate is an independent. This is supplied as an attribute rather than affiliation as certain election
 438 types treat independents differently from other candidates, even though they may define an affiliation.
 439 The candidate profile describes the candidate. The election statement describes the opinions of the
 440 candidate. Optionally, a photo may be included, either as a link or as Base64 encoded binary.

441 **6.2.13 ChannelStructure**

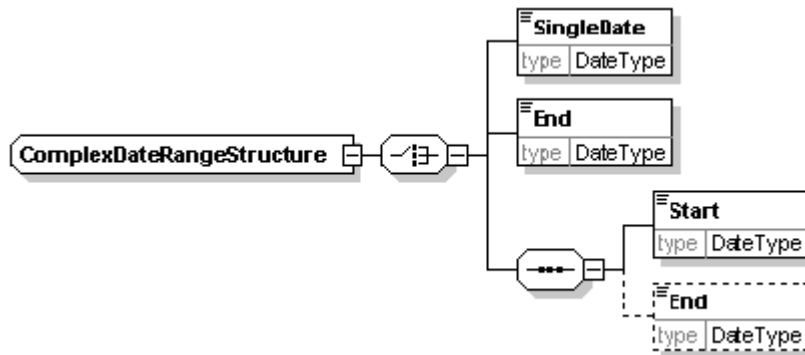


442

Element	Attribute	Type	Use	Comment
PreferredChannel	Fixed	Yes/NoType	optional	

443 This data type is used to describe the voter's preferred channel for casting of the vote and the period for
 444 which that preference is valid.

445 **6.2.14 ComplexDateRangeStructure**



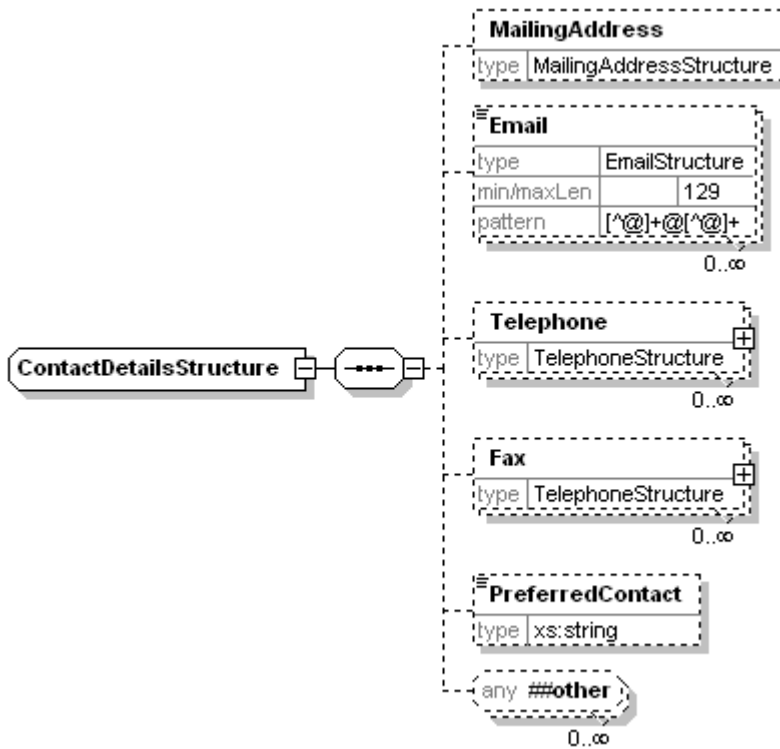
446

Element	Attribute	Type	Use	Comment
ComplexDateRangeStructure	Type	xs:token	required	

447 This data type is used to describe ranges of dates or dates and times. Each date can be a single date, a
 448 start date, an end date or include both start and end dates.

449 The `Type` attribute is used to indicate the purpose of the date (e.g. "deadline for nominations").

450 **6.2.15 ContactDetailsStructure**

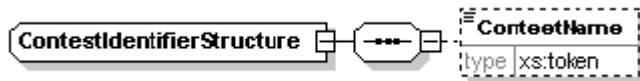


451

Element	Attribute	Type	Use	Comment
ContactDetailsStructure	DisplayOrder	xs:positiveInteger	optional	

452 This data type is used in many places throughout the EML schemas. The mailing address uses whatever
 453 format is defined in the EML externals schema document. Where several addresses or numbers can be
 454 given (for example, email addresses), there is a facility to indicate whichever is preferred. The overall
 455 preferred method of contact can also be provided by placing an XPath to the preferred method in the
 456 PreferredContact element.

457 **6.2.16 ContestIdentifierStructure**

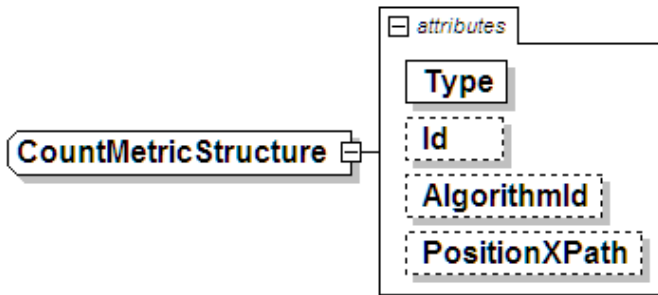


458

Element	Attribute	Type	Use	Comment
ContestIdentifierStructure	Id	xs:NMTOKEN	required	
	DisplayOrder	xs:positiveInteger	optional	
	ShortCode	ShortCodeType	optional	

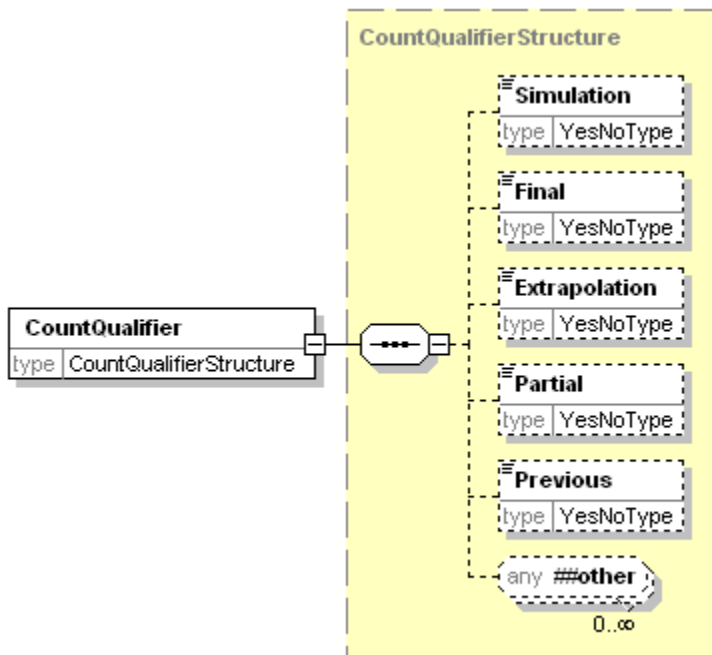
459 This data type is used to define an element that is an identifier for a contest. It holds a name and ID. A
 460 short code can also be included, for example, for SMS voting.

461 **6.2.17 CountMetricsStructure**



462
463 This allows for the metrics to be used in the Count of cast votes to be defined.

464 **6.2.18 CountQualifierStructure**



465
466 This allows for an indication of whether the count is final or not, and for the count to be either simulated or
467 extrapolated.

468 **6.2.19 DocumentIdentifierStructure**

469 The DocumentIdentifierStructure is an extension of xs:token to add the following attribute:

Element	Attribute	Type	Use	Comment
DocumentIdentifierStructure	Href	xs:anyURI	required	

470 This allows identification of external documents relating to an event, election or contest. The document
471 can have a name and URL.

472 **6.2.20 ElectionGroupStructure**

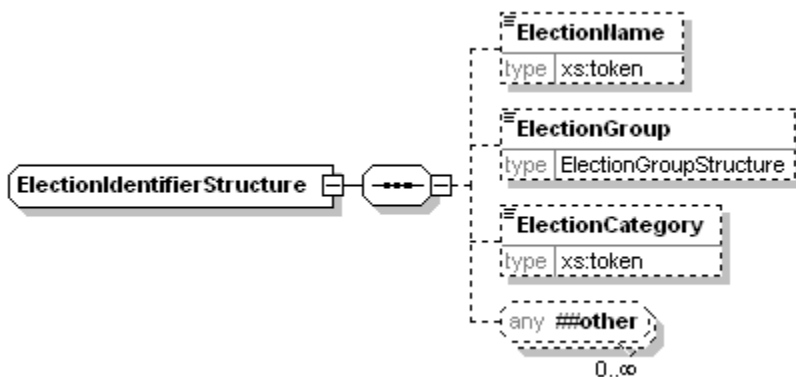
473 The ElectionGroupStructure is an extension of xs:token to add the following attribute:

Element	Attribute	Type	Use	Comment
---------	-----------	------	-----	---------

DocumentIdentifierStructure	Id	xs:token	required	
-----------------------------	----	----------	----------	--

474 The election group is used to group a number of elections together. This could be required, for example,
 475 under the additional member system, where two elections are held, the result of one influencing the result
 476 of the other. It could also be used at a company AGM, where proposals might be grouped for display
 477 purposes.

478 6.2.21 ElectionIdentifierStructure



479

Element	Attribute	Type	Use	Comment
ElectionIdentifierStructure	Id	xs:NMTOKEN	required	
	DisplayOrder	xs:positiveInteger	optional	
	ShortCode	ShortCodeType	optional	

480 The election identifier is used wherever the election needs to be specified. There is an Id attribute, which
 481 can often be used on its own to identify the election. In other cases, particularly where the content of a
 482 message is to be displayed, the election name can also be provided. The election group is used to group
 483 a number of elections together as described above.

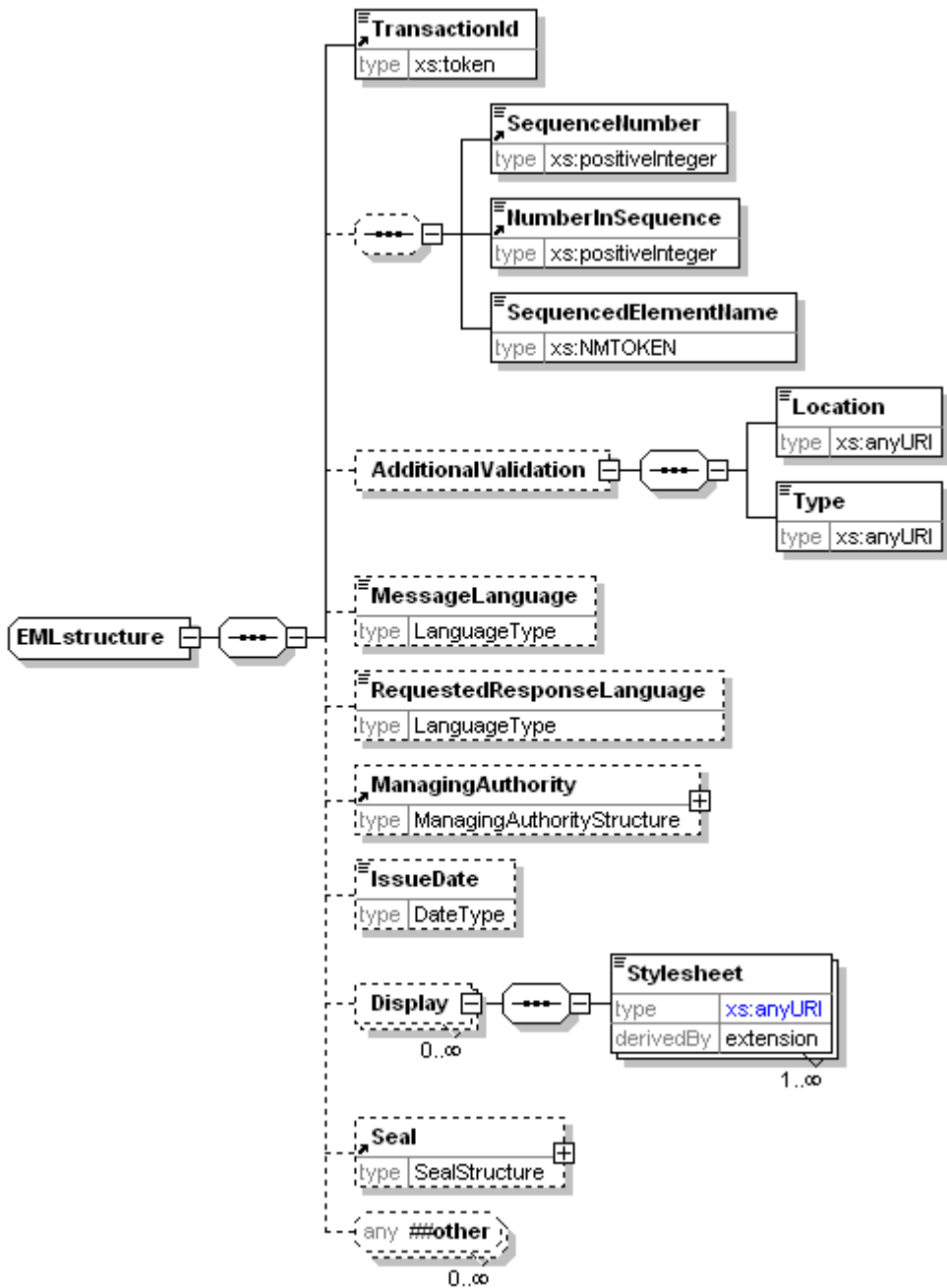
484 The election category is used in messages where several elections are included in the message, but may
 485 be treated differently under localisation rules. Each election that requires different treatment will be given
 486 a category unique within that election event, allowing a Schematron processor to distinguish between the
 487 elections.

488 6.2.22 EmailStructure

489 The EmailStructure is an extension of the EmailType to add the following attribute:

Element	Attribute	Type	Use	Comment
EmailStructure	Preferred	YesNoType	optional	

490 The Preferred attribute is used to distinguish which of several email addresses to use.



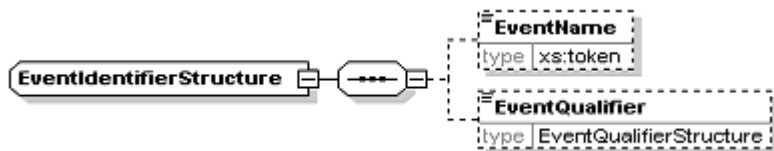
492

Element	Attribute	Type	Use	Comment
EMLstructure	Id	MessageTypeType	required	
	SchemaVersion	xs:NMTOKEN	required	
Stylesheet	Type	xs:token	required	

493 The EML element defined by this data type forms the root element of all EML documents. The transaction
 494 ID is used to group messages together, for example, when they are split using the message splitting
 495 mechanism. This mechanism is implemented using the next three elements. The optional message
 496 language indicates the language of the message using ISO 639 three letter language codes, while the
 497 requested response language can be used to indicate the preferred language for a response. This
 498 element is used in messages from the voter or candidate to the election organizers.

499 The display element allows the definition of stylesheets to display the message. Multiple stylesheets can
 500 be declared. When displaying on the web, the first is likely to be an XSLT stylesheet, while the second
 501 might describe a CSS stylesheet to be incorporated as well. The `Type` attribute of the `Stylesheet`
 502 element should contain a media types as defined in RFC 2046 Pt 2 [1] using the list of media types
 503 defined by IANA, for example, `text/xsl`. The final element defined is the seal, which is used to seal the
 504 complete message.

505 6.2.24 EventIdentifierStructure



506

Element	Attribute	Type	Use	Comment
EventIdentifierStructure	Id	xs:NMTOKEN	optional	
	DisplayOrder	xs:positiveInteger	optional	

507 The event identifier is used wherever the election event needs to be specified. There is an `Id` attribute,
 508 which can often be used on its own to identify the event. In other cases, particularly where the content of
 509 a message is to be displayed, the event name can also be provided. The event qualifier is used to further
 510 identify the event.

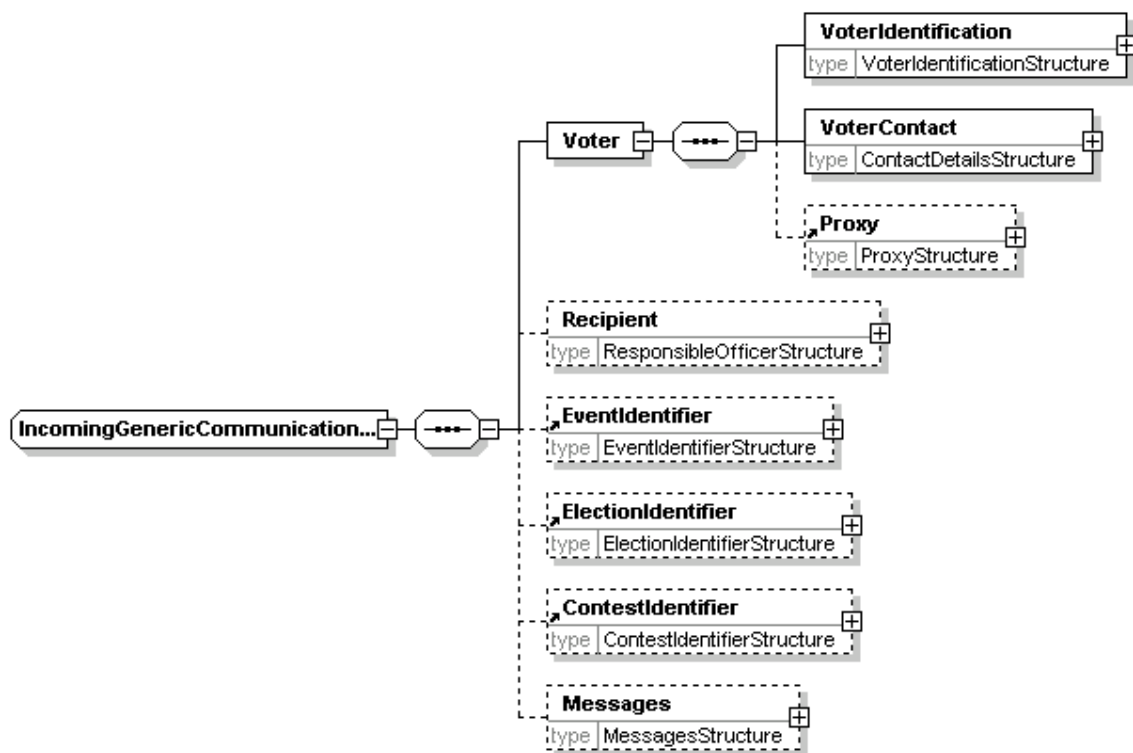
511 6.2.25 EventQualifierStructure

512 The `EventQualifierStructure` is an extension of `xs:token` to add the following attribute:

Element	Attribute	Type	Use	Comment
EventQualifierStructure	Id	xs:NMTOKEN	optional	

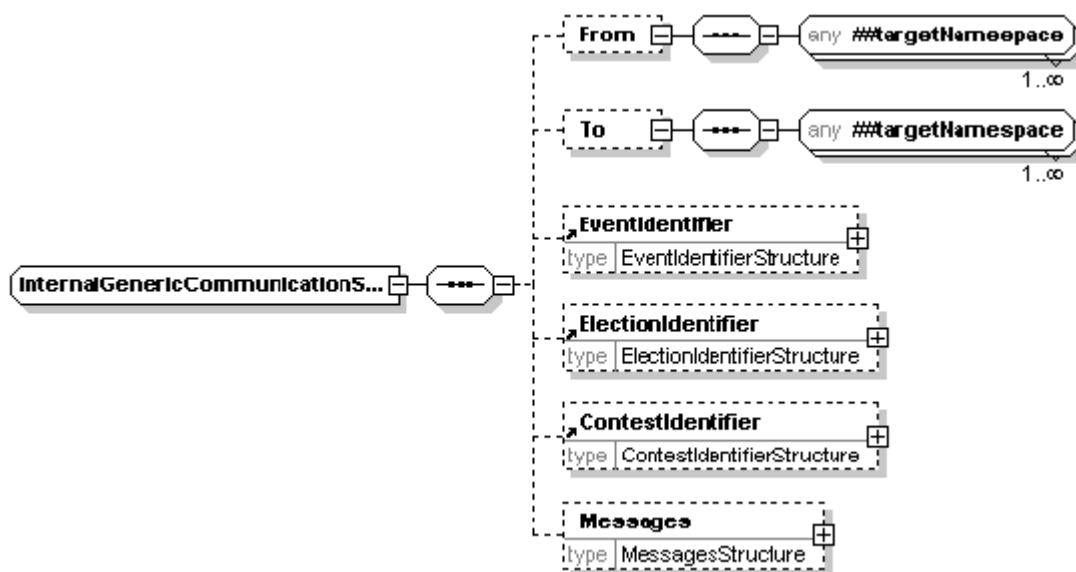
513 The event qualifier is used to further identify the event. For example, there might be "County Elections"
 514 covering an entire country, but the events are organized at a county level, so the event qualifier would
 515 identify the county.

516 **6.2.26 IncomingGenericCommunicationStructure**



517
 518 This data type provides a common structure for incoming communications. Individual message types,
 519 such as that used for selecting a preferred voting channel (schema 360b) are based on extensions of this
 520 type.

521 **6.2.27 InternalGenericCommunicationStructure**



522
 523 This data type provides a common structure for communications between entities involved in the
 524 organisation of an election. Individual message types are based on extensions of this type. The sender
 525 and recipient can use any elements defined within EML.

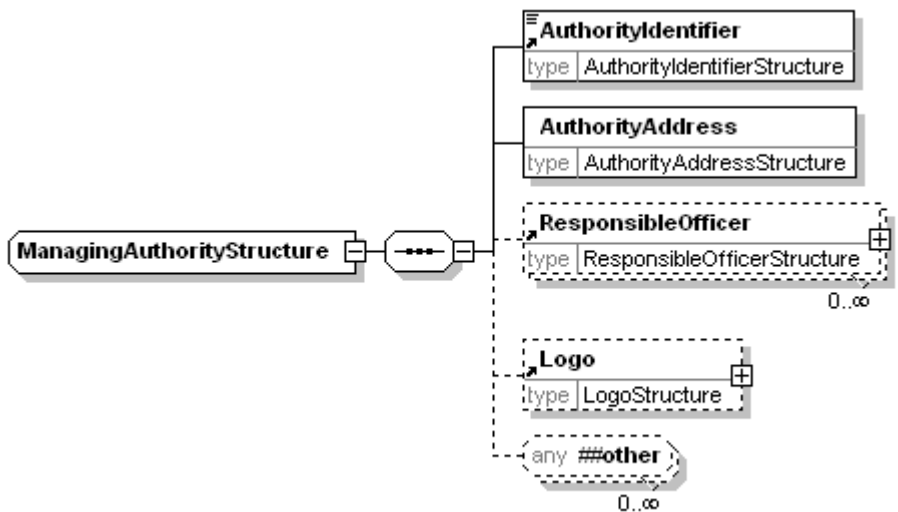
526 **6.2.28 LogoStructure**

527 The LogoStructure is an extension of the BinaryItemStructure to add attributes:

Element	Attribute	Type	Use	Comment
LogoStructure	Id	xs:NMTOKEN	optional	Standard attribute for a BinaryItemStructure
	DisplayOrder	xs:positiveInteger	optional	Standard attribute for a BinaryItemStructure
	ItemType	xs:token	optional	
	Verified	YesNoType	optional	
	Problem	YesNoType	optional	
	Notes	Xs:string	optional	
	Role	xs:token	optional	Additional attribute for this element

528 This element extends the binary item structure by adding attributes to define the type and role of the logo.
 529 This can be used to indicate the purpose of the logo (for example, it is to appear on a ballot).

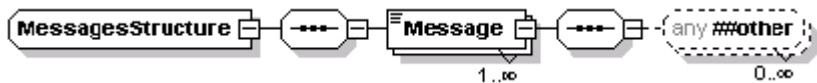
530 **6.2.29 ManagingAuthorityStructure**



531
 532 The managing authority is the body responsible for an election event, election, contest or reporting unit. In
 533 most cases, not all of these will be required, but sometimes more than one is necessary. For example, an
 534 election using the additional member system might be organized on a regional basis, whilst local
 535 authorities organise their local election events. In this case, the region becomes the managing authority
 536 for the contest, whilst the local authority is the managing authority for the event. There will also be an
 537 authority responsible for the overall conduct of the election, although this information might not be
 538 required.

539 The managing authority indicates the authority name, address, Id, any logo that might be required for
 540 display during the election and a list of responsible officers.

541 **6.2.30 MessageStructure**

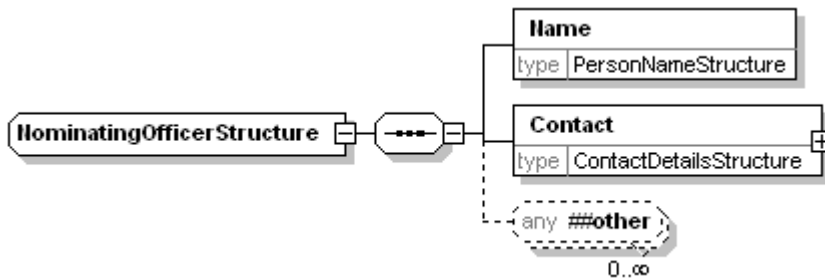


542
 543

Element	Attribute	Type	Use	Comment
MessagesStructure	DisplayOrder	xs:positiveInteger	optional	
Message	Format	xs:topken	optional	
	Type	xs:token	optional	
	Lang	LanguageType	optional	

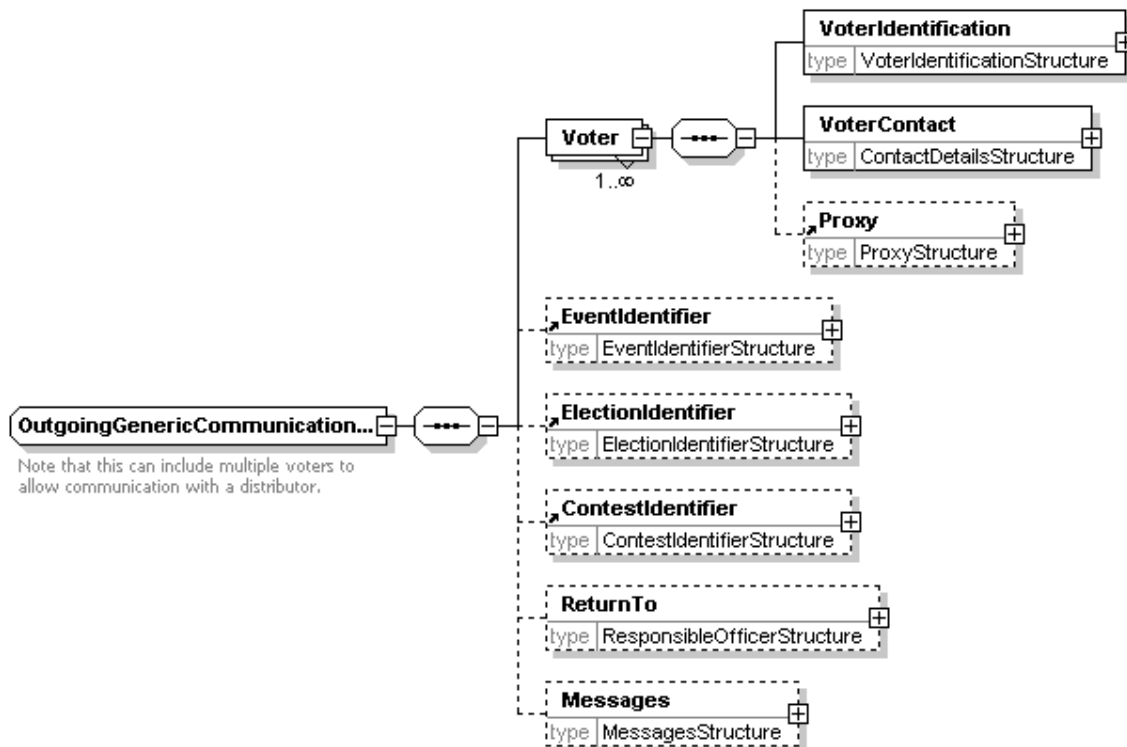
544 The Message element is of 'mixed' type, so can have both text and element content. The intention is that
545 it should have one or the other. The Message element has three attributes: Lang is used to indicate the
546 language of the message using ISO 639 three letter language codes, Format indicates the format of
547 element content using the media types definition from RFC 2046 Pt 2 [1] and the list of media types
548 defined by IANA, for example, text/html, and Type indicates the purpose of the message.

549 6.2.31 NominatingOfficerStructure



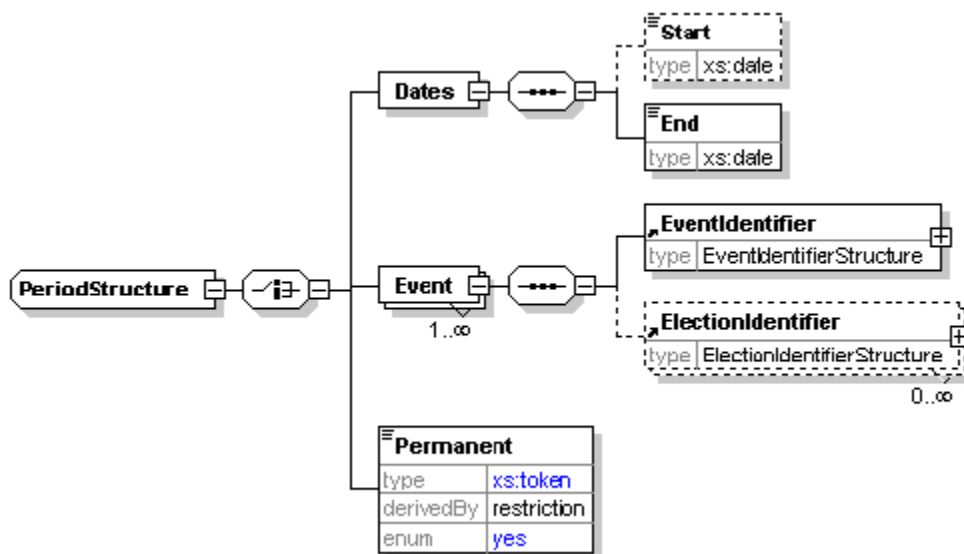
550
551 The nominating officer is the person nominating a party in an election run under, for example, the party
552 list system. The data type includes a name and contact information.

553 6.2.32 OutgoingGenericCommunicationStructure



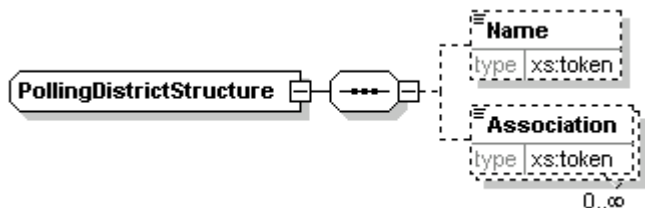
554
555 This data type provides a common structure for communications from electoral service organisers to
556 voters. Multiple voters can be identified to allow printing of messages. Individual message types, such as
557 that used for offering voting channel options (360a) are based on extensions of this type.

558 **6.2.33 PeriodStructure**



559
 560 This element can be used when appointing a proxy or registering to vote using a specific channel (e.g.
 561 postal). It allows this registration to be for a period of time, for specific election events (and possibly
 562 elections within those events) or permanently.

563 **6.2.34 PollingDistrictStructure**

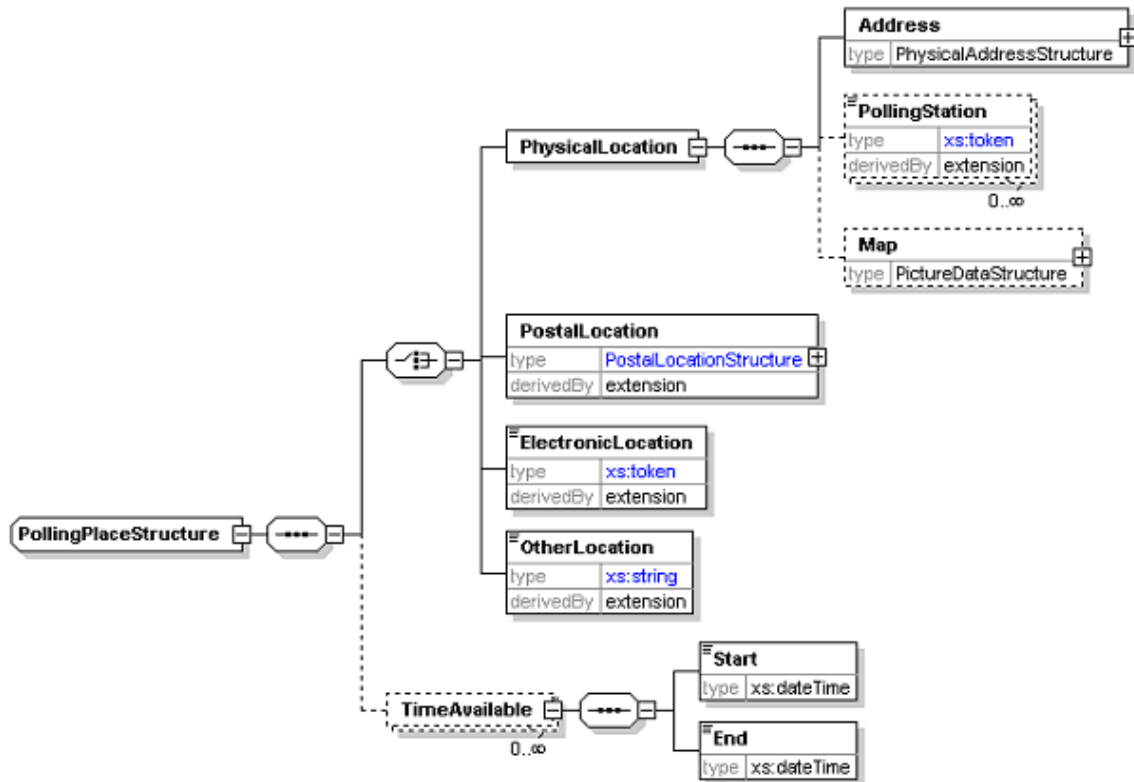


564

Element	Attribute	Type	Use	Comment
PollingDistrictStructure	Id	xs:NMTOKEN	optional	
	DisplayOrder	xs:positiveInteger	optional	

565 The polling district indicates where a voter is registered to vote. The polling district can have a name and
 566 an Id attribute. It can also be associated with other terms such as a constituency. This is done through the
 567 Association element, which has Type attribute and may have an Id attribute as well as a text value.

568 **6.2.35 PollingPlaceStructure**



569

Element	Attribute	Type	Use	Comment
PollingPlaceStructure	Channel	VotingChannelType	required	
	DisplayOrder	xs:positiveInteger	optional	
PhysicalLocation	Id	xs:NMTOKEN	optional	
	DisplayOrder	xs:positiveInteger	optional	
PostalLocation	Id	xs:NMTOKEN	optional	
	DisplayOrder	xs:positiveInteger	optional	
ElectronicLocation	Id	xs:NMTOKEN	optional	
	DisplayOrder	xs:positiveInteger	optional	
OtherLocation	Id	xs:NMTOKEN	optional	
	DisplayOrder	xs:positiveInteger	optional	
PollingStation	Id	xs:NMTOKEN	optional	

570 In general, a polling place will be either a physical location (for paper or kiosk voting), a postal address
 571 (for postal votes) or an electronic location (for Internet, SMS, telephone and other electronic means of
 572 voting). However, it is possible that none of these types will meet every need, and so an
 573 `OtherLocation` element has been included. Each of these locations must indicate the channel for
 574 which it is to be used. If a single location supports multiple channels, it must be included multiple times.
 575 A physical location has an address. Sometimes, several polling stations will be at the same address, so a
 576 polling station can be defined by name and/or Id within the address. Access to an external map can also
 577 be provided as a URI or Base64 encoded binary data.
 578 An electronic location must indicate its address (e.g. phone number, URL).
 579 An optional `TimeAvailable` element is also provided. In most cases, this is not required as the time a
 580 location is available is the same as the time the channel is available. However, there are circumstances,
 581 such as the use of mobile polling stations, where this is not the case.

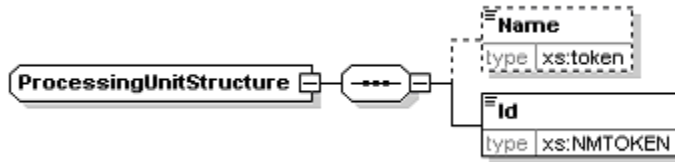
582 **6.2.36 PositionStructure**

583 The PositionStructure is an extension of xs:token to add the following attributes:

Element	Attribute	Type	Use	Comment
PositionStructure	Id	xs:NMTOKEN	optional	
	DisplayOrder	xs:positiveInteger	optional	

584 The element defined by this type indicates the position (e.g. President) for which an election is being held.
 585 It has a text description and an optional ID.

586 **6.2.37 ProcessingUnitStructure**



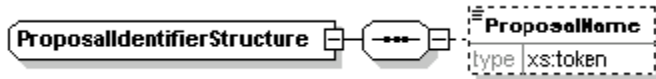
587

Element	Attribute	Type	Use	Comment
ProcessingUnitStructure	Role	xs:token (restricted)	required	

588 A processing unit is a physical system used in the election process. It is identified as part of audit
 589 information by its ID (which might be an IP address or an URI) and optional name.

590 Each processing unit has an attribute to describe its role. The role can be "sender", "receiver", "previous
 591 sender" or "next receiver". The latter two are used when there is a gateway involved. For example, a 440
 592 (cast vote) message might have an `OriginatingDevice` as its original sender, a gateway as sender
 593 and voting system as receiver.

594 **6.2.38 ProposalIdentifierStructure**



595

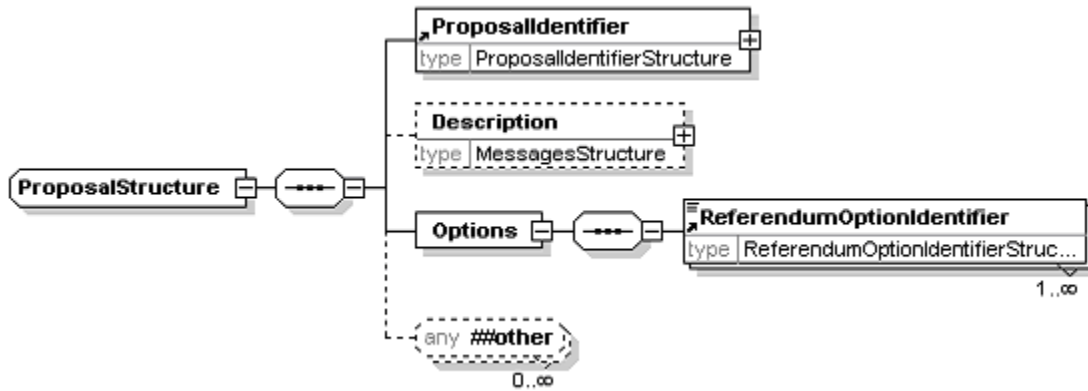
Element	Attribute	Type	Use	Comment
ProposalIdentifierStructure	Id	xs:NMTOKEN	optional	
	DisplayOrder	xs:positiveInteger	optional	
	ShortCode	ShortCodeType	optional	
	ExpectedConfirmationReference	ConfirmationReferenceType	optional	

596 A proposal is used in a referendum. At a basic level, it is a piece of text with the options ('yes' and 'no',
 597 'for' and 'against' etc) to be voted on.

598 The proposal identifier indicates a system ID for the proposal. A short code can also be included, either
 599 for SMS voting or where the security mechanism in place requires it. An

600 `ExpectedConfirmationReference` attribute also allows for security mechanisms where the
 601 confirmation reference may be different for each combination of voter and candidate.

602 **6.2.39 ProposalStructure**



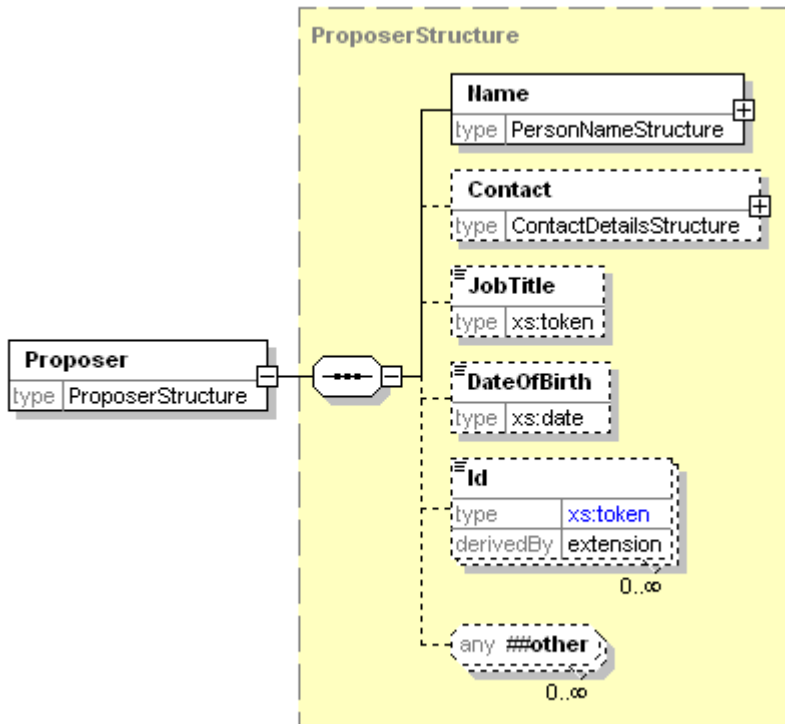
603

Element	Attribute	Type	Use	Comment
ProposalStructure	Type	xs:token	optional	

604 The proposal identifier provides a name and ID. The description is used to provide the information that
 605 will be displayed to the voter to indicate the aim of the proposal. The options are then used to indicate
 606 how the voter may vote.

607 The `Type` attribute allows for referenda where there are different kinds of proposal, for example,
 608 'initiative' or 'referendum'.

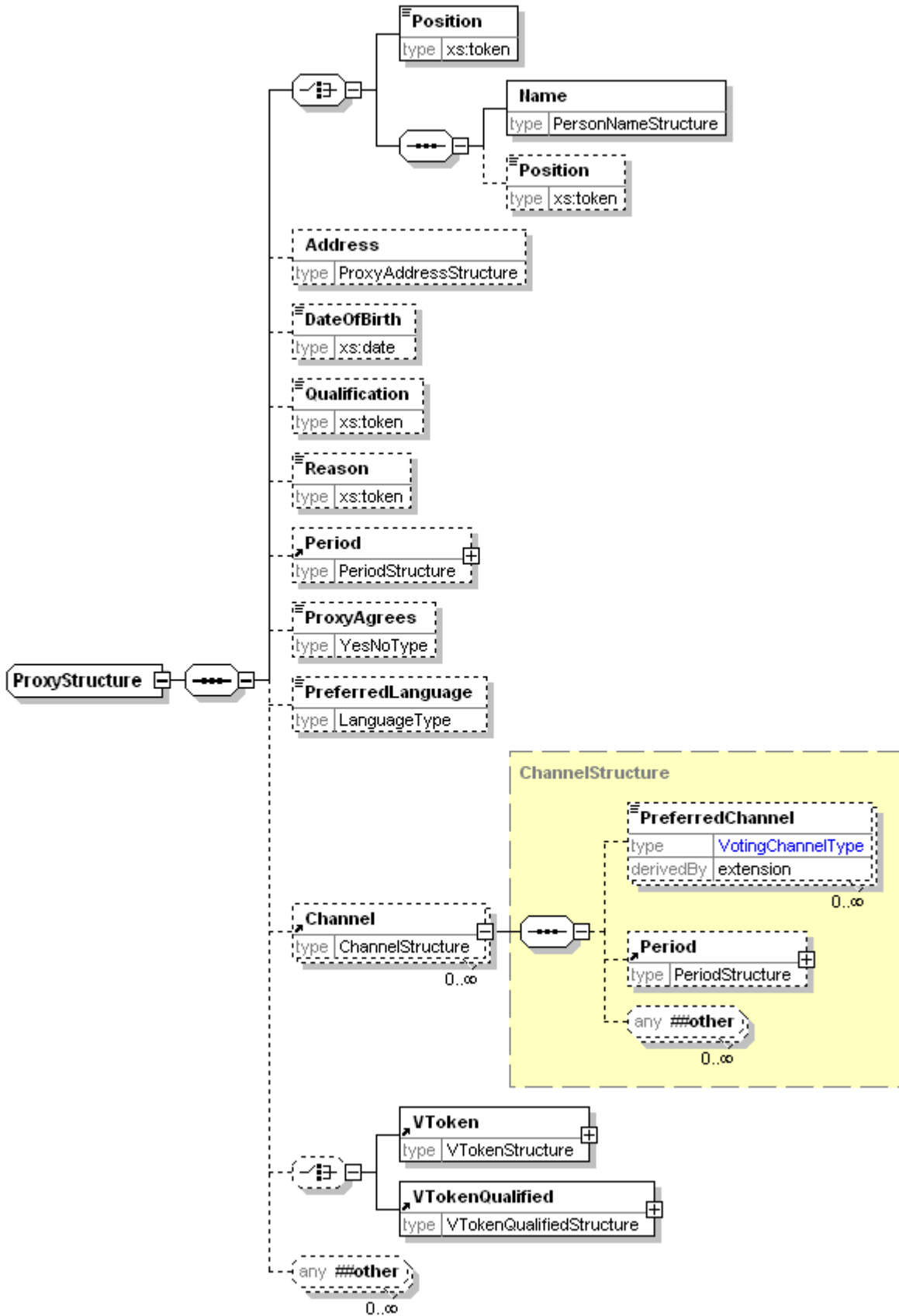
609 **6.2.40 ProposerStructure**



610

Element	Attribute	Type	Use	Comment
ProposerStructure	Category	xs:token (restricted)	optional	

611 A proposer proposes, seconds or endorses a candidate or referendum proposal. A proposer can have a
612 category, which indicates one of "primary", "secondary" or "other". A name is always required, and
613 additional information might be needed.



Element	Attribute	Type	Use	Comment
ProxyStructure	Id	xs:NMTOKEN	optional	
	DisplayOrder	xs:positiveInteger	optional	
PreferredChannel	Fixed	YesNoType	optional	

616 In many elections, a voter may appoint a proxy to vote on his or her behalf. That proxy may be identified
617 by position (for example, appointing the chairman as proxy at a company AGM), or by name (for example,
618 appointing your spouse as proxy for a public election), or both.

619 In some elections, the proxy must, for example, be a family member. This is indicated using the
620 Qualification element, while a reason for appointing a proxy can be indicated using the Reason
621 element.

622 A proxy can be permanent (i.e. appointed until revoked), appointed for one or more election events (and
623 individual elections within each event) or for a period of time. A proxy can also list his or her preferred
624 voting channels. These are listed in order of preference for a given period (which may be specific election
625 events, a date range or permanent), so that information can be sent regarding the most appropriate
626 voting channel at any election. The channel may be fixed, for example, if registering to vote by a specific
627 channel prevents voting by other means.

628 A proxy may also have a voting token, indicating the right to vote, or a qualified voting token, indicating
629 that there is a question over their right to vote.

630 6.2.42 ReferendumOptionIdentifierStructure

631 The ReferendumOptionIdentifierStructure is an extension of xs:token to add the following attributes:

Element	Attribute	Type	Use	Comment
ReferendumOptionIdentifierStructure	Id	xs:NMTOKEN	optional	
	DisplayOrder	xs:positiveInteger	optional	
	ShortCode	ShortCodeType	optional	
	ExpectedConfirmationReference	ConfirmationReferenceType	optional	

632 A referendum option is used to indicate the possible answers to a referendum question, such as "yes"
633 and "no" or "for" and "against".

634 The referendum option identifier has a text description and can have a system ID. A short code can also
635 be included, either for SMS voting or where the security mechanism in place requires it. An
636 ExpectedConfirmationReference attribute also allows for security mechanisms where the confirmation
637 reference may be different for each combination of voter and option.

638 6.2.43 ReportingUnitIdentifierStructure

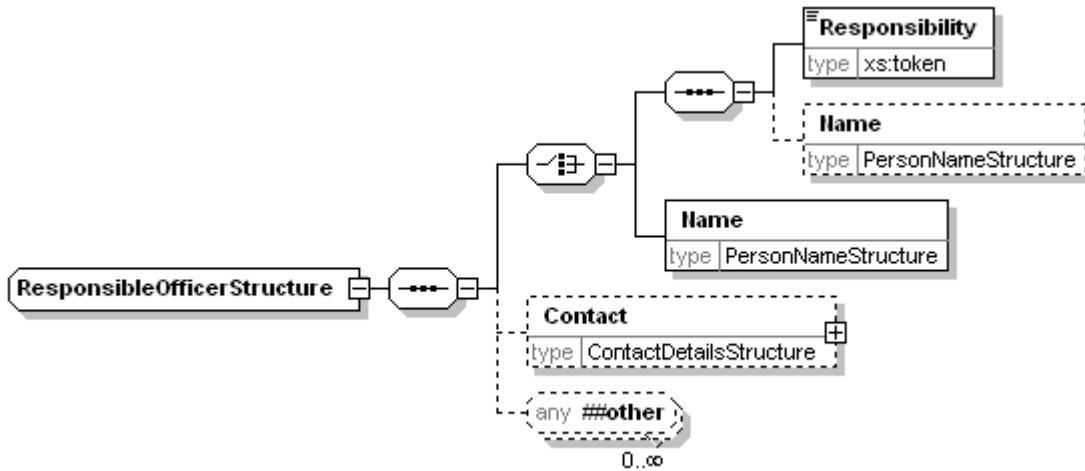
639 The ReportingUnitIdentifierStructure is an extension of xs:token to add the following attributes:

Element	Attribute	Type	Use	Comment
ReportingUnitIdentifierStructure	Id	xs:NMTOKEN	optional	
	DisplayOrder	xs:positiveInteger	optional	

640 A reporting unit is an entity that reports partial information relating to a contest (votes or the results of a
641 count) without having the full set of information required to generate a result. This will happen when votes
642 from several independently managed areas must be amalgamated to produce a result.

643 The reporting unit identifier structure defines a string with an optional Id.

644 **6.2.44 ResponsibleOfficerStructure**

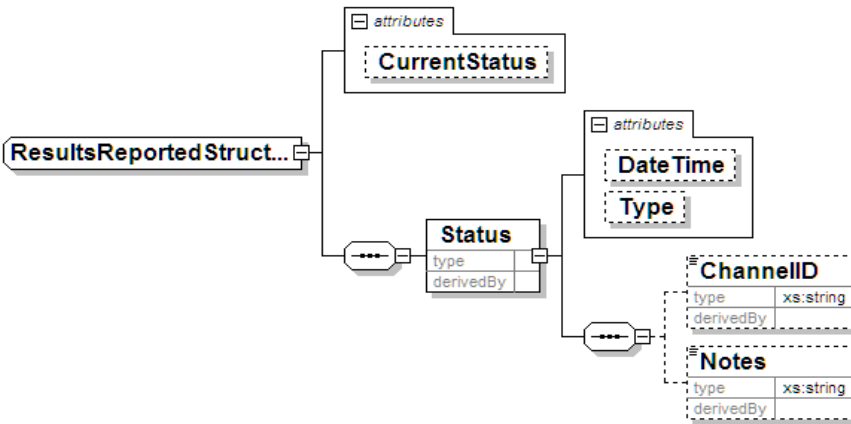


645

Element	Attribute	Type	Use	Comment
ResponsibleOfficerStructure	Id	xs:NMTOKEN	optional	

646 A responsible officer is someone who has some sort of role to play in the organization of an election.
 647 Each responsible officer has a name and/or responsibility (such as 'returning officer') and optional contact
 648 information. Local rules will usually indicate the values allowed in the Responsibility element.

649 **6.2.45 ResultsReportingStructure**



650 This allows for the extending ability to report optionally on partial/complete results and prior election result
 651 comparisons along with external press release totals rather than tabulation result totals.
 652

653 **6.2.46 ScrutinyRequirementStructure**

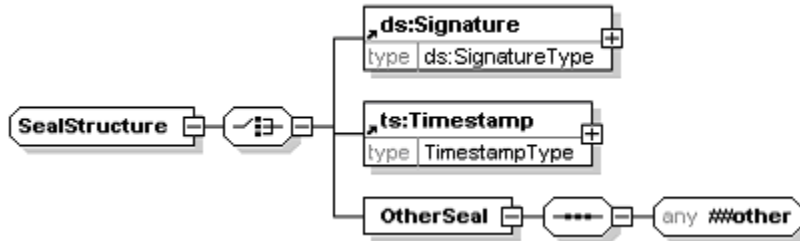
654 The ScrutinyRequirementStructure is an extension of xs:token to add the following attribute:

Element	Attribute	Type	Use	Comment
ScrutinyRequirementStructure	Type	xs:token	required	

655 A scrutiny requirement has two parts, a Type attribute and a text value. The Type specifies a condition
 656 that a candidate must meet, such as an age or membership requirement or the payment of a fee. The text
 657 describes how that condition has been met. For example:

```
658 <ScrutinyRequirement Type="dateofbirth">8 June 1955</ScrutinyRequirement>
```

659 **6.2.47 SealStructure**



660

Element	Attribute	Type	Use	Comment
OtherSeal	Type	xs:token	required	

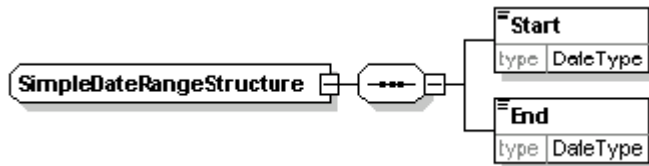
661 The seal is used to protect information such as a vote, voting token or complete message. The seal
 662 provides the means of proving that no alterations have been made to a message or individual parts of a
 663 message such as a vote or collection of votes, from when they were originally created by the voter. The
 664 seal may also be used to authenticate the identity of the system that collected a vote, and provide proof of
 665 the time at which the vote was cast.

666 If a message is to be divided, each part must be separately sealed to protect the integrity of the data. For
 667 example, if votes in several elections are entered on a single ballot, and these votes are being counted in
 668 separate locations, each vote must be separately sealed.

669 A seal may be any structure which provides the required integrity characteristics, including an XML
 670 signature [1] or a time-stamp.

671 The XML signature created by the voting system provides integrity and authentication of the identity of the
 672 system that collected the vote. The time-stamp provides integrity of the vote and proof of the time that the
 673 vote was cast.

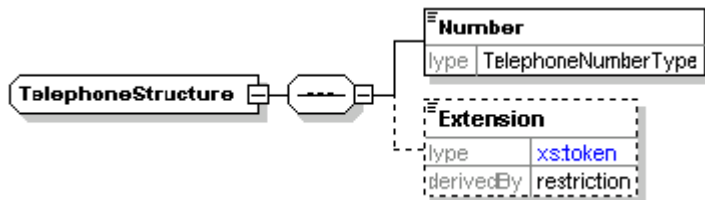
674 **6.2.48 SimpleDateRangeStructure**



675

676 This data type is used to describe ranges of dates or dates and times.

677 **6.2.49 TelephoneStructure**



678

Element	Attribute	Type	Use	Comment
TelephoneStructure	Preferred	YesNoType	optional	
	Mobile	YesNoType	optional	

679 This is an extension of the TelephoneType and adds an Extension element and the two attributes
 680 Preferred and Mobile of YesNoType. The Preferred attribute indicates which of several phone
 681 numbers or fax numbers is preferred.

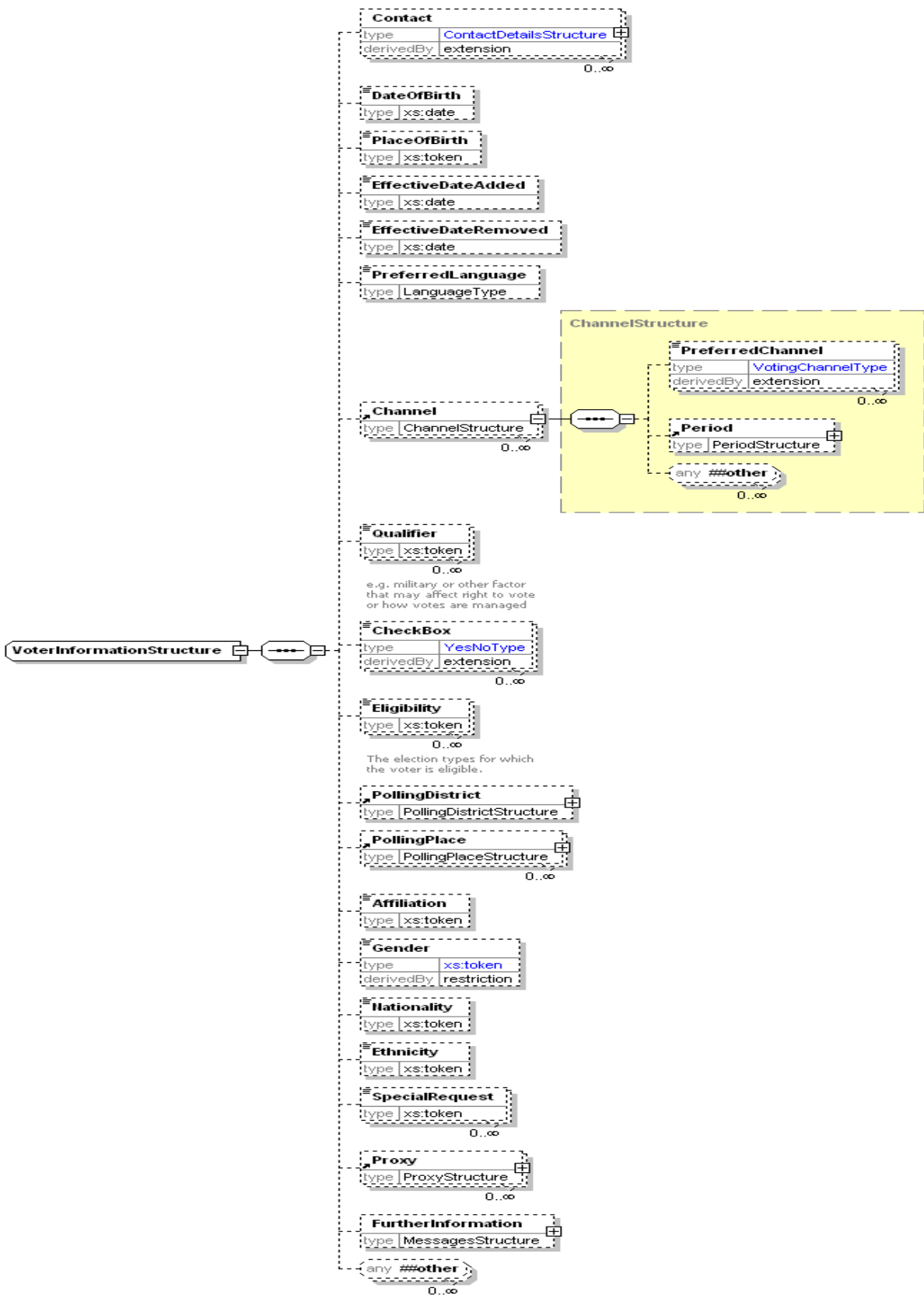
682 **6.2.50 VoterIdentificationStructure**



683

Element	Attribute	Type	Use	Comment
VoterIdentificationStructure	VoterId	xs:any	optional	
	DisplayOrder	xs:positiveInteger	optional	

684 An element defined by this data type is used wherever identification of a voter is required. It contains the
 685 voter's name and electoral address (the address that gives them the right to vote in a specific contest),
 686 the voting token (either normal or qualified) and a number of identifiers (such as an electoral registration
 687 number, the scanned signature of the voter, the voter's Social Security Number or driving licence). It may
 688 also include a previous electoral address if this is required (for example, because a voter has not been at
 689 his or her current address for more than a predefined period).



Element	Attribute	Type	Use	Comment
VoterInformationStructure	Id	xs:NMTOKEN	optional	
	DisplayOrder	xs:positiveInteger	optional	
ContactDetailsStructure	DisplayOrder	xs:positiveInteger	optional	standard attribute for this data type
	ElectionId	xs:NMTOKEN	optional	additional attribute
PreferredChannel	Fixed	YesNoType	optional	
Checkbox	Type	xs:token	required	

692 This contains more information about the voter. It contains all the information that would typically be
693 included on an electoral register other than that used for identification of the voter. In many cases, it will
694 be restricted to only include the information required in a specific message type.

695 A voter can list his or her preferred voting channels. These are listed in order of preference for a given
696 period (which may be specific election events, a date range or permanent), so that information can be
697 sent regarding the most appropriate voting channel at any election. The channel may be fixed, for
698 example, if registering to vote by a specific channel prevents voting by other means.

699 The *Qualifier* element is used to hold information that might affect a voter's right to vote or how the
700 voting process is managed. Suitable enumerations for this are likely to be added as part of localisation.
701 The *CheckBox* element with its *Type* attribute allows binary information such as whether the voter's entry
702 on the electoral register can be sold, or whether the voter wants to participate in the count. The eligibility
703 indicates what election types a voter is eligible to participate in.

704 Special requests are requests from the voter, for example, for wheelchair access to a polling station.

705 6.2.52 VTokenStructure



706

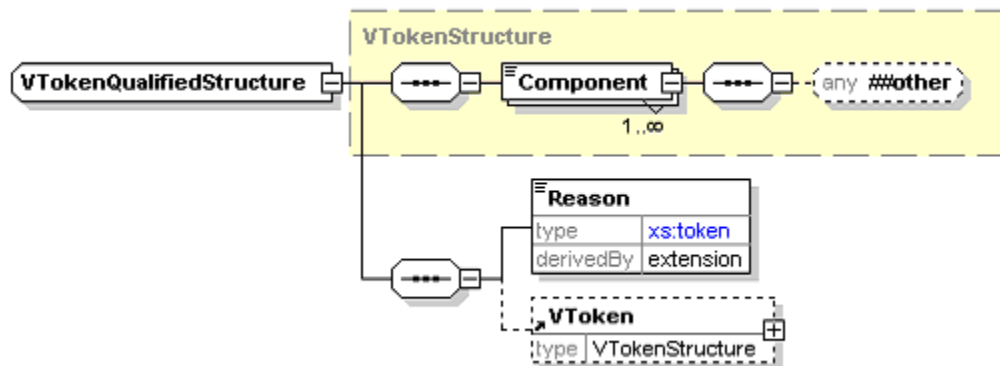
Element	Attribute	Type	Use	Comment
Component	Type	xs:NMTOKEN	required	

707 The voting token contains the information required to authenticate the voter's right to vote in a specific
708 election or contest. A voting token can consist of a continuous string of encoded or encrypted data,
709 alternatively it may be constructed from several data components that a user may input at various stages
710 during the voting process (such as PIN, password and other coded data elements). The totality of the
711 voting token data proves that a person with the right to vote in the specific election has cast the vote.

712 Depending on the type of election, the voter may need to cast their votes anonymously, thus not providing
713 a link to the voter's true identity. In this case the voting token data will not identify the actual person
714 casting the vote; it just proves that the vote was cast by a person with the right to do so. Election rules
715 may require a link to be maintained between a vote and a voter, in which case a link is maintained
716 between the voting token data and the voter's identity.

717 The components of the voting token are identified by a *Type* attribute and may contain text or markup
718 from any namespace depending on the token type. The content could be defined further in separate
719 schemas for specific types of token.

720 **6.2.53 VTokenQualifiedStructure**



721

Element	Attribute	Type	Use	Comment
Reason	Type	xs:token	required	

722 There are occasions when a normal voting token cannot be used. For example, if a voter is challenged, or
 723 an election officer claims the voter has already voted. In these circumstances a qualified voting token can
 724 be used and treated appropriately by the election system according to the election rules. For example,
 725 challenged votes might be ignored unless there were sufficient to alter the result of the election, in which
 726 case each vote would be investigated and counted if deemed correct to do so.

727 The VTokenQualifiedStructure is therefore an extension of the VTokenStructure to add the
 728 additional information required. This additional information comprises a reason for qualification (as a
 729 Reason element with a Type attribute and textual description) and possibly an original VToken.

730 **7 Elements**

731 The following elements are simply specified by their similarly-named data type and are not described
732 further here:

733 Affiliation, AffiliationIdentifier, Agent, AgentIdentifier, Area, AuditInformation, AuthorityIdentifier,
734 BallotIdentifier, BallotIdentifierRange, Candidate, CandidateIdentifier, ContactDetails, ContestIdentifier,
735 CountingAlgorithm, DocumentIdentifier, ElectionIdentifier, EventIdentifier, EventQualifier, Gender, Logo,
736 ManagingAuthority, MessageType, NominatingOfficer, NumberOfPositions, Period, PollingDistrict,
737 PollingPlace, Position, PreferredChannel, Proposal, ProposalIdentifier, Proposer, Proxy,
738 ReferendumOptionIdentifier, ReportingUnitIdentifier, ResponsibleOfficer, ScrutinyRequirement, Seal,
739 VoterId, VToken, VTokenQualified

740 **7.1 Accepted**

741 YesNoType

742 This element indicates that a candidate, referendum proposal or vote has been accepted.

743 **7.2 Election Statement**

744 MessagesStructure

745 This is the candidate's message to voters.

746 **7.3 MaxVotes**

747 xs:positiveInteger

748 The maximum number of votes allowed (also known as the vote limit). This defaults to the value of "1".

749 **7.4 MinVotes**

750 xs:nonNegativeInteger

751 The minimum number of votes allowed. This defaults to the value of "0".

752 **7.5 NumberInSequence**

753 xs:positiveInteger

754 The number of partial messages when a message is split. See "Spitting of Messages"

755 **7.6 NumberOfSequence**

756 This element represents the number of identical positions that will be elected as the result of a contest.

757 For example, in a contest for a Town Council, three councillors might be elected as the result of the

758 contest in one part of the town. The element is an `xs:positiveInteger` and defaults to a value of "1".

759 **7.7 PersonName**

760 This element uses the PersonNameStructure defined in the EML externals schema.

761 **7.8 Profile**

762 MessagesStructure

763 This is the candidate's profile statement.

764 **7.9 SequenceNumber**

765 xs:positiveInteger

766 The sequence number of a partial message when a message is split. See “Splitting of Messages”
767 (Section 4).

768 **7.10 TransactionId**

769 xs:token

770 A reference code for a specific transaction, which may comprise several messages.

771 **7.11 VoterName**

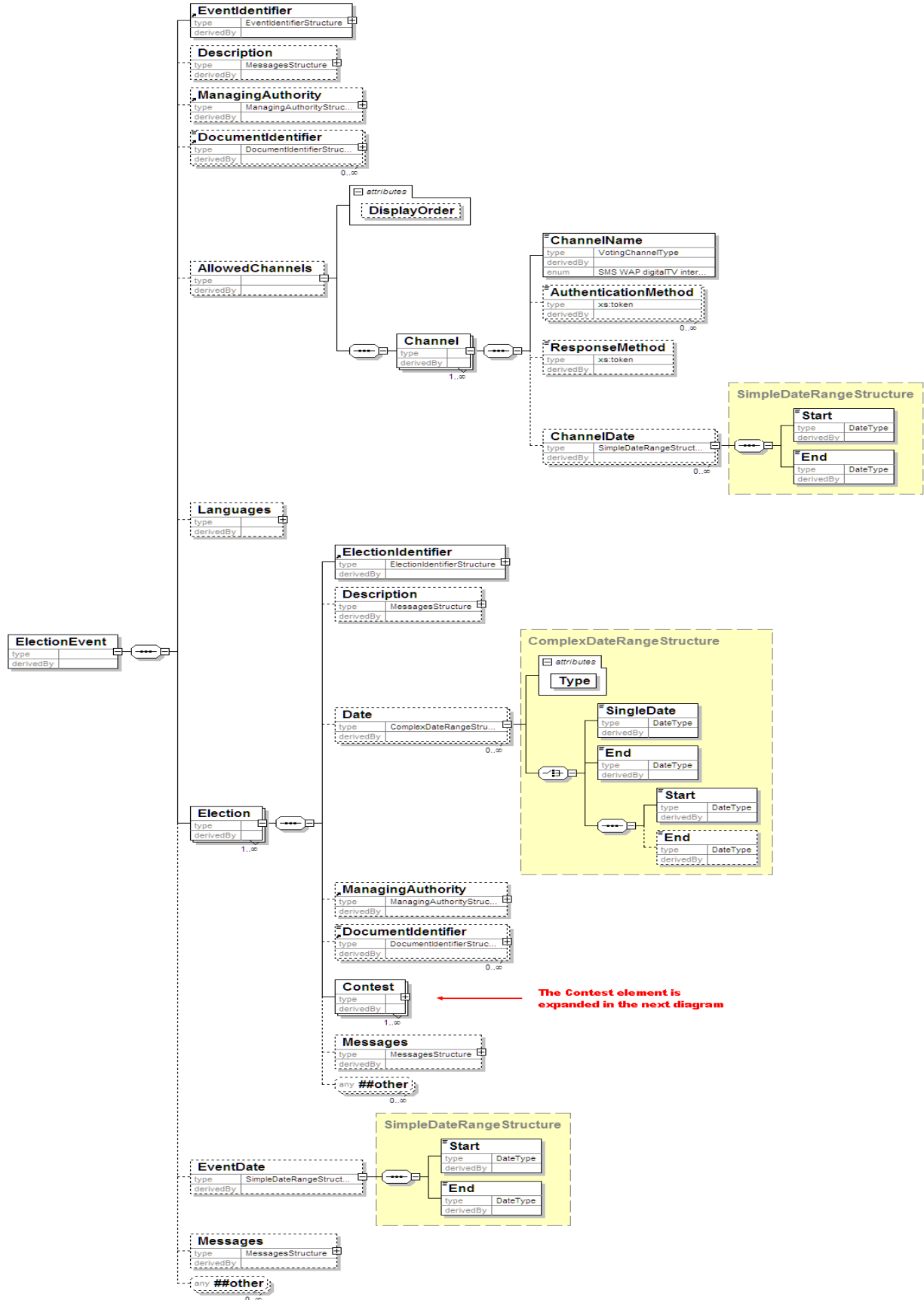
772 PersonNameStructure

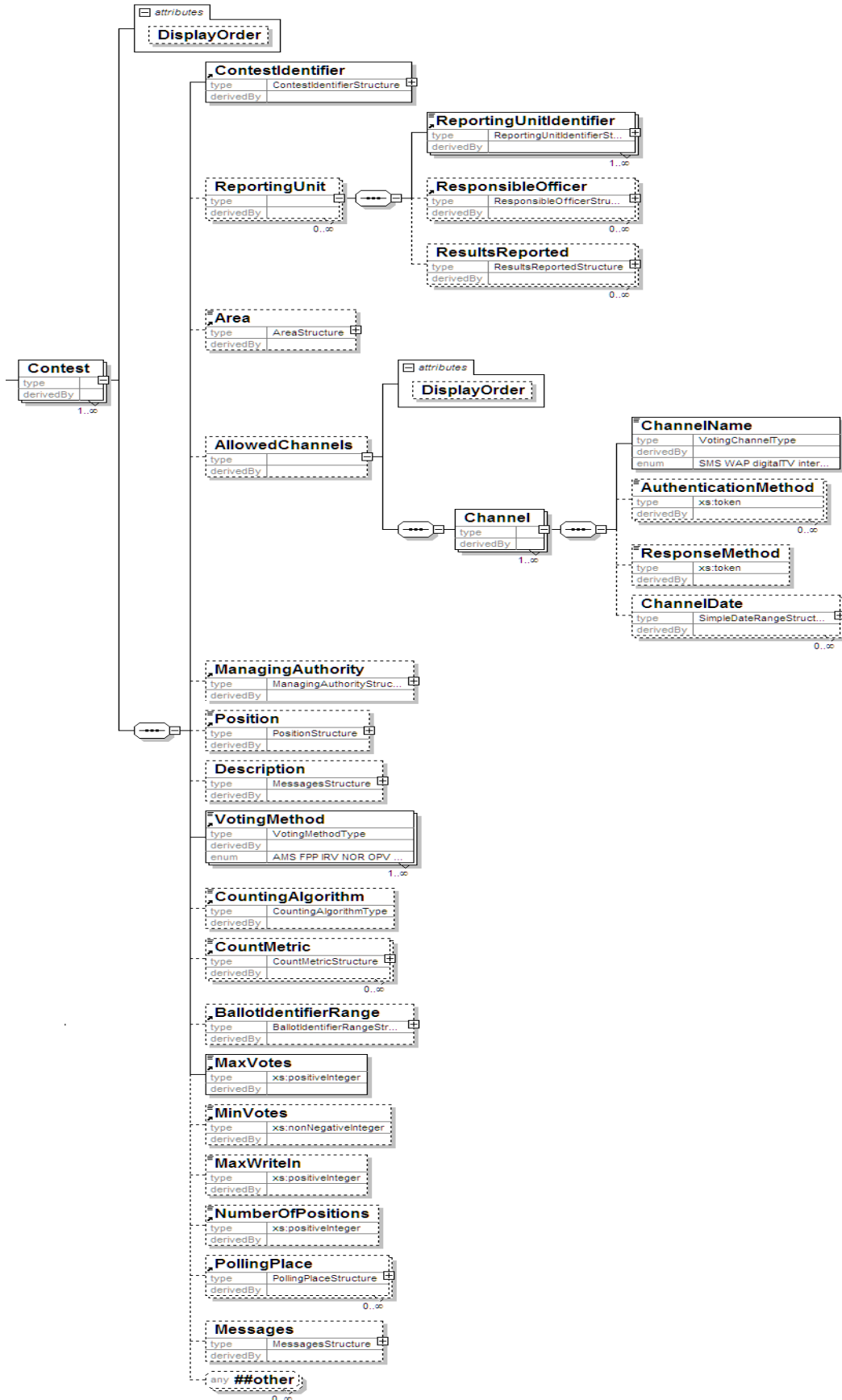
773 The name of a voter.

774 **8 EML Message Schemas**

775 This section describes the EML messages and how the message specifications change for this
776 application. It uses the element and attribute names from the schemas.

777 Attributes are shown where they are not the standard attributes of data types already described.





Element	Attribute	Type	Use	Comment
AllowedChannels	DisplayOrder	xs:positiveInteger	optional	
Contest	DisplayOrder	xs:positiveInteger	optional	

781 8.1.1 Description of Schema

782 This schema is used for messages providing information about an election or set of elections. It is usually
783 used to communicate information from the election organisers to those providing the election service.

784 The message therefore provides information about the election event, all elections within that event and
785 all contests for each election.

786 For the election event, the information includes the ID and name of the event, possibly with a qualifier on
787 the event. This qualifier is used when an event has several local organisers. For example, for a UK
788 general election, each constituency organises its own contests. The election event is therefore an
789 general election, whilst the qualifier would indicate the constituency. Other information regarding an
790 election event comprises the languages to be used, the start and end dates of the event, potentially a list
791 of external documents that are applicable (such as the rules governing the election), a description and
792 information about the managing authority.

793 The managing authority can be indicated for the event, each election, each contest within the election and
794 each reporting unit.

795 An election can have a number of dates associated with it. For example, there is likely to be a period
796 allowed for nomination of candidates and a date when the list of eligible voters is fixed. Each date can be
797 expressed as a single date when something happens, a start date, an end date, or both start and end
798 dates. These dates can be either just a date or both a date and time using the subset of the ISO 8601
799 format supported by XML Schema.

800 Like the event, an election can have both a managing authority and referenced documents. Finally, there
801 is a `Messages` element for additional information.

802 A contest has a name and ID. It can also have reporting unit identifiers. A contest may need to specify its
803 geographical area independently from its name, for which purpose the `Area` element is provided. Each
804 contest can specify the voting channels allowed. In general, the list of possible channels will be further
805 restricted as part of a local customisation. Each channel can specify several methods for authenticating
806 the voter, such as PIN and password, and a response method, indicating the type of response to be given
807 to a cast vote. Finally, facilities are provided to indicate the dates and times when the channel will be
808 available to the voter.

809 As described previously, a contest can indicate its managing authority. It may also indicate the position
810 (such as 'President') for which votes are being cast. The `Description` allows for additional text describing
811 the contest. Each contest indicates the voting method being used, whilst the `CountingAlgorithm`
812 indicates the method of counting (such as the d'Hondt or Meeks method) that will be used. The minimum
813 and maximum number of votes to be cast by each voter can also be indicated.

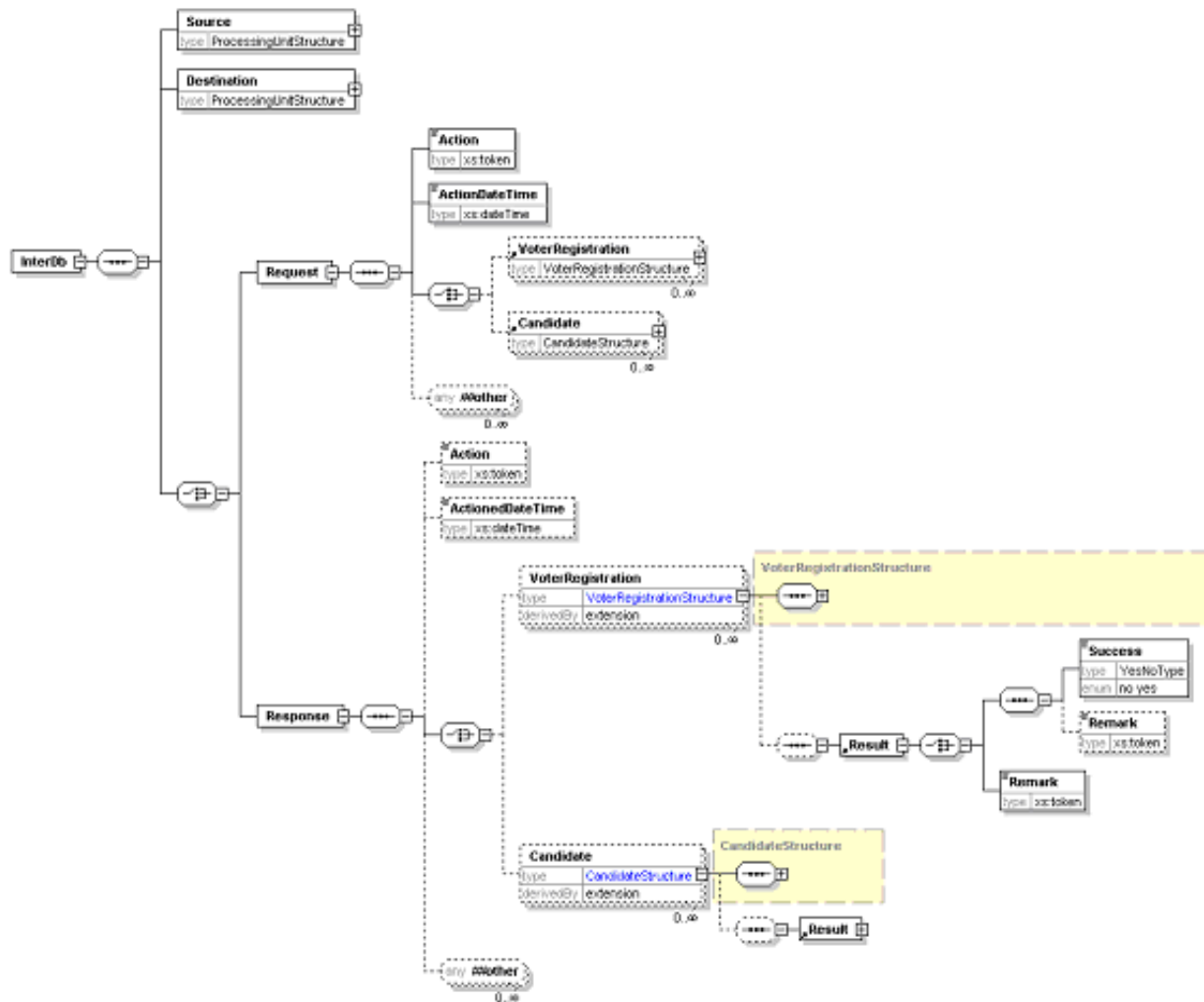
814 A list of polling places can be provided. These can be either physical locations for people to go to vote,
815 postal addresses for postal votes or electronic locations. An 'other location' is also allowed for cases
816 where these do not meet the requirements. A location can also say when it will be available. This is
817 intended for mobile polling stations that will only be available at a given address for a part of the voting
818 period.

819 Finally, a `Messages` element allows for additional information that might be communicated to the voter
820 later through other messages.

821 8.1.2 EML Additional Rules

Error Code	Error Description
3110-001	The allowed channels must not be declared at both the election event level and the contest level.

822 **8.2 Inter Database (120)**



823

824 **8.2.1 Description of Schema**

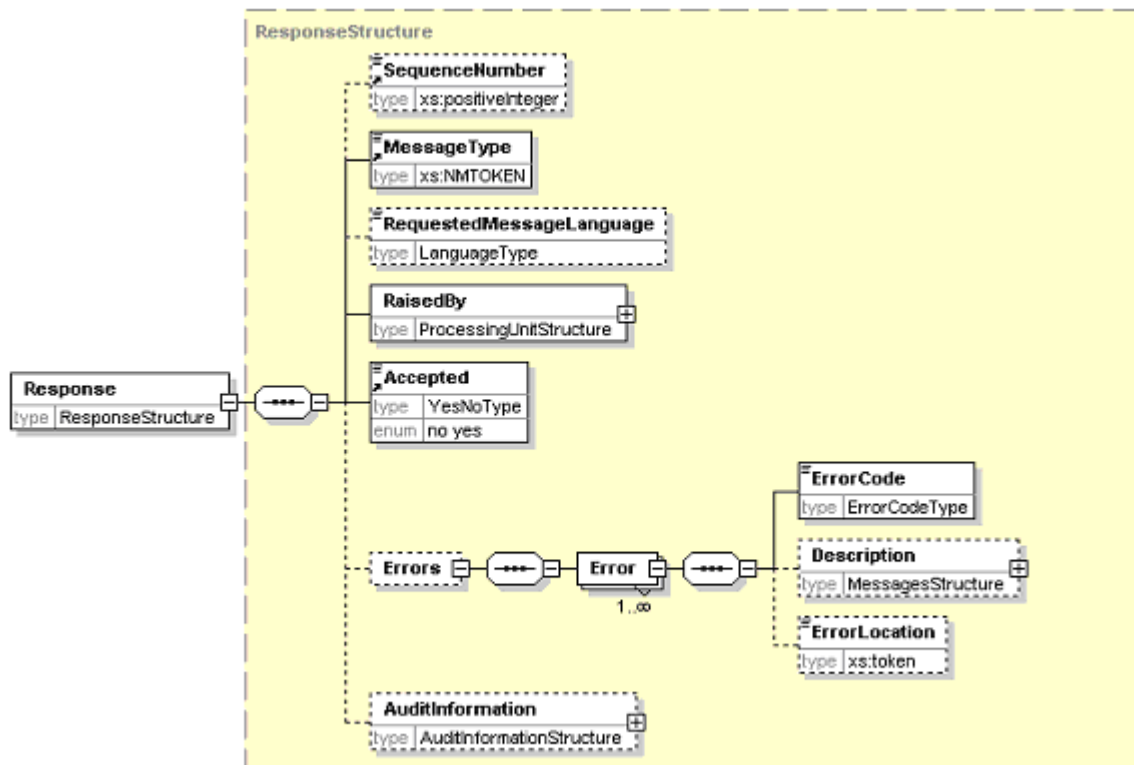
825 This schema is used for messages requesting services from other electoral registers or candidate
 826 databases. This can, for example, be used to de-dupe databases, check that a candidate in an election is
 827 only standing in one contest or confirm that the proposers of a candidate are included on a relevant
 828 electoral register. The schema is in two parts, so a message will be either a request or a response.

829 Both request and response start by identifying the source and destination as processing units.

830 A request has an Action code to identify the request being made. Possible actions include, but are not
 831 limited to, 'add', 'delete', 'replace', 'confirm' and 'return'. The code 'confirm' returns success if the person
 832 indicated is included in the database. The code 'return' causes the receiving the database to return the
 833 full information for the person identified. The ActionDateTime is used to specify when the action should
 834 be carried out, and then there is an optional list of voters or candidates.

835 A response has a similar structure. It could be that the Action code is no longer required, so this is now
 836 optional. The TransactionID must match that given in the request. The Result is either a binary
 837 Success flag or a remark or both. Again, there is a date and time, but in this case it is the date and time at
 838 which the action took place.

839 **8.3 Response (130)**



840

841 **8.3.1 Description of Schema**

842 Some messages have a defined response message that provides useful information. However, there is a
 843 need for a more general response, either to indicate that a message has been accepted, or to indicate the
 844 reasons for rejection.

845 The message includes information to identify the message to which the response applies (by using the
 846 same transaction id in the EML element and, if necessary, including the sequence number of the message
 847 to which the response applies in the Response element), with information on the entity raising the
 848 message, whether the message was accepted and information about the errors if it was not. The desired
 849 language for a display message can also be included to allow a downstream processor to substitute a
 850 language-specific error message if required.

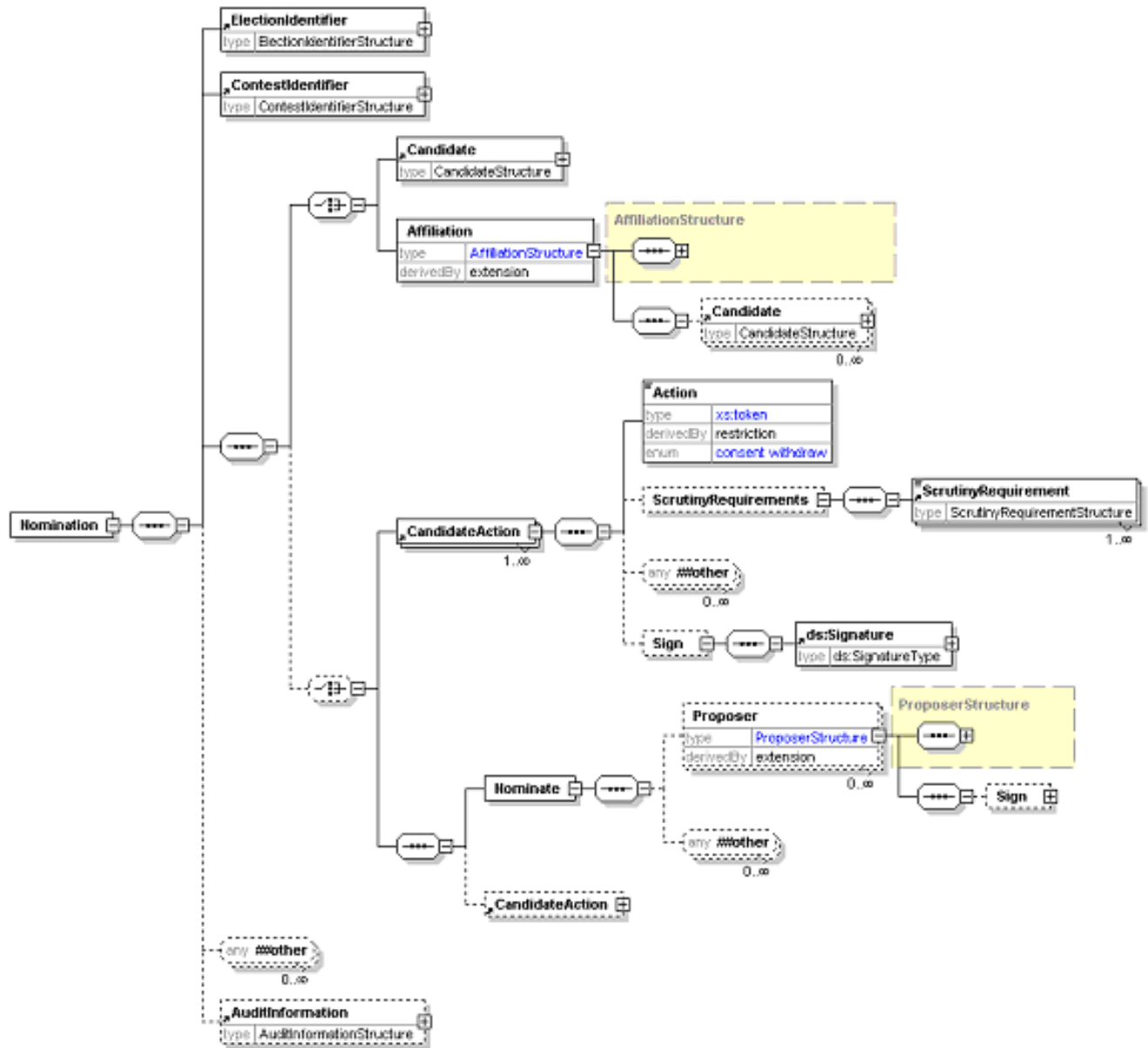
851 If the message is reporting an error, the location of the error within the message can be indicated.
 852 Usually, this will be an XPath to the location of the error. However, errors detected by an XML parser may
 853 be in a different format, such as a line number.

854 Note that a single response can be raised for a series of sub-messages with the same transaction ID.
 855 This allows indication, for example, that a sub-message was missing.

856 **8.3.2 Additional EML Rules**

Error Code	Error Description
3130-001	If the message is not accepted, there must be an Errors element

857 **8.4 Candidate Nomination (210)**



858

859 **8.4.1 Description of Schema**

860 Messages conforming to this schema are used for four purposes:

- 861 1. nominating candidates in an election;
- 862 2. nominating parties in an election;
- 863 3. consenting to be nominated; or
- 864 4. withdrawing a nomination.

865 Candidate consent can be combined in a single message with a nomination of the candidate or party or
866 sent separately.

867 Note that the message does not cover nomination for referendums.

868 The election and contest must be specified. When a candidate is being nominated, there must be
869 information about the candidate and one or more proposers. The candidate must supply a name.

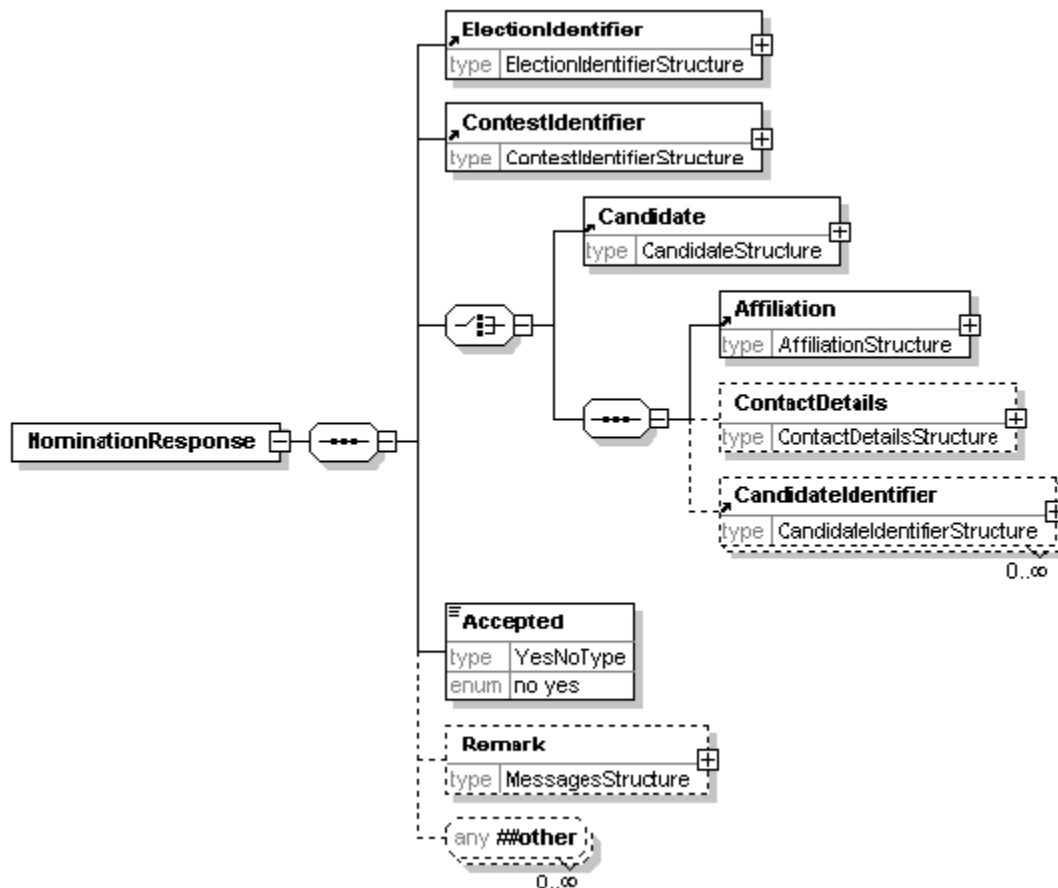
870 Optionally, the candidate can provide contact information, an affiliation (e.g. a political party) and textual
 871 profiles and election statements. These two items use the `MessagesStructure` to allow text in multiple
 872 languages. There is also scope to add additional information defined by the election organiser.

873 The proposers use the standard proposer declaration with a mandatory name and optional contact
 874 information and job title. Again, additional information can be required.

875 If a party is being nominated, the primary proposer will be the contact. Information on candidates in a
 876 party list can also be provided.

877 Candidates, either individuals or on a party list, must define the action being taken and may provide
 878 scrutiny information. The scrutiny requirements indicate how the candidate has met any conditions for
 879 standing in this election. This could include indicating that a deposit has been paid or providing a
 880 reference to prove that he or she lives in the appropriate area. This information can be signed
 881 independently of the complete message.

882 **8.5 Response to Nomination (220)**



883

884 **8.5.1 Description of Schema**

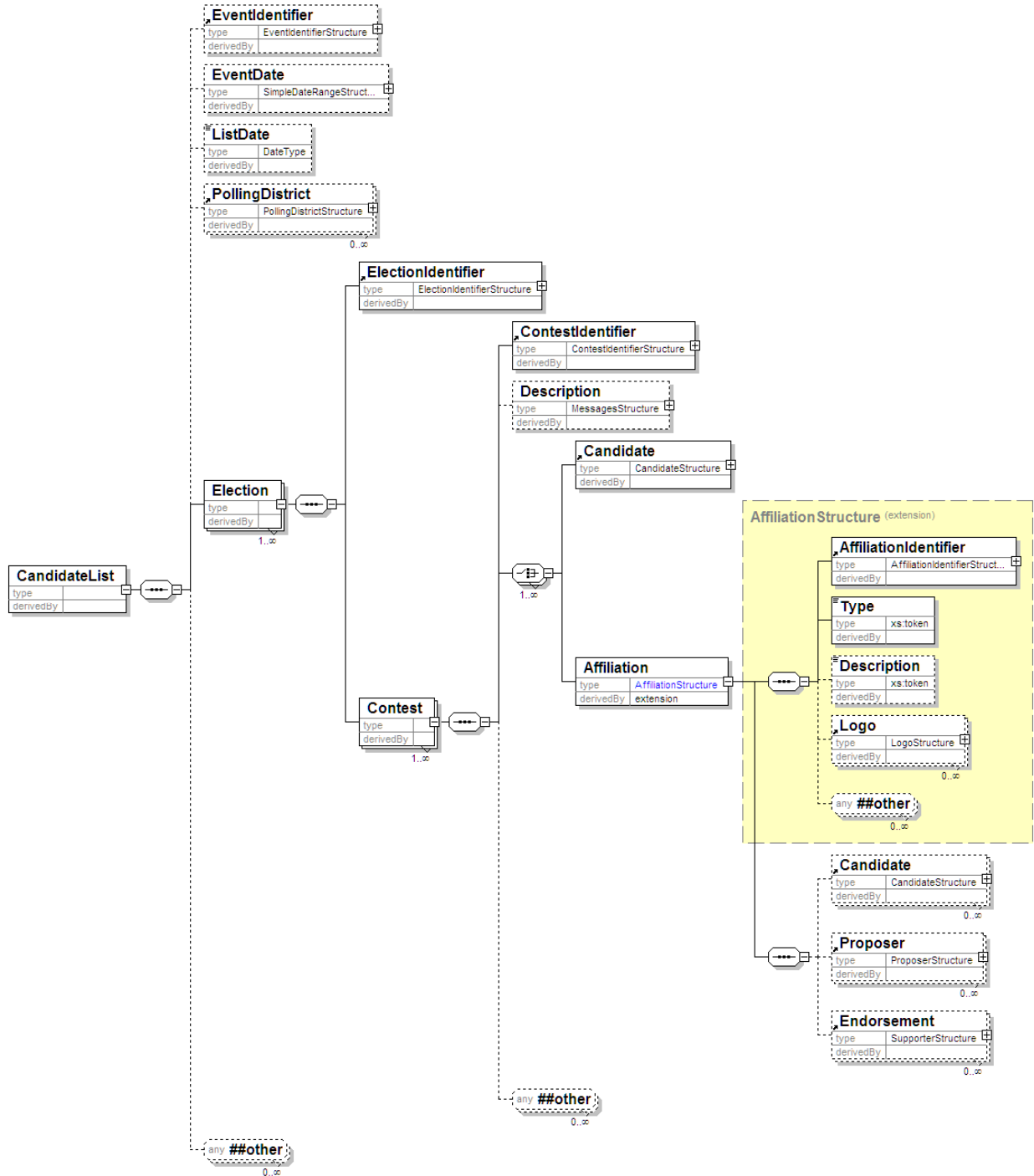
885 This message is sent from the election organiser to the candidate or nomination authority for a party to
 886 say whether the nomination has been accepted. Along with the acceptance information and the basic
 887 information of election, contest and party and candidate names, the candidate's contact details and
 888 affiliation can be included and a remark explaining the decision.

889

890 **8.5.2 EML Additional Rules**

Error Code	Error Description
3220-001	If the nomination has not been accepted, a reason for rejection is required in the Remark element

891 **8.6 Candidate List (230)**

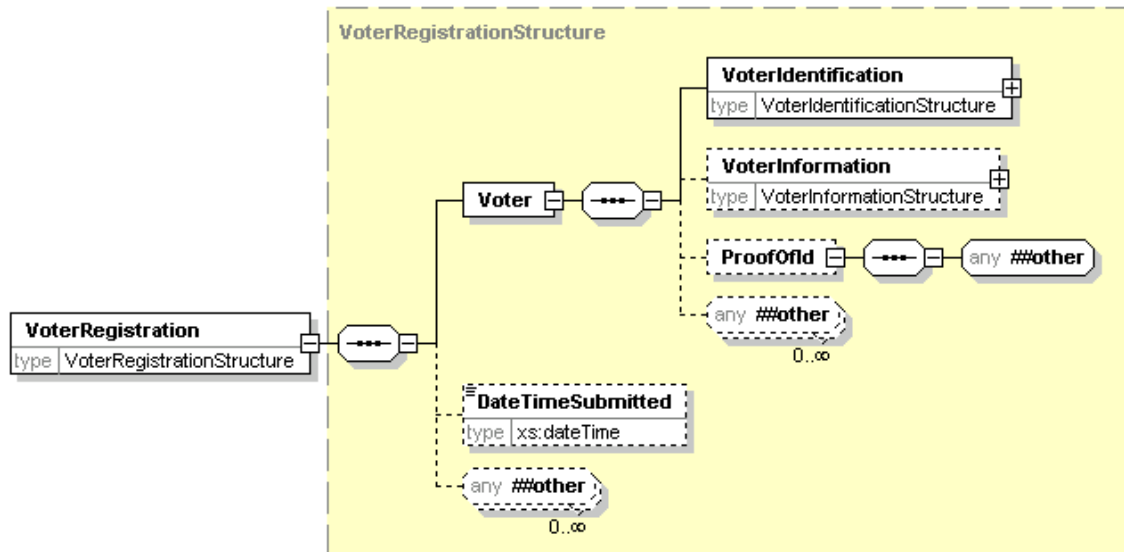


892

893 **8.6.1 Description of Schema**

894 This schema is used for messages transferring candidate lists for specified contests. It has the election
 895 event, election and contest identifiers, and optionally the event dates and a contest description. The list
 896 itself can be either a list of candidates, each with a name, address, optional affiliation and other useful
 897 data, or a list of parties. In the latter case, contact information and a list of candidates under a party list
 898 system can also be included.

899 **8.7 Voter Registration (310)**



900

901 **8.7.1 Description of Schema**

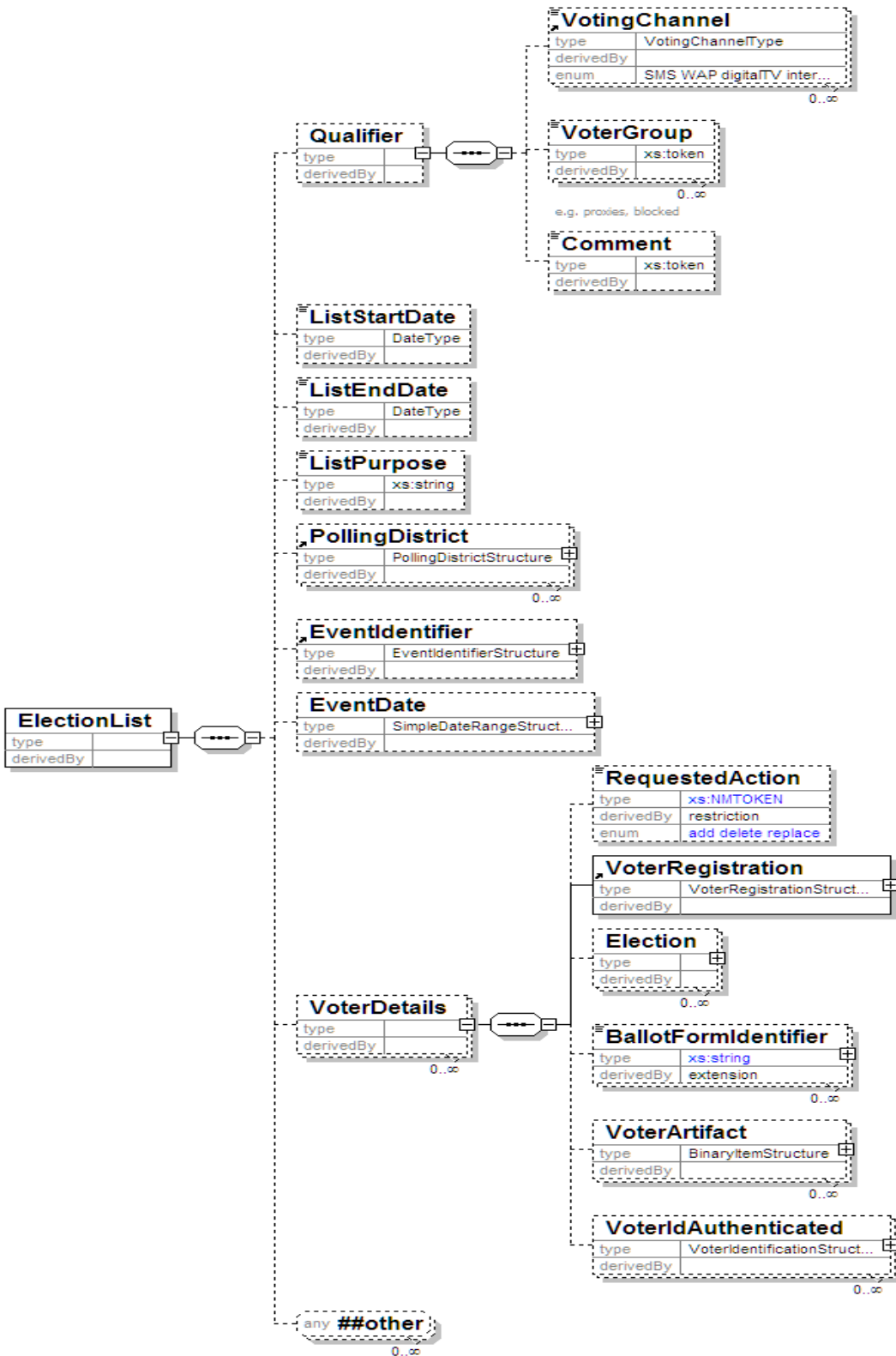
902 This schema is used for messages registering voters. It uses the VoterIdentificationStructure.
 903 The VoterInformationStructure is used unchanged. Proof of ID can be provided.

904 There is the facility for the transmission channel (for example a trusted web site) to add the time of
 905 transmission.

906 **8.7.2 EML Additional Rules**

Error Code	Error Description
3310-001	The Proxy must not have a VToken or VTokenQualified

907 **8.8 Election List (330)**



908
909

Element	Attribute	Type	Use	Comment
Blocked	Reason	xs:token	optional	
	Channel	VotingChannelType	optional	

910 8.8.1 Description of Schema

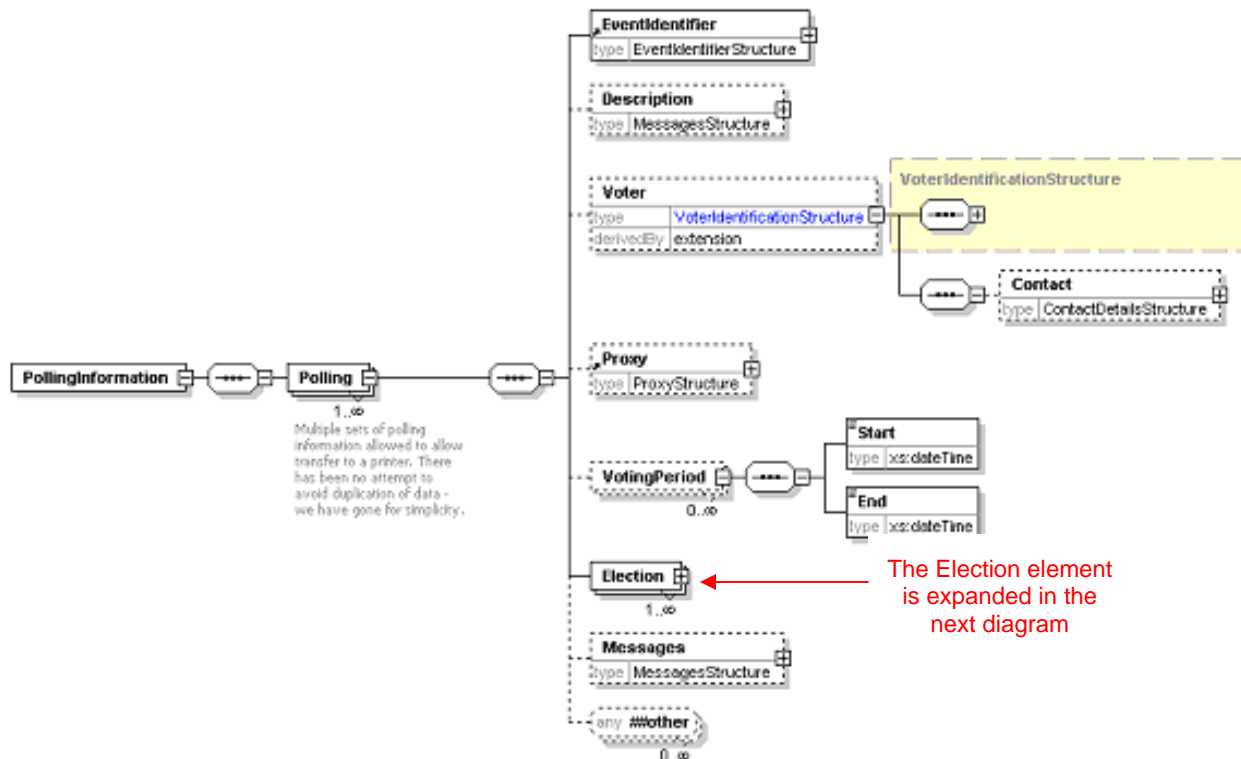
911 This schema is primarily used for messages communicating the list of eligible voters for an election or set
 912 of elections. It can also be used for any other purpose that involves the transfer of voter information
 913 where the 120-interDB message is not appropriate. Partial lists are allowed through the use of the
 914 Qualifier, Blocked and VoterGroup elements. So, for example, a list of postal voters or a list of proxies
 915 can be produced. The schema can also be used for filtered lists such as a list of postal proxies. These
 916 lists sometimes do not contain any names meeting the filter so empty lists are allowed.

917 For each voter, information is provided about the voter himself or herself, and optionally about the
 918 elections and contests in which the voter can participate. The information about the voter is the same as
 919 that defined in the 310-voterregistration schema. Added to this can be a list of elections, each identifying
 920 the election and the contest in which this voter is eligible to vote, and the polling places available. Any
 921 voter can have a Blocked element set against them with an optional Reason and Channel. This allows a
 922 list to be produced for a polling place indicating those that have already voted by another means or who
 923 have registered for a postal vote. It can also be used if the complete electoral register must be transmitted
 924 (perhaps as a fraud prevention measure) but some people on the register are no longer eligible to vote.

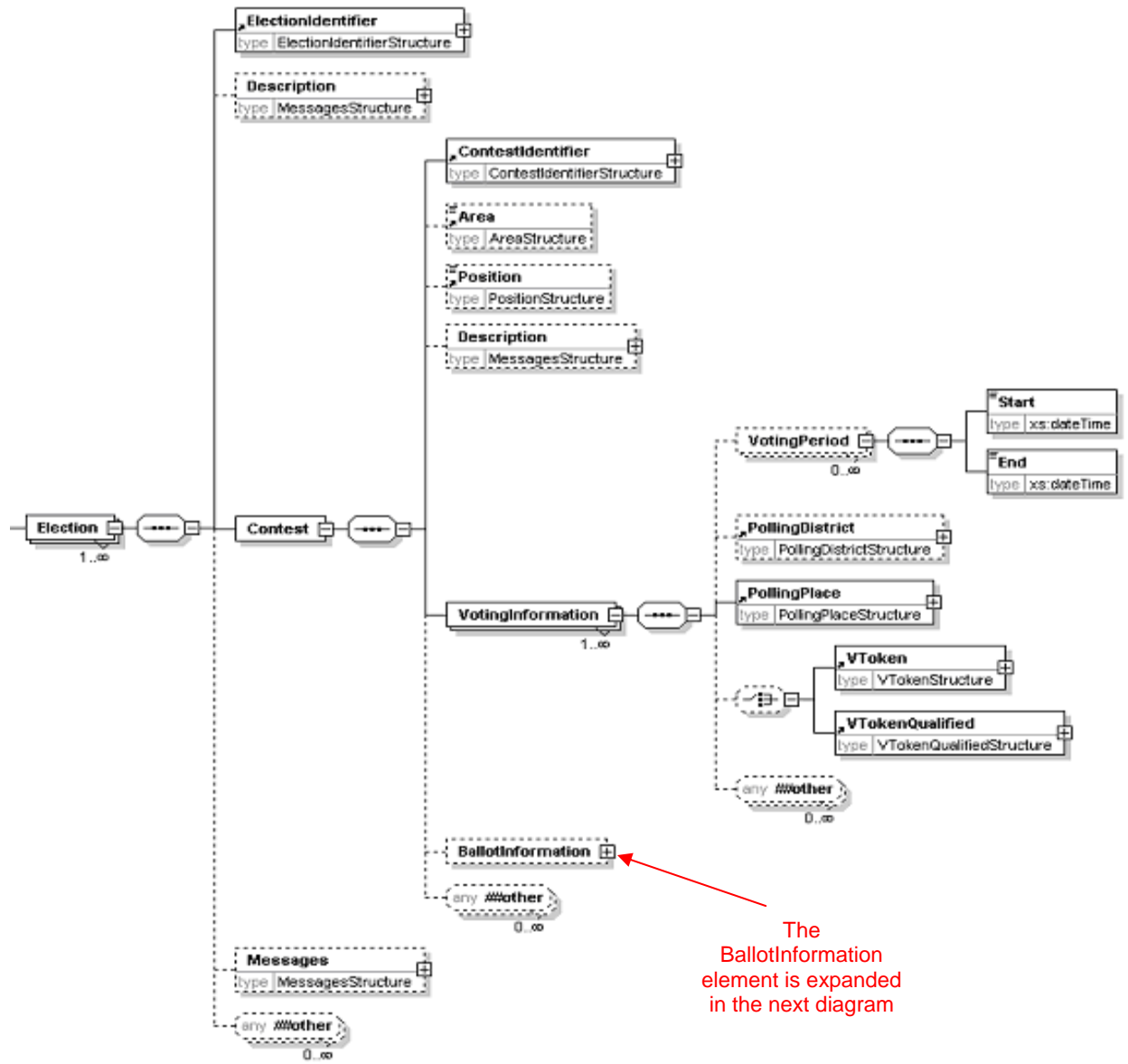
925 8.8.2 EML Additional Rules

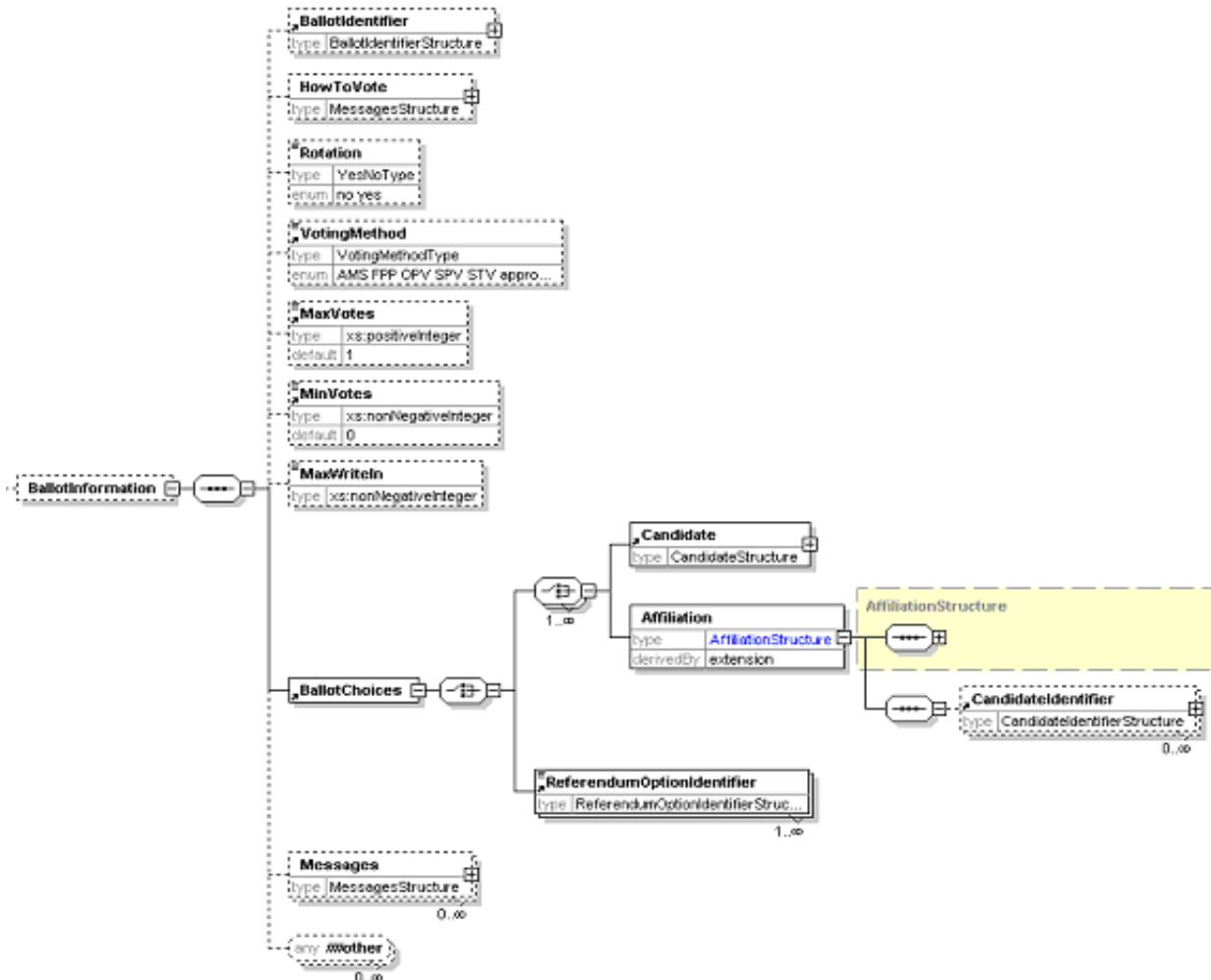
Error Code	Error Description
3330-002	The polling district can only be included for either the voter or the election.
3330-003	The polling place can only be included for either the voter or the election.

926 8.9 Polling Information (340)



927





929

Element	Attribute	Type	Use	Comment
BallotChoices	Contested	YesNoType	optional	
VotingPeriod	DisplayOrder	xs:positiveInteger		
VotingInformation	DisplayOrder	xs:positiveInteger	optional	
	Channel	VotingChannelType	optional	

930 8.9.1 Description of Schema

931 The polling information message defined by this schema is sent to a voter to provide details of how to
 932 vote. It can also be sent to a distributor, so multiple sets of information are allowed. In the case of SMS
 933 voting, ballot information may also be required, so this can be included. Either one or several sets of
 934 polling information may be sent to each voter for any election event.

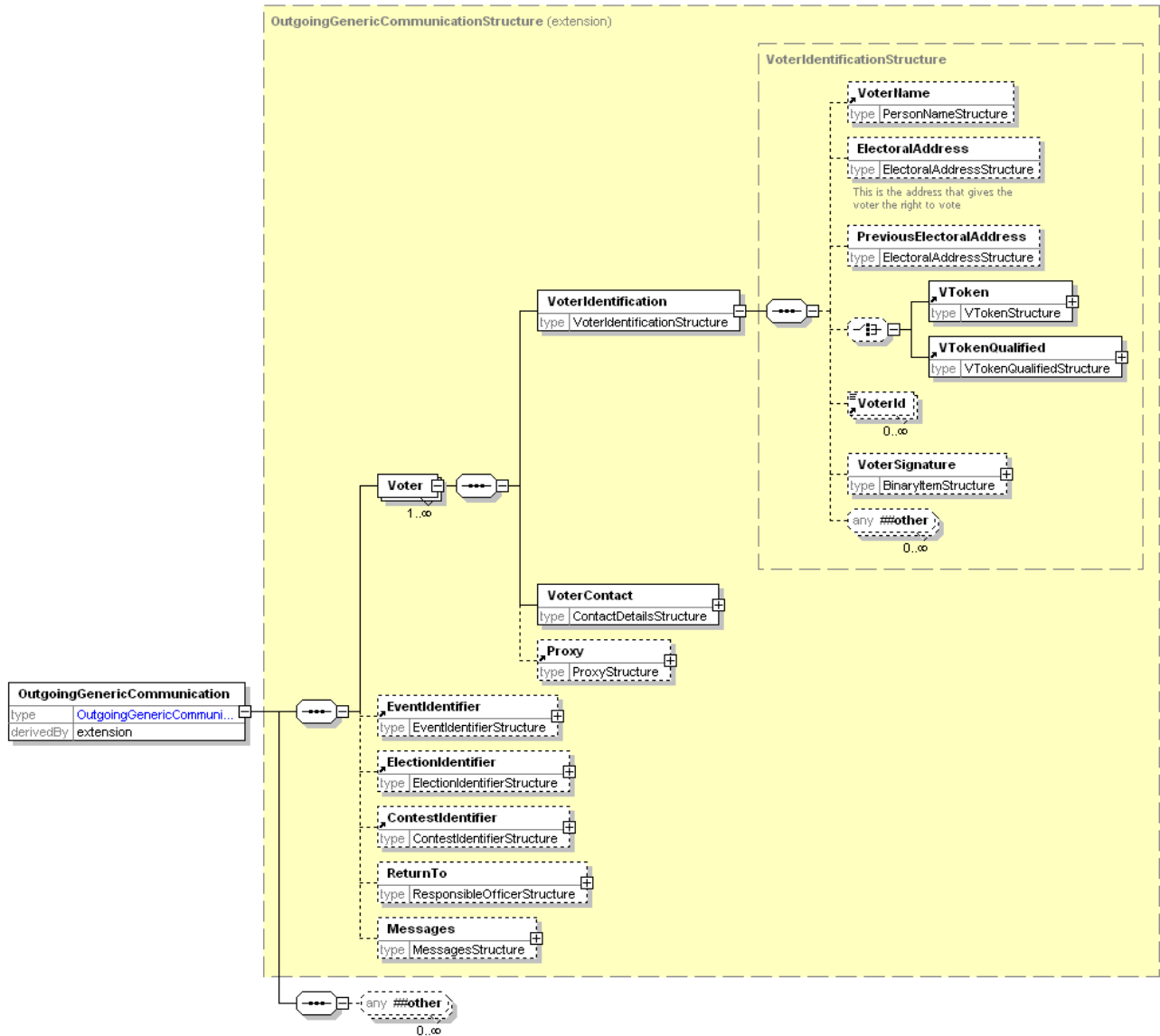
935 Some information about the voter and any proxy may be included, for example to print on a polling card.
 936 This can also include a mailing address for a distributor to use.

937 Information about the elections and contests is included for the benefit of the voter. For each voting
 938 channel, this includes where to vote (which could be a polling station, address for postal voting, URL for
 939 Internet voting, phone number for SMS voting etc) and the times that votes can be placed. Use of the
 940 DisplayOrder attribute on these allows the display or printing of information to be tailored from within the
 941 XML message.

942 Ballot information may be included if required. This is a subset of the information defined in the 410-
 943 ballots schema. In this case, it is likely that the short code for a candidate will be used for SMS voting. It is

944 possible that an expected response code will be provided as well. Both the short code and expected
 945 response code may be tailored to the individual voter as part of a security mechanism.

946 **8.10 Outgoing Generic Communication (350a)**



947

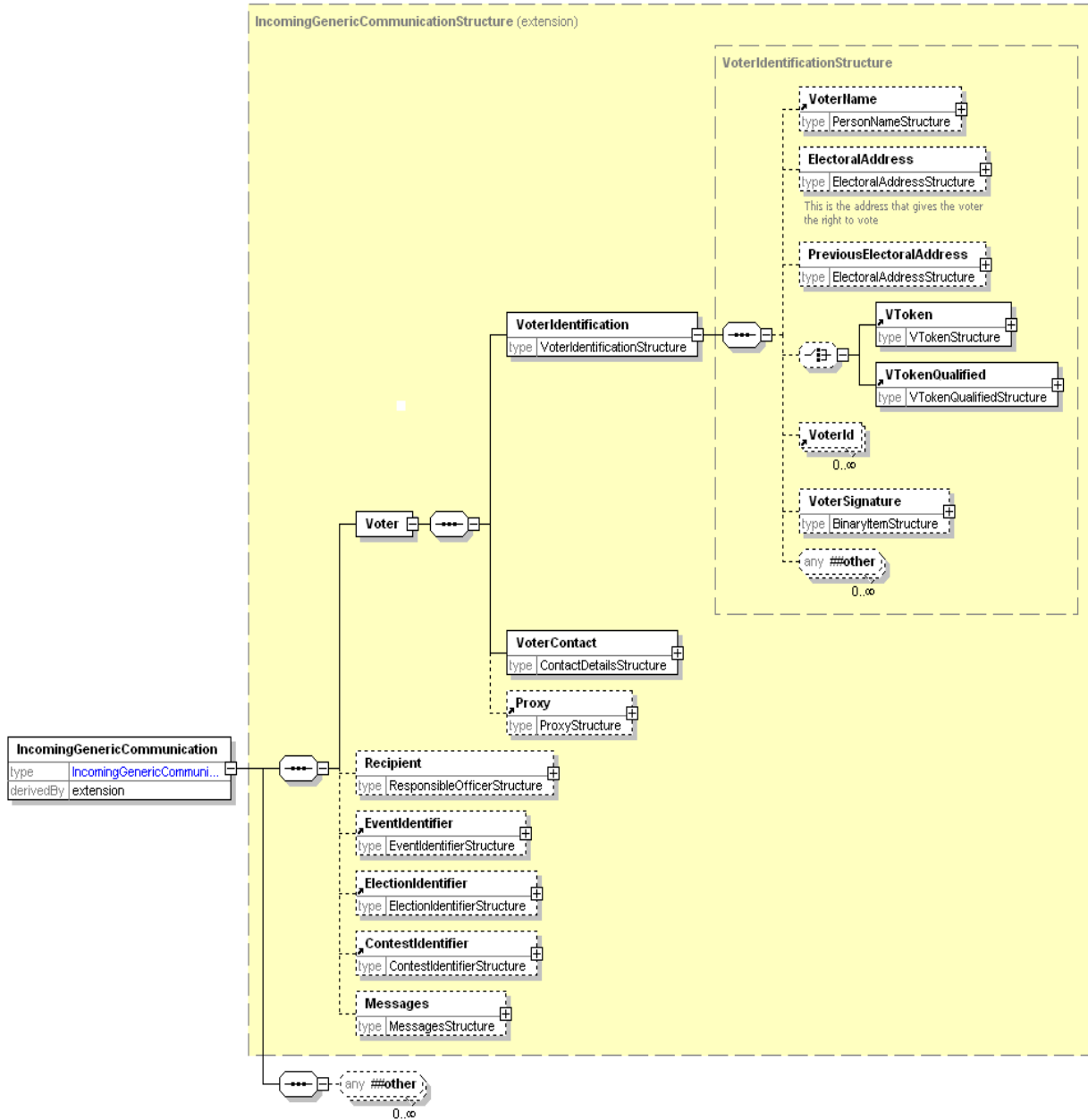
948 **8.10.1 Description of Schema**

949 This schema provides a common structure for communications to the voter. Individual message types can
 950 be designed based on extensions of this schema.

951 The voter must always provide a name and might provide one or more identifiers. These are shown as a
 952 restriction of the VoterIdentificationStructure, the restriction being to leave out the VToken and
 953 VTokenQualified. Contact details are also required, and it is expected that at least one of the allowed
 954 contact methods will be included. Inclusion of proxy information is optional.

955 The identifiers for the election event, election and contest are optional. There is then an element in which
 956 a message can be placed in any of several different formats according to the channel being used.

957 **8.11 Incoming Generic Communication (350b)**



958

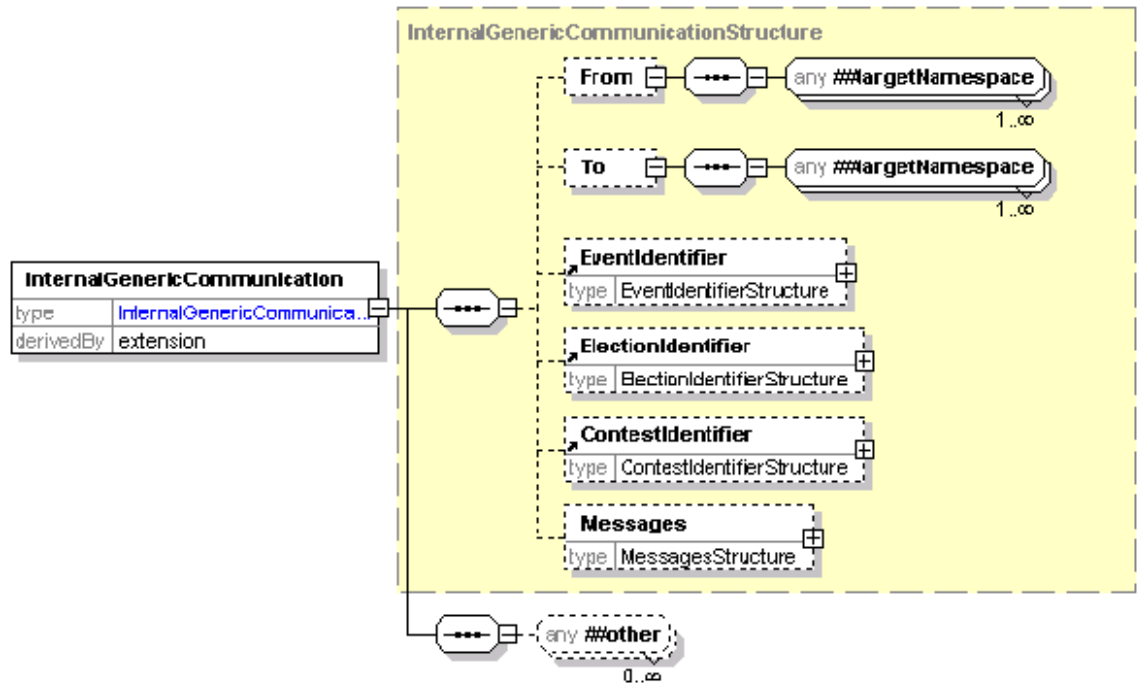
959 **8.11.1 Description of Schema**

960 This schema provides a common structure for communications from the voter. Individual message types
 961 can be designed based on extensions of this schema.

962 The voter's name must be provided and there can be one or more identifiers. These are shown as a
 963 restriction of the VoterIdentificationStructure, the restriction being to leave out the VToken and
 964 VTokenQualified. Contact details are also required, and it is expected that at least one of the allowed
 965 contact methods will be included. Inclusion of proxy information is optional.

966 The identifiers for the election event, election and contest are optional. There is then an element in which
 967 a message can be placed in any of several different formats according to the channel being used.

968 **8.12 Internal Generic (350c)**



969

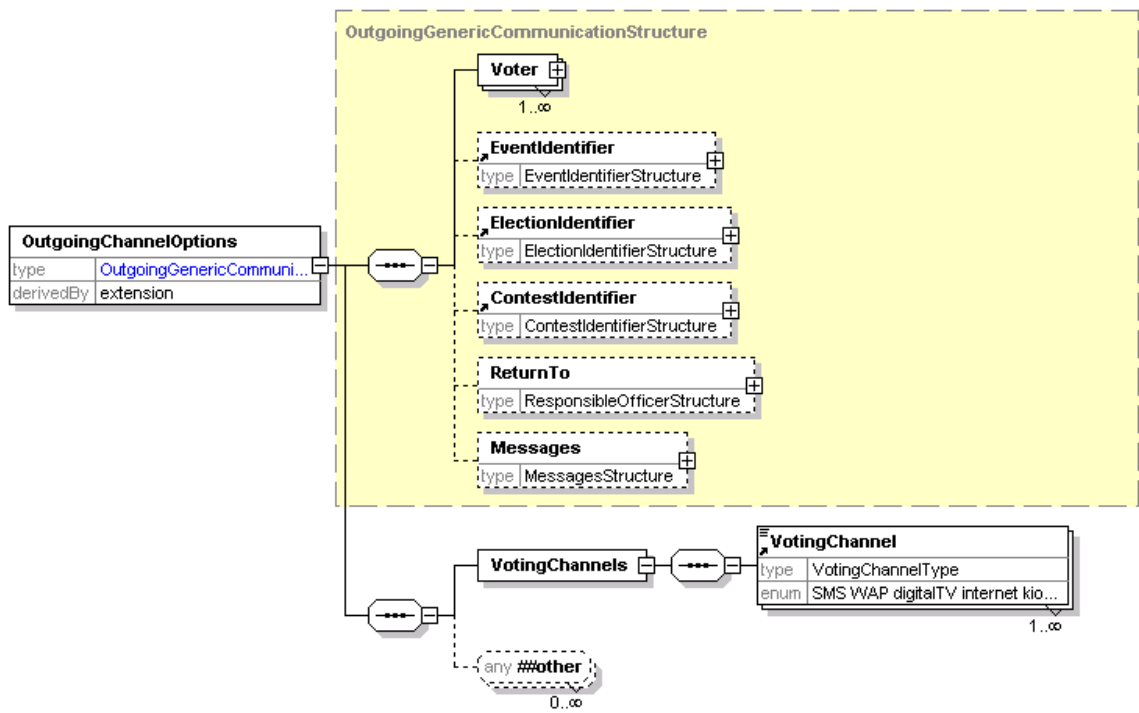
970 **8.12.1 Description of Schema**

971 This schema provides a common structure for communications between those involved in organizing an
 972 election. Individual message types can be designed based on extensions of this schema.

973 There are optional `To` and `From` elements, which can contain any EML elements. It is expected that
 974 these will usually be a responsible officer or a person's name and contact information.

975 The identifiers for the election event, election and contest are optional. There is then an element in which
 976 a message can be placed in any of several different formats according to the channel being used.

977 **8.13 Outgoing Channel Options (360a)**

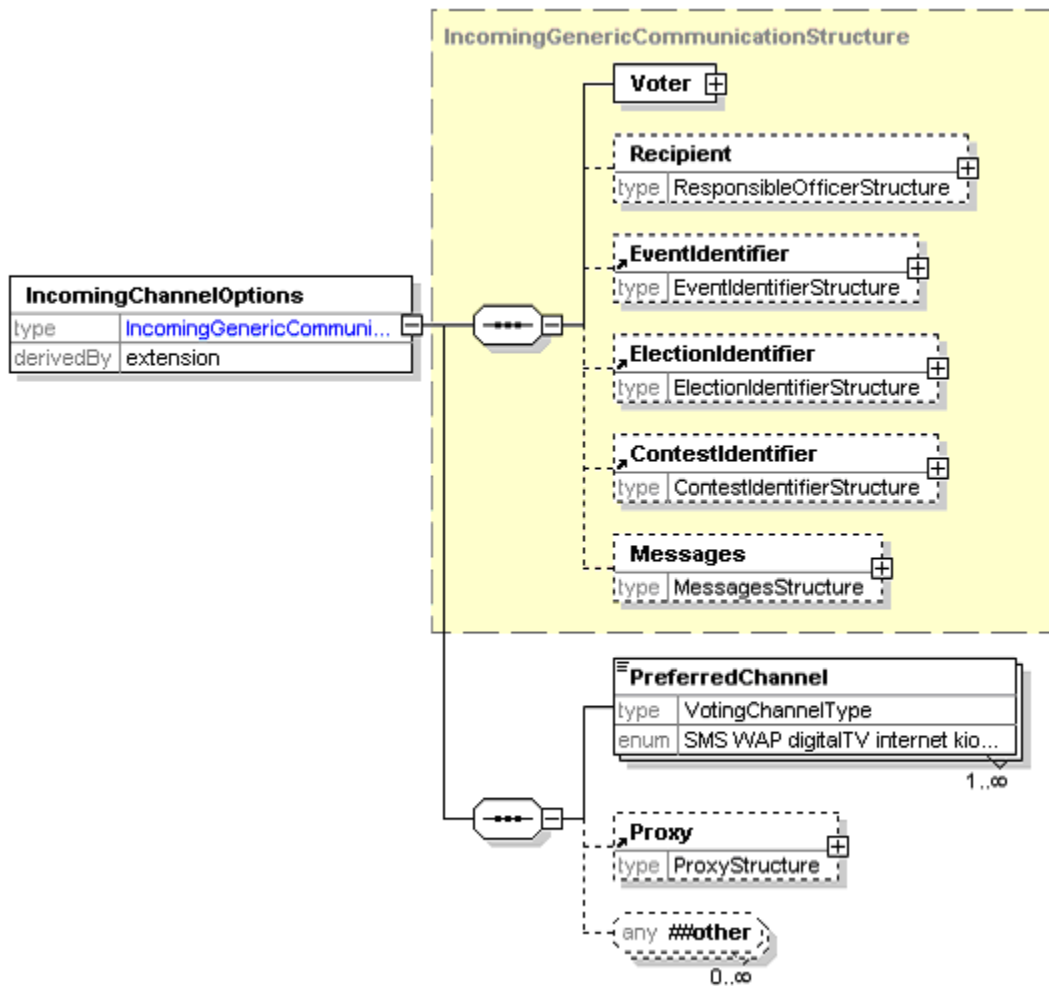


978

979 **8.13.1 Description of Schema**

980 This schema is used for messages offering a set of voting channels to the voter. It is an extension of
 981 schema 350a. A message conforming to this schema will include a list of allowed channels, either to
 982 request general preferences or for a specific election event or election within the event.

983 **8.14 Incoming Channel Options (360b)**

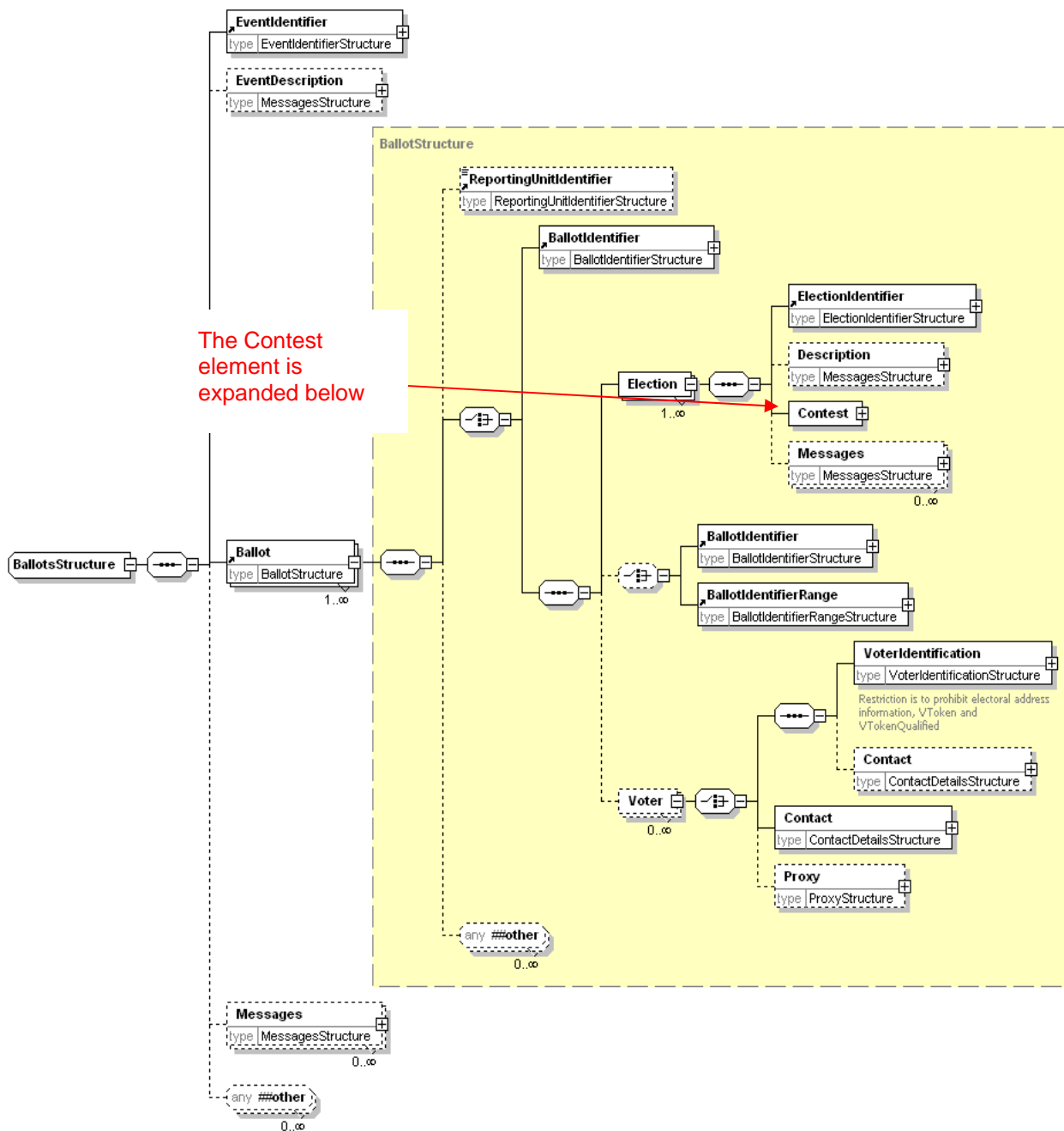


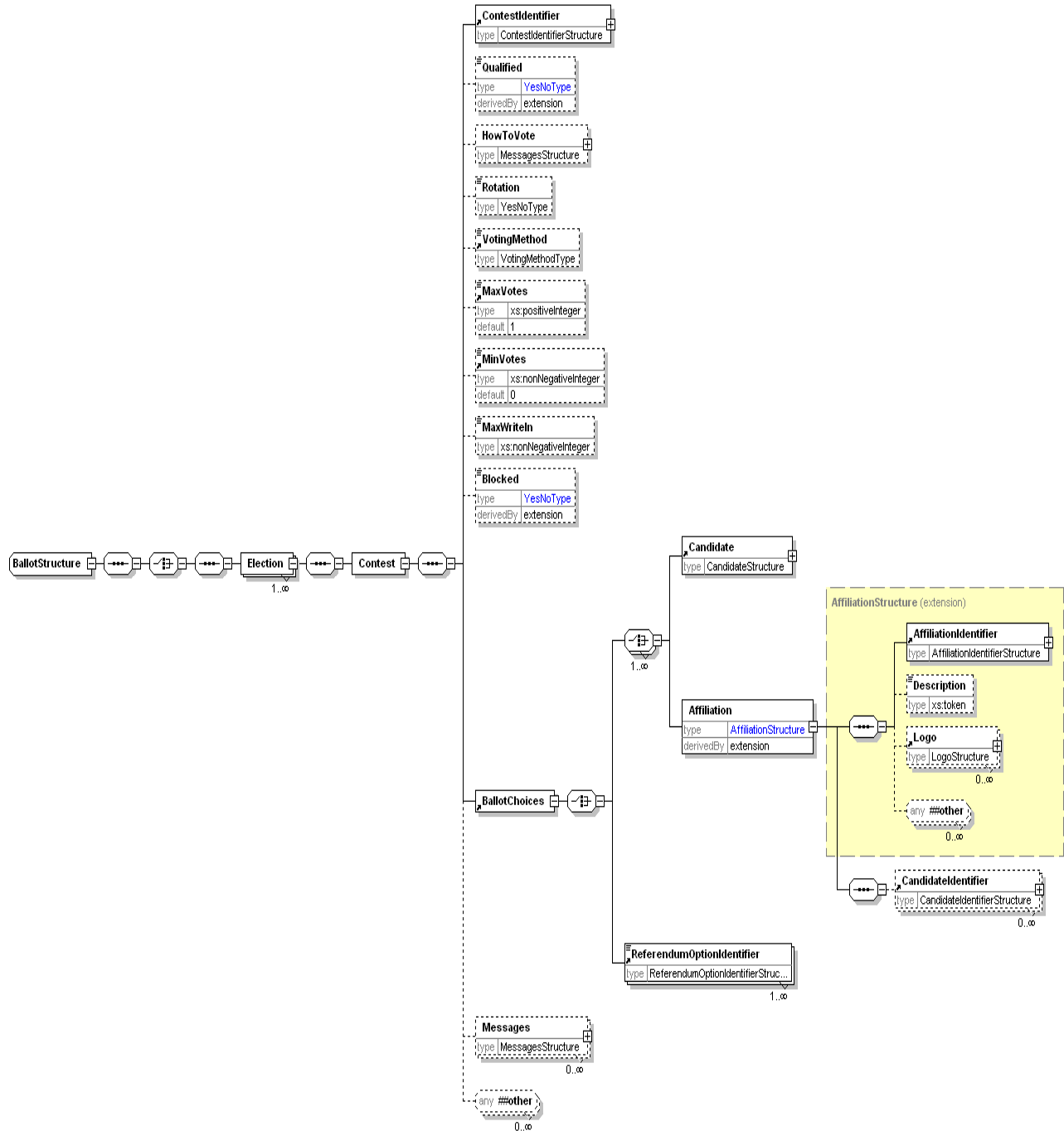
984

985 **8.14.1 Description of Schema**

986 This schema is used for messages indicating one or more preferred voting channels. It may be sent in
 987 response to 360a or as an unsolicited message if this is supported within the relevant jurisdiction.

988 It is an extension of schema 350b, and indicates preferred voting channels in order of preference.





991

Element	Attribute	Type	Use	Comment
Contest	DisplayOrder	xs:positiveInteger	optional	
	Completed	YesNoType	optional	
Qualified	Reason	xs:token	required	
Blocked	Reason	xs:token	optional	
	Channel	VotingChannelType	optional	
BallotChoices	Contested	YesNoType	optional	

992 **8.15.1 Description of Schema**

993 This schema is used for messages presenting the ballot to the voter or providing a distributor with the
994 information required to print or display multiple ballots.

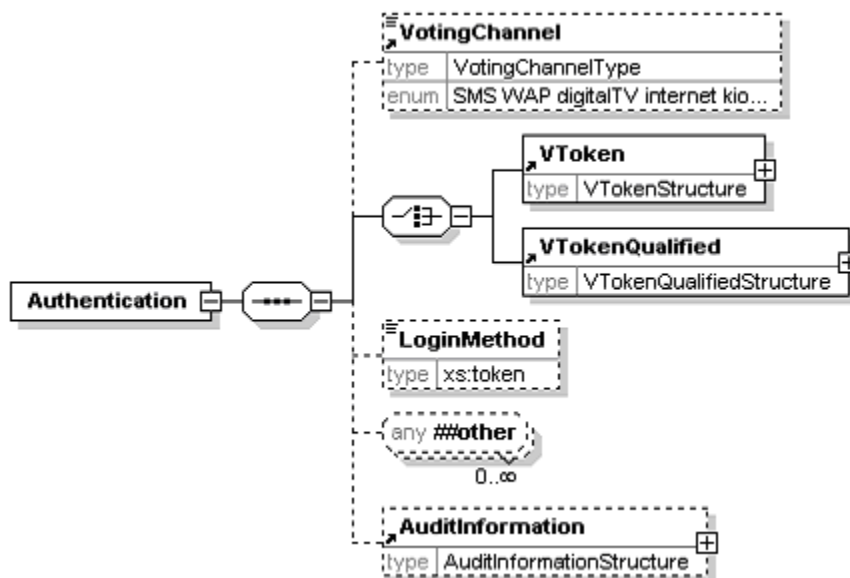
995 In the simplest case, a distributor can be sent information about the election event and a ballot ID to
996 indicate the ballot to print.

997 In other cases, the full information about the elections will be sent with either an election rule ID to identify
998 the voters to whom that election applies or a set of voter names and contact information. If the ballot is
999 being sent directly to the voter, this information is not required. Since printed ballot papers are likely to
1000 require a unique identifier printed on them, the range to be used for each ballot type can be defined.

1001 The election information starts with the election identifier and description. This is followed by information
1002 related to the contest and any other messages and information required. Note that each voter can only
1003 vote in a single contest per election, so only a single iteration of the Contest element is required.

1004 A contest must have its identifier and a list of choices for which the voter can vote. A voter can vote for a
1005 candidate, an affiliation (possibly with a list of candidates) or a referendum proposal. There is also a set of
1006 optional information that will be required in some circumstances. Some of this is for display to the voter
1007 (*HowToVote* and *Messages*) and some controls the ballot and voting process (*Rotation*,
1008 *VotingMethod*, *MaxVotes*, *MinVotes*, *MaxWriteIn*).

1009 **8.16 Authentication (420)**

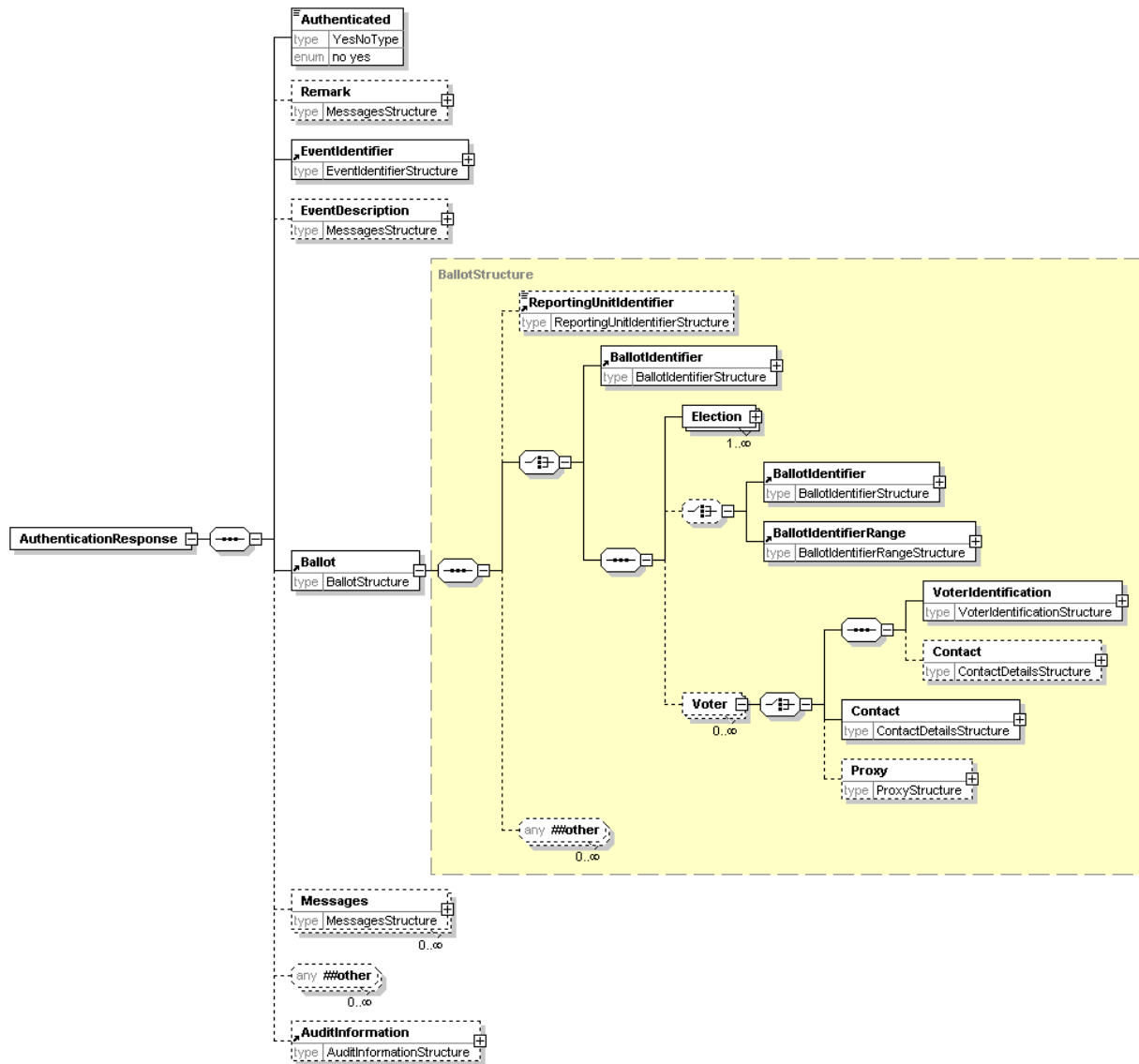


1010

1011 **8.16.1 Description of Schema**

1012 The authentication message defined by this schema may be used to authenticate a user during the voting
1013 process. Depending on the type of election, a voter's authentication may be required. The precise
1014 mechanism used may be channel and implementation specific, and can be indicated using the
1015 *LoginMethod* element. In some public elections the voter must be anonymous, in which case the prime
1016 method used for authentication is the voting token. The voting token can contain the information required
1017 to authenticate the voter's right to vote in a specific election or contest, without revealing the identity of the
1018 person voting. Either the *VToken* or the *VTokenQualified* must always be present in an authenticated
1019 message. The *VotingChannel* identifies the channel by which the voter has been authenticated.

1020 **8.17 Authentication Response (430)**



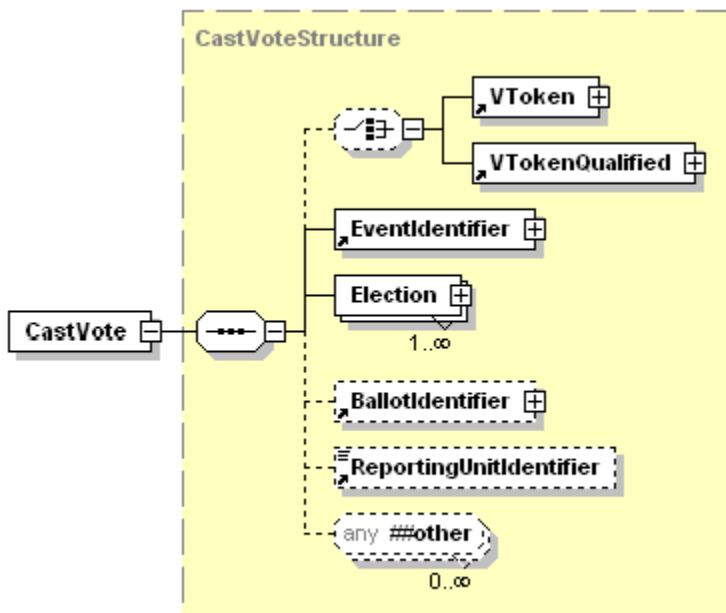
1021

Element	Attribute	Type	Use	Comment
Contest	DisplayOrder	xs:positiveInteger	optional	
	Completed	YesNoType	optional	
Qualified	Reason	xs:token	required	
Blocked	Reason	xs:token	optional	
	Channel	VotingChannelType	optional	
BallotChoices	Contested	YesNoType	optional	

1022 **8.17.1 Description of Schema**

1023 The authentication response is a response to message 420. It indicates whether authentication
 1024 succeeded using the Authenticated element, and might also present the ballot to the user. This is a
 1025 restriction of the Ballots element to allow only a single ballot per reply.

1026 **8.18 Cast Vote (440)**



1027

Element	Attribute	Type	Use	Comment
CastVote	Spoilt	xs:token	optional	
Contest	Spoilt	xs:token	optional	
Selection	Value	VotingValueType	optional	
	ShortCode	ShortCodeType	optional	
Candidate	Value	VotingValueType	optional	

1028 **8.18.1 Description of Schema**

1029 This message represents a cast vote, which comprises an optional voting token (which may be qualified)
 1030 to ensure that the vote is being cast by an authorized voter, information about the election event, each
 1031 election within the event and the vote or votes being cast in each election, an optional reference to the
 1032 ballot used, the identifier of the reporting unit if applicable and a set of optional audit information.

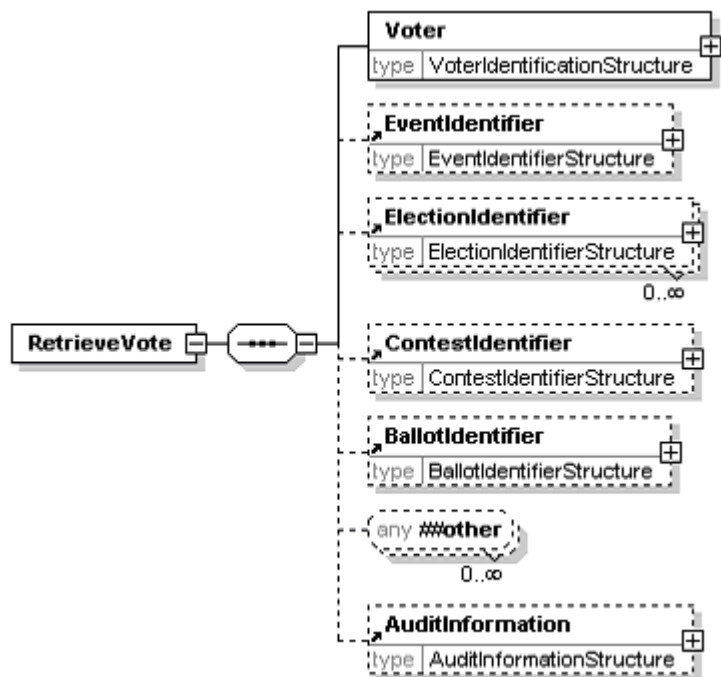
1033 For each election, the contest is identified, with a set of, possibly sealed, votes. The votes are sealed at
 1034 this level if there is a chance that the message will be divided, for example so that votes in different
 1035 elections can be counted in different locations.

1036 The selection of candidates, affiliations or a referendum option uses the Selection element. If an
 1037 election requires preferences to be expressed between candidates, multiple Selection elements will be
 1038 used, each of these having a suitable Value attribute. Some elections allow write-in candidates, and
 1039 these are handled in a similar way. Preferences can also be expressed between parties, using the
 1040 Affiliation element. The PersonalIdentifier is used in elections where each voter is given an
 1041 individual list of codes to indicate their selection.

1042 A more complex election might request the voter to vote for a party, then express a preferences of
 1043 candidates within the party. In this case, the Affiliation element is used to indicate the party
 1044 selected, and multiple CandidateIdentifier elements, each with a Value attribute are used to
 1045 express candidate preferences.

1046 Preferences in a referendum are handled in the same way as they are for candidates and parties, using
 1047 the ReferendumOptionIdentifier.

1048 **8.19 Retrieve Vote (445)**

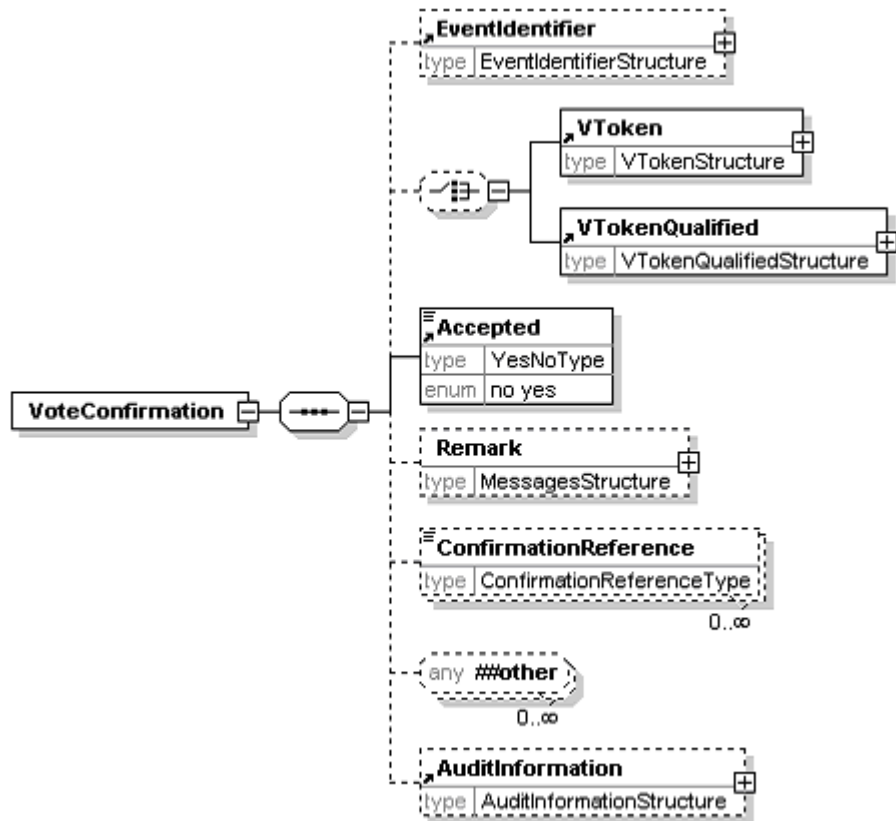


1049

1050 **8.19.1 Description of Schema**

1051 This message is used for voting systems that include a pre-ballot box from which votes can be retrieved
1052 and amended before being counted. When a vote is retrieved, it should be deleted from the pre-ballot
1053 box.

1054 **8.20 Vote Confirmation (450)**

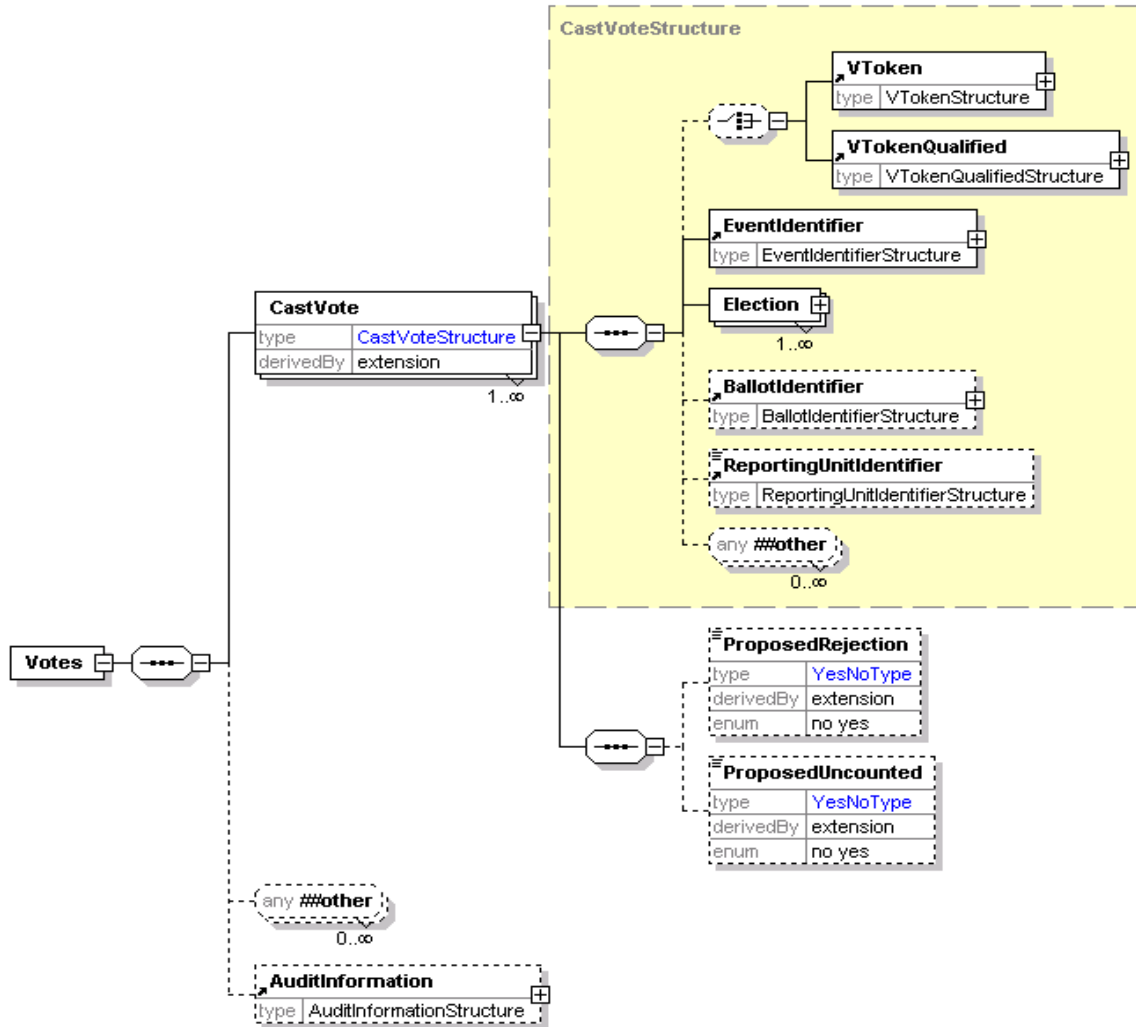


1055

1056 **8.20.1 Description of Schema**

1057 The vote confirmation message can be used to show whether a vote has been accepted and provide a
 1058 reference number in case of future queries. Some voting mechanisms require multiple
 1059 ConfirmationReference elements. If the vote is rejected, the Remark element can be used to show a
 1060 reason.

1061 **8.21 Votes (460)**



1062
1063 See 440-CastVote for the detail of the CastVoteStructure.

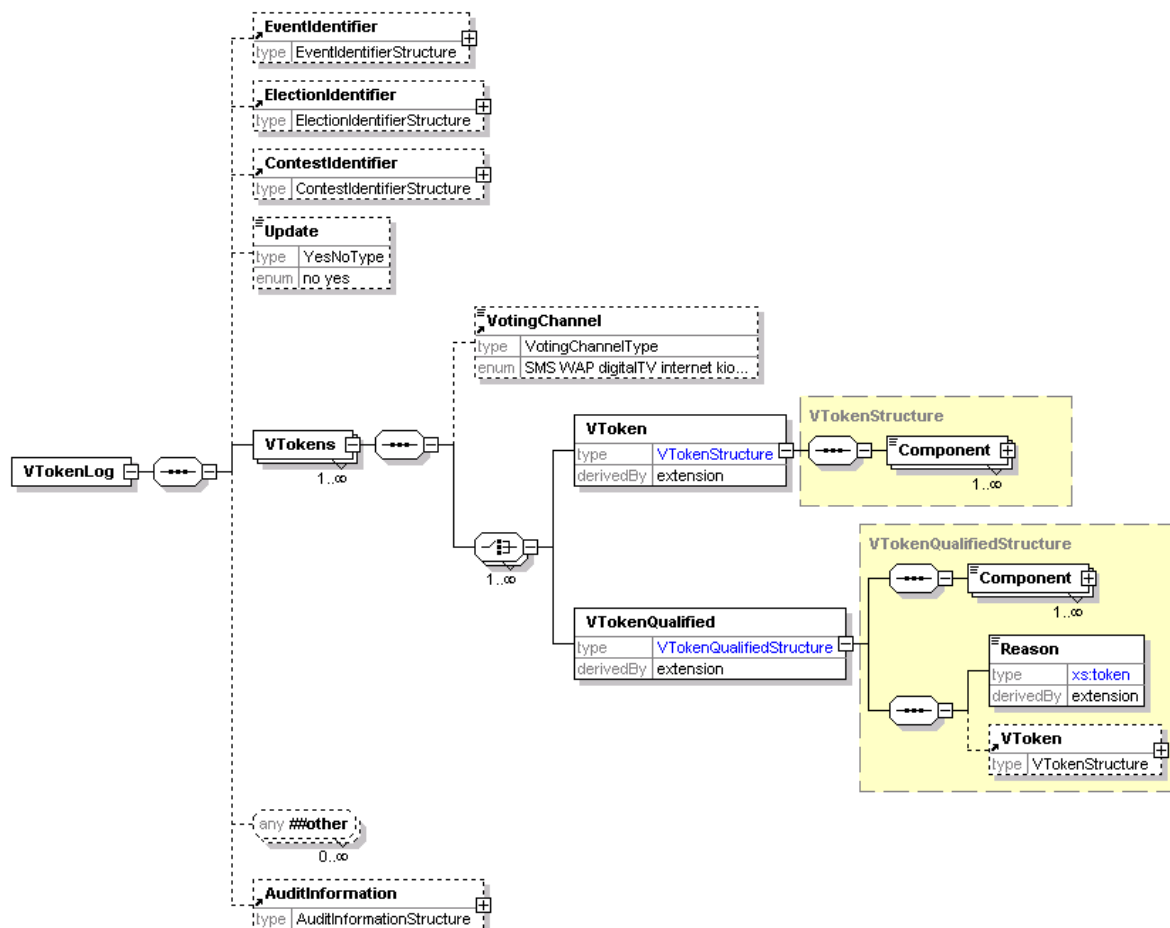
Element	Attribute	Type	Use	Comment
CastVote	Spoilt	xs:token	optional	
Contest	Spoilt	xs:token	optional	
Selection	Value	VotingValueType	optional	
	ShortCode	ShortCodeType	optional	
Candidate	Value	VotingValueType	optional	
ProposedRejection	Reason	xs:token	optional	
	ReasonCode	xs:token	required	
	Objection	YesNoType	optional	
ProposedUncounted	Reason	xs:token	optional	
	ReasonCode	xs:token	required	
	Objection	YesNoType	optional	

1064 **8.21.1 Description of Schema**

1065 This schema is used to define a message comprising a set of votes being transferred for counting. It is a
1066 set of CastVote elements from schema 440 with the addition of the ProposedRejection and
1067 ProposedUncounted elements and audit information for the voting system. If a vote is rejected, for
1068 example, because a voter has chosen to spoil a ballot paper, many authorities will want to count that vote

1069 as having been cast. The `UncountedVotes` element is reserved for those cases where that record is not
 1070 required, for example when the result is thought to be fraudulent. A `ProposedRejection` or
 1071 `ProposedUncounted` element must have a `ReasonCode` attribute, and may have a `Reason` attribute to
 1072 describe the code. They may also have an `Objection` attribute. This indicates that someone has
 1073 objected to this vote being rejected or the proposal that it should not be counted.

1074 8.22 VToken Log (470)

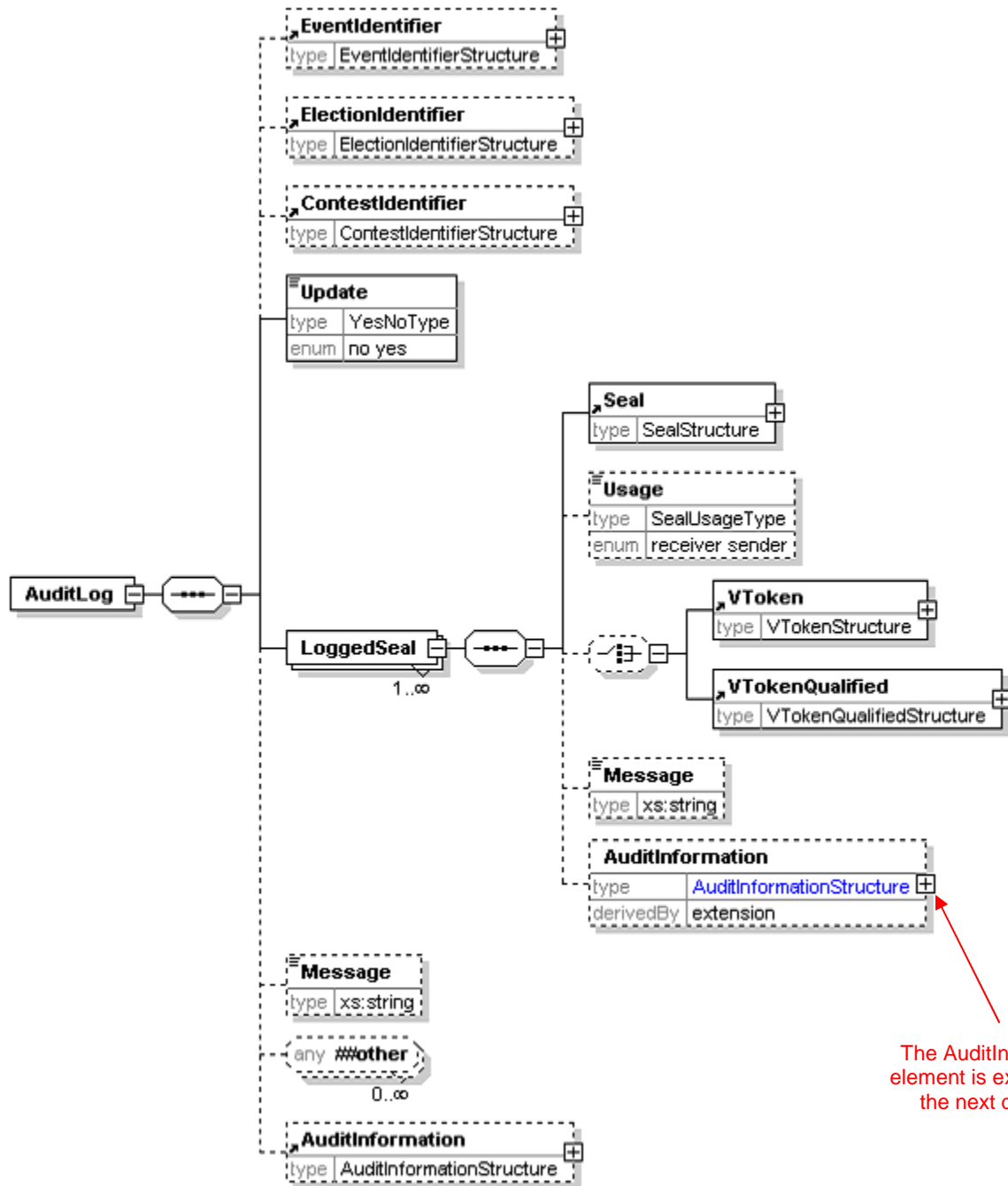


1075

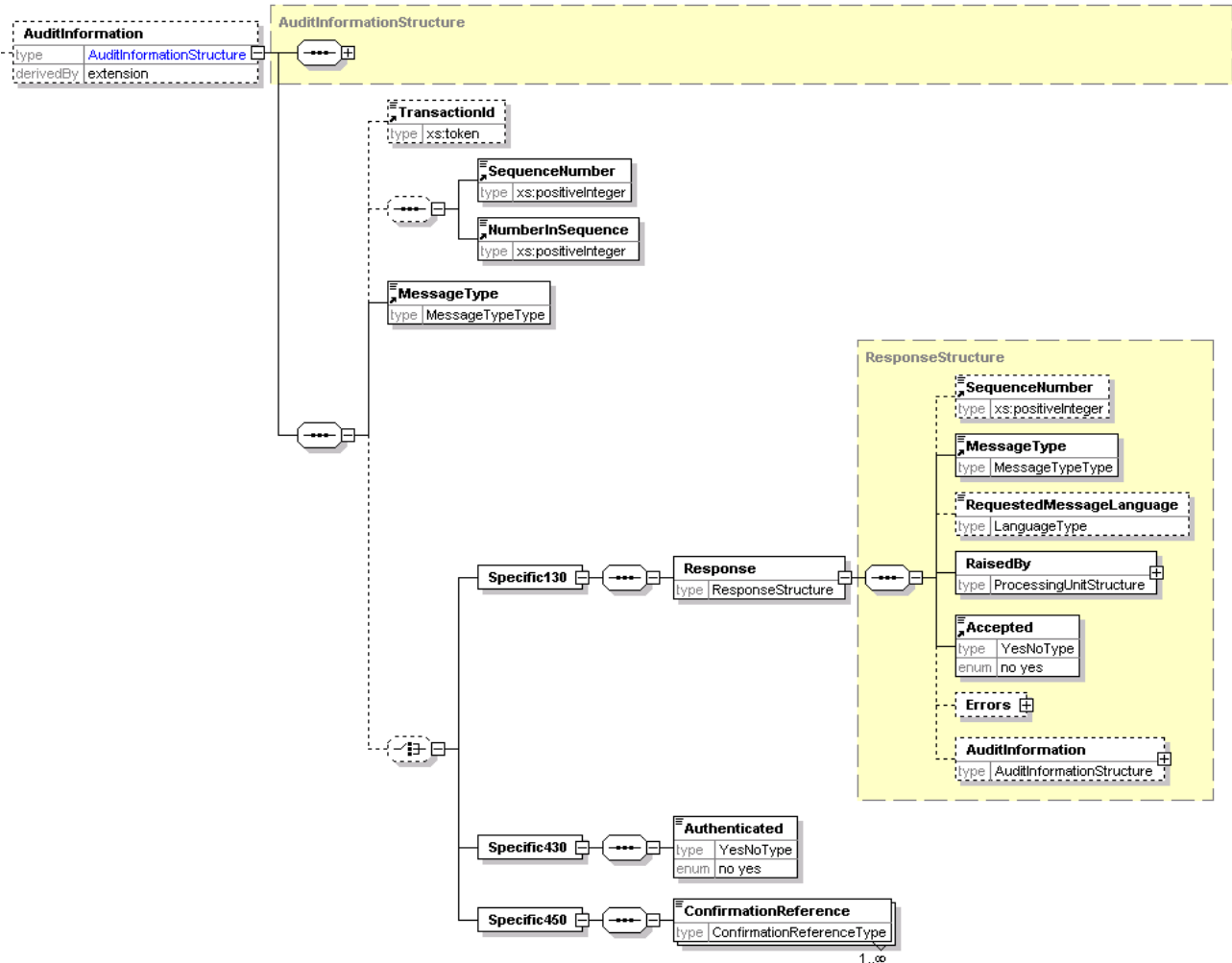
Element	Attribute	Type	Use	Comment
VToken	Status	xs:token (restricted)	required	
VTokenQualified	Status	xs:token (restricted)	required	

1076 8.22.1 Description of Schema

1077 The message defined by this schema is used to add voting tokens (which may be qualified) to an audit
 1078 log. The `VToken` or `VTokenQualified` is extended by the addition of a `Status` attribute with a value of
 1079 voted or unvoted for the `VToken` and voted, unvoted and withdrawn for the `VTokenQualified`. In
 1080 addition to sending single tokens as they are used, the schema can be used to validate a message
 1081 sending multiple tokens optionally grouped by voting channel. This might be used instead of sending
 1082 tokens as they used or, for example, to send the unused tokens at the end of an election. The `Update`
 1083 element can be used to indicate that an existing log is being updated rather than the message containing
 1084 a complete new log. The logging system can also be identified for audit purposes.



The AuditInformation element is expanded in the next diagram



1087

1088 **8.23.1 Description of Schema**

1089 The message defined by this schema is used to log the use of each seal with associated information for
 1090 audit purposes.

1091 An audit log message can be transmitted individually as the message causing the log entry is sent or
 1092 received, or the logs can be stored, and several seals logged at once. Ideally, every device that can
 1093 create or consume a message will create a log entry so that pairs of entries can be matched. The most
 1094 important messages to log are those associated with the voting process itself, and these are shown
 1095 below.

1096 When used in this message, the *Response* element will not have an *AuditInformation* child.

	<i>Originating Device</i>	<i>Gateway</i>	<i>Voting System</i>	<i>Counting System</i>	<i>Vtoken Logging System</i>	<i>Seal Logging System</i>	<i>Other</i>	<i>Notes</i>
130								4
410	next receiver	receiver	sender					
420	previous sender	sender	receiver					
430	next receiver	receiver	sender				sender / receiver	3
440	previous sender	sender	receiver					
445	previous sender	sender	receiver					
450	next receiver	receiver	sender					
460			sender	receiver				
470			sender	sender	receiver		sender	
480	sender	sender	sender	sender	sender	receiver	sender	2
510				sender			receiver	
520				sender			sender / receiver	

Notes:

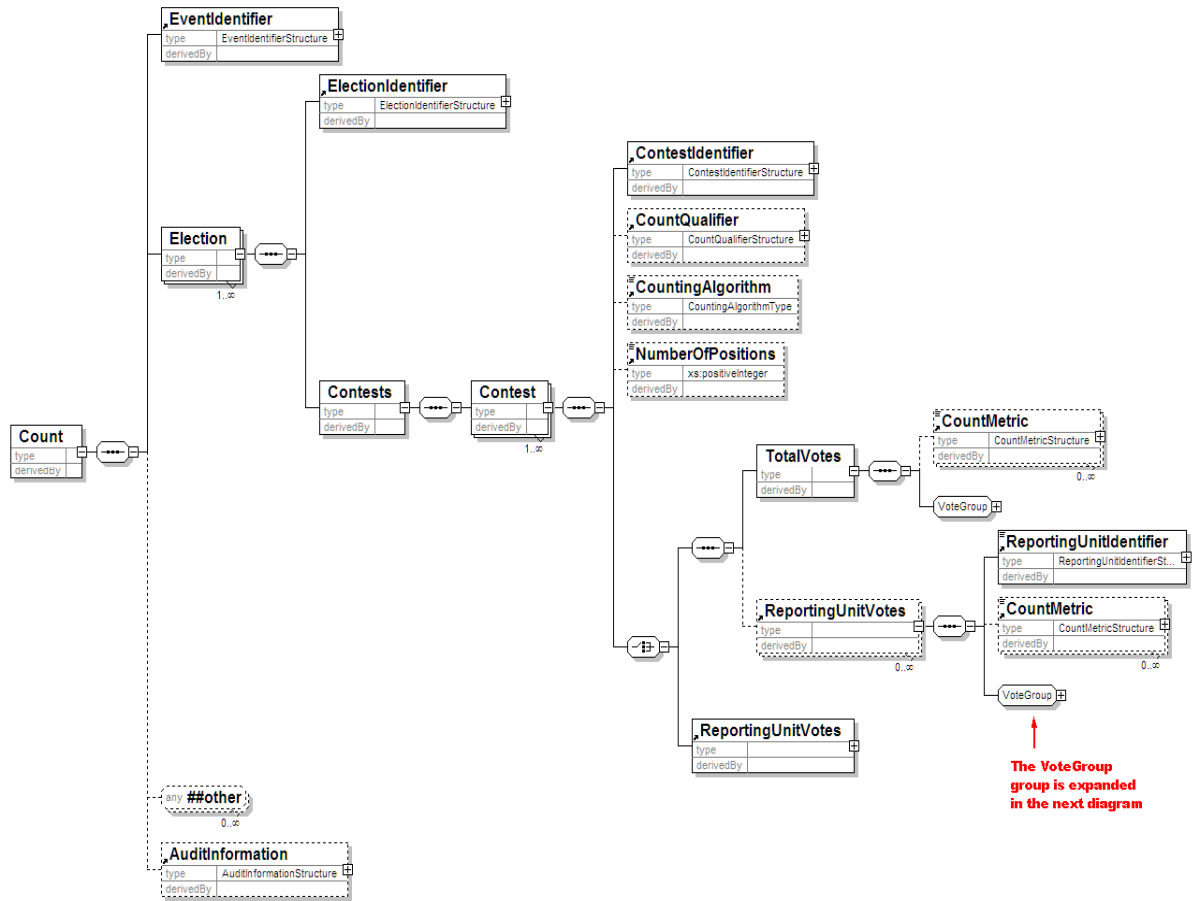
1. In some cases (e.g. a kiosk) there may be no gateway involved. In this case, the values in the Gateway column apply to the Originating Device.
2. Creators and receivers of 480 (audit log) messages may not be required to log the seals. In particular, if an audit log message is sent per seal created or received, the seal on the 480 message must not be logged.
- 3 "Other" may be the sender when the message is sent to a printer. In this case, the receiver will also be an "Other".
4. An audit log should only be created when the message is used to communicate an error. Most devices can send or receive 130 messages.

1097

1098 The message may contain the name and ID of the event, election and contest. It can also indicate
 1099 whether this is an update to an existing log or a new log. Following the logged seals, a text message can
 1100 be added as well as audit information for the audit logging message itself.

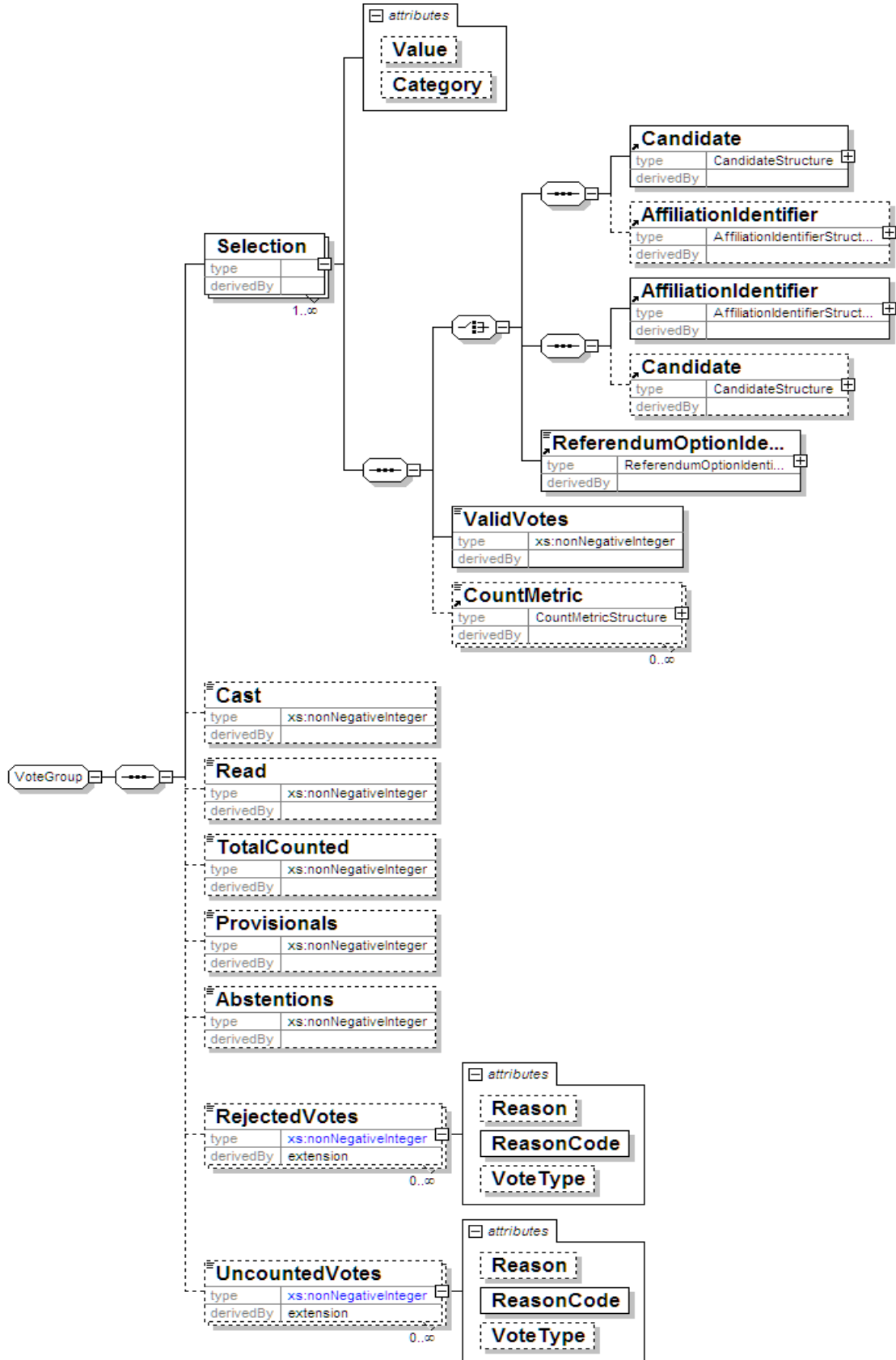
1101 Each seal being logged must indicate whether the device sending the log was the sender or receiver of
 1102 the sealed message. It may be accompanied by the voting token associated with the seal and possibly
 1103 additional audit information. This will be the audit information from the message being logged with
 1104 additional information about the message. Most of this is common to all message types, but some
 1105 message types require specific audit information. One of these is the 130-response message. When this
 1106 is used to convey an error, almost the complete message payload (the `Response` element and its
 1107 contents apart from the audit information) is logged with the usual message-independent data.

1108 **8.24 Count (510)**



The VoteGroup group is expanded in the next diagram

1109



Element	Attribute	Type	Use	Comment
Selection	Value	VotingValueType	optional	
RejectedVotes	Reason	xs:token	optional	
	ReasonCode	xs:token	required	
UncountedVotes	Reason	xs:token	optional	
	ReasonCode	xs:token	required	

1111 8.24.1 Description of Schema

1112 The count message defined by this schema is used to communicate the results of one or more contests
1113 that make up one or more elections within an election event. It may also be used to communicate the
1114 count of a single reporting unit for amalgamation into a complete count.

1115 The message includes the election event identifier, and for each election, the election identifier, an
1116 optional reference to the election rule being used and information concerning the set of contests.

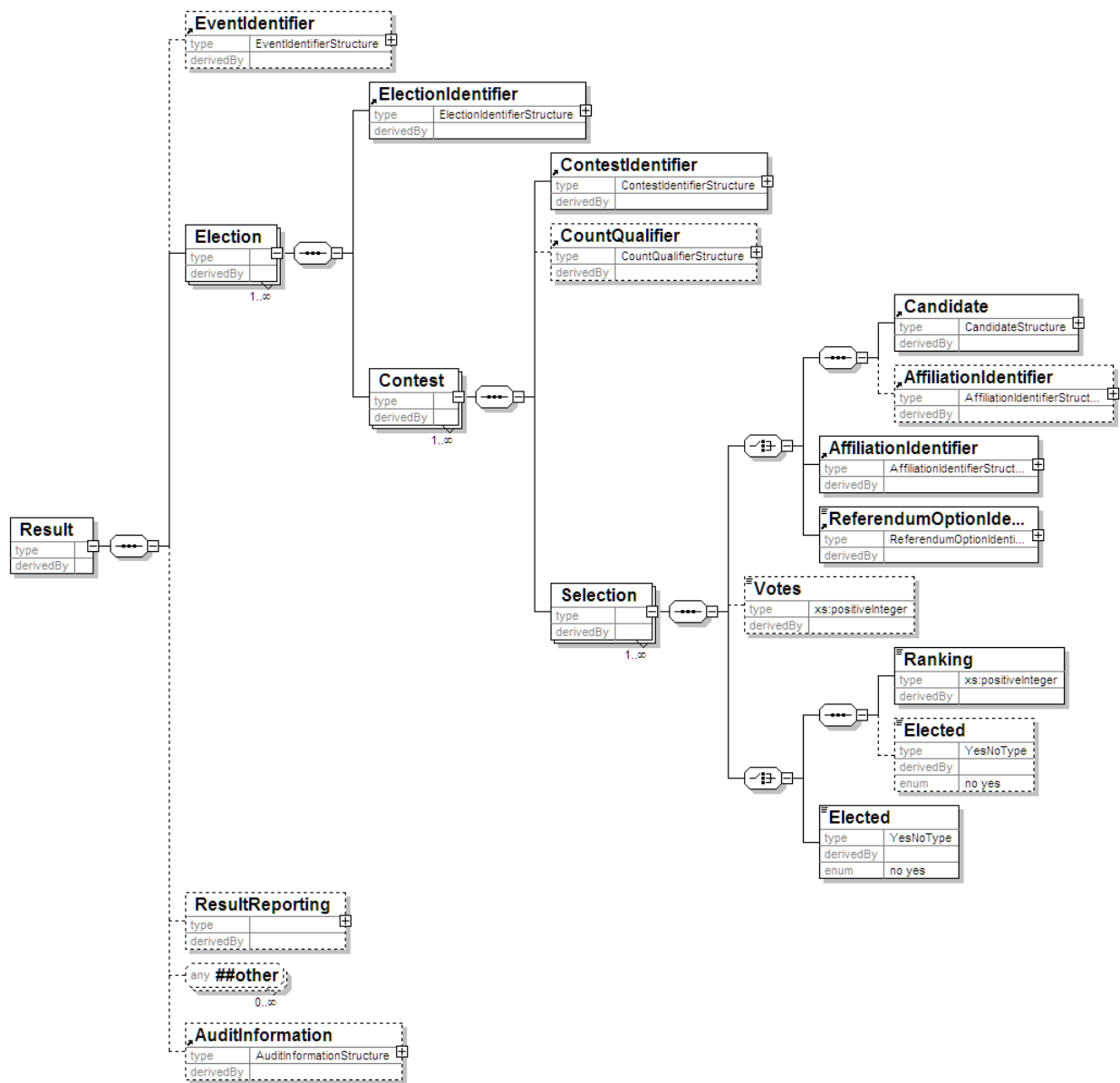
1117 In some cases, reporting for a contest may be required at a lower level (for example, for each county in a
1118 state). For this reason, reporting may be done at the level of the reporting unit, the total votes, or for a
1119 total vote and the breakdown according to the multiple reporting units.

1120 Each contest indicates its identifier, and optionally the counting system and the maximum number of
1121 votes that each voter could cast. The key information is that about the votes cast for each of the choices
1122 available and the numbers of abstentions and rejected and uncounted votes. If a vote is rejected, for
1123 example, because a voter has chosen to spoil a ballot paper, many authorities will want to count that vote
1124 as having been cast. The `UncountedVotes` element is reserved for those cases where that record is not
1125 required, for example when the result is thought to be fraudulent. Both the `UncountedVotes` and
1126 `RejectedVotes` elements have `Reason` (optional) and `ReasonCode` (mandatory) attributes to indicate
1127 why the votes were treated as they have been. The former is a textual description, and the latter a code.

1128 For each choice available to the voter, the identifier and number of valid votes are mandatory. The other
1129 information provided depends on the type of election. For example, the `Value` attribute of the `Selection`
1130 element can be used to indicate whether a candidate was a first or second choice in an election run under
1131 the single transferable vote system. In the simplest cases, the identifier for the candidate (perhaps with
1132 the party), the party or the referendum option is given. If the voter was able to vote for a party and provide
1133 a preference for candidates within the party, the `AffiliationIdentifier` element is used, and multiple
1134 `CandidateIdentifier` elements may be used, each with a `Count` attribute. This count is the result of
1135 whatever algorithm has been used to calculate the ranking of the candidates.

1136 This schema allows for Simulation and Extrapolation of Counts and subsequently Results. Simulation
1137 being the facility to forecast the result of a contest based on the result of another contest. Extrapolation is
1138 the facility to forecast the final result of a contest based on the count so far.

1139 **8.25 Result (520)**



1140

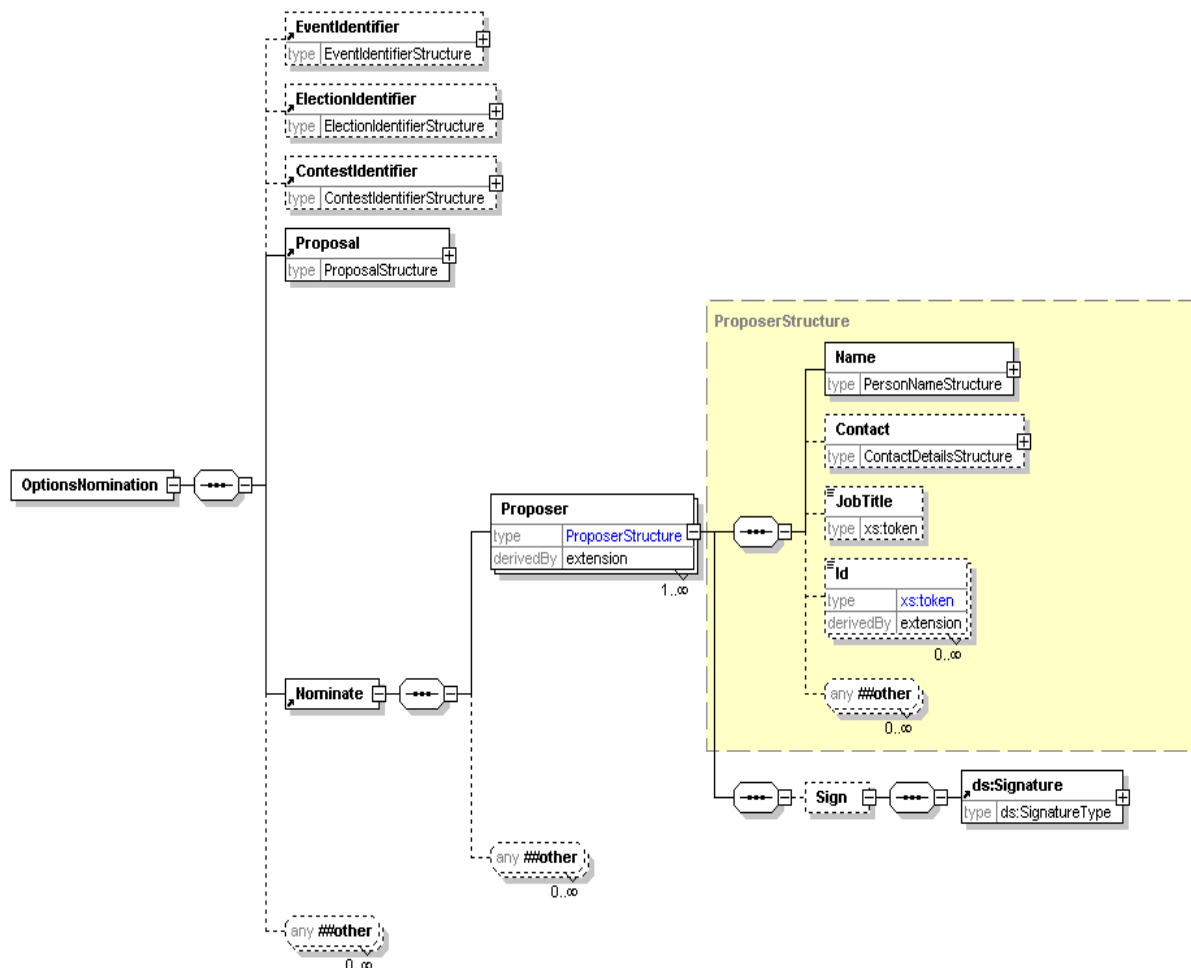
1141 **8.25.1 Description of Schema**

1142 Messages described by this schema can be used to communicate the results of simple election types.
 1143 One specific use is to provide an input into the calculation algorithm for elections using the additional
 1144 member system.

1145 The main part of the schema is held within the `Selection` element. This allows a choice of candidate,
 1146 affiliation or referendum option identifiers to be defined with the position that choice achieved (first,
 1147 second etc). Optionally, the number of votes can be shown. A candidate can be associated with his or her
 1148 affiliation if required. Write in candidates will be shown in the same way as other candidates, although
 1149 they will only have an `Id` attribute if this is assigned in the election system after the votes are cast.

1150 This schema allows for Simulation and Extrapolation of Results using data from Counts. Simulation being
 1151 the facility to forecast the result of a contest based on the result of another contest. Extrapolation is the
 1152 facility to forecast the final result of a contest based on the count so far.

1153 **8.26 Options Nomination (610)**

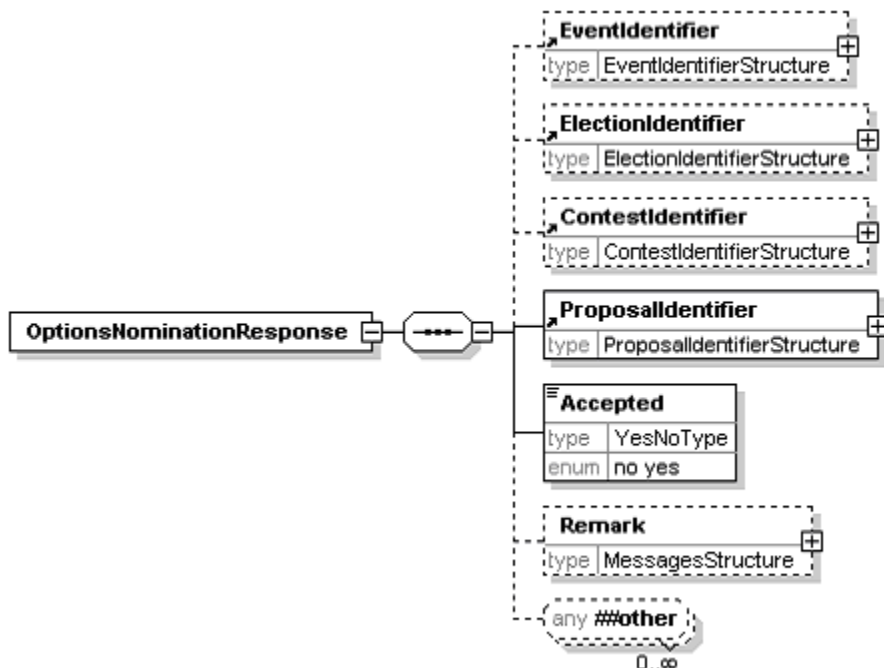


1154

1155 **8.26.1 Description of Schema**

1156 This schema is used to submit proposals, for example for a referendum or company AGM. It uses the
 1157 generic Proposal element to define the proposal itself. One of more proposers can be named and may
 1158 sign the nomination.

1159 **8.27 Options Nomination Response (620)**



1160

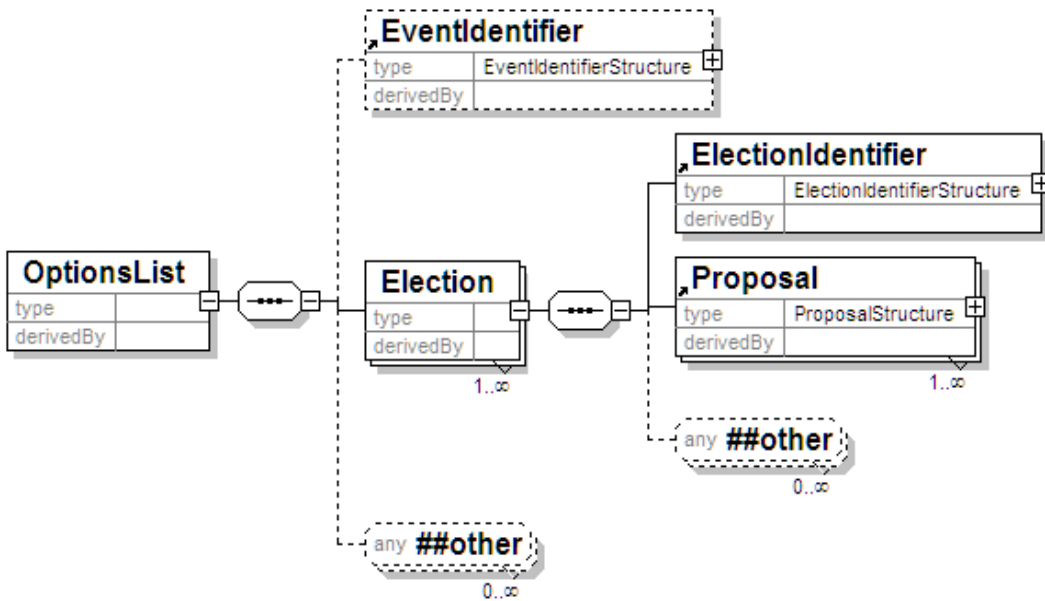
1161 **8.27.1 Description of Schema**

1162 This message is sent from the election organiser to the proposer to say whether the nomination has been
 1163 accepted. Along with the acceptance information and the basic information of election, contest and
 1164 identifier for the proposal, a remark can be made explaining the decision.

1165 **8.27.2 EML Additional Rules**

Error Code	Error Description
3620-001	If the nomination has not been accepted, a reason for rejection is required in the Remark element

1166 **8.28 Options List (630)**



1167

1168 **8.28.1 Description of Schema**

1169 This schema is used for messages transferring lists of proposals for a referendum. It may identify the
 1170 election event, and provides details about the election. Each proposal in a referendum counts as an
 1171 election, so each election identified will hold a single proposal.

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1187