Abstract: This standard specifies two data interchange formats for reporting and containing election results data exported from voting systems used for managing elections and tabulating election results. It allows for reporting on information known in advance about the election, for reporting election night results, and for reporting on updates and certified results from the post-election canvass. It can be used for reporting election results from distributed voting places to central offices of the county or state, and from county or state offices to news media and the general public. The electronic formats can also be used as a basic export of election information from an election management system (EMS) and for combining election data from different EMSs or transferring election data between EMSs.

This standard includes a data model in UML (Unified Modeling Language) that itemizes and defines the data involved in election management and election results reporting, and specifies two concrete data formats that can be used to import and export data from voting systems:

- XML (extensible markup language), and
- JSON (JavaScript Object Notation).

Keywords: ballot style, candidate, contest, EAC, district, EMS, FWAB, geo-political, JSON, jurisdiction, overvote, precinct, UML, undervote, UOCAVA, VRDB, XML
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Introduction

This standard specifies an XML (eXtensible Markup Language) format and a JSON (JavaScript Object Notation) example for exporting election and election results data from voting systems used for managing elections and tabulating election results. It allows for reporting on information known in advance about the election, for reporting election night results, and for reporting on updates and certified results from the post-election canvass. It can be used for reporting election results from distributed voting places to central offices of the county or state, and from county or state offices to news media and the general public. The electronic formats can also be used as a basic export of election information from an election management system (EMS) and for combining election data from different EMSs or transferring election data between EMSs.

This standard includes a data model in UML (Unified Modeling Language) that itemizes and defines the data involved in election management and election results reporting. It also includes the following data formats that can be used to export data from voting systems:

- An XML schema, and
- A JSON implementation example.

The primary features of this standard include:

- Major data elements and their attributes and associations with each other are fully defined as part of the data model.
- The data model can be used to generate data formats for today’s voting systems as well as for election systems to be developed.
- Election data and results can be reported at flexible levels from highly aggregated to very detailed.
- Detailed reporting includes by device types, by types of ballot, and down to various geo-political geographies including precinct, split-precinct, and by specific equipment.
- Geo-political geography can be specified in a flexible manner that will accommodate most or all states and jurisdictions reporting structures.
- Major elements such as for contests, geo-political units, and parties include multiple identifiers so as to support a future guideline on uniform codes for election objects.
- Detailed instructions for implementation and use of the formats are included.
- Accommodations for various non-standard features of elections have been made, e.g., ballot fusion.
- Relevant data elements required in the EAC (Election Assistance Commission) survey are included to make it easier to report statistical information.

This standard is part of a series of standards being written by the IEEE VSSC/1622 (Voting System Standards Committee), which envisions a common data format for use by voting equipment, derived from a comprehensive election data model.
Draft Standard for Election Results Reporting Data Interchange Format

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1. Overview

1.1 Scope

This standard specifies an XML (eXtensible Markup Language) format and a JSON (JavaScript Object Notation) example for exporting election and election results data from voting systems used for managing elections and tabulating election results. It allows for reporting on information known in advance about the election, for reporting election night results, and for reporting on updates and certified results from the post-election canvass. It can be used for reporting election results from distributed voting places to central offices of the county or state, and from county or state offices to news media and the general public. The electronic formats can also be used as a basic export of election information from an election management system (EMS) and for combining election data from different EMSs or transferring election data between EMSs.

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The data model can be used to generate data formats for today’s voting systems as well as for election systems to be developed.

Election data and results can be reported at flexible levels from highly aggregated to very detailed.

Detailed reporting includes by device types, by types of ballot, and down to various geo-political geographies including precinct, split-precinct, and by specific equipment.

Geo-political units of geography can be specified in a flexible manner that will accommodate most or all states and jurisdictions reporting structures.

Major elements such as for contests, geo-political units, and parties include multiple identifiers so as to support a future guideline on uniform codes for election objects.

Detailed instructions for implementation and use of the formats are included.

Accommodations for various non-standard features of elections have been made, e.g., ballot fusion.

Relevant data elements required in the EAC (Election Assistance Commission) survey are included to make it easier to report statistical information.

This standard is part of a series of standards being written by the IEEE VSSC/1622 (Voting System Standards Committee), which envisions a common data format for use by voting equipment and systems, derived from a comprehensive election data model.

1.2 Purpose

The purpose of this standard is to provide common data interchange formats for reporting election results that manufacturers of voting equipment can integrate into their product lines and for which election offices, the media and other groups can develop or procure to facilitate their own reporting and analysis of election results.

Advantages of using this standard include:

Election results can be reported directly from election offices in this format regardless of voting systems manufacturer.

The need for custom software and custom reporting formats can be greatly reduced or made less expensive.

Jurisdictions that use multiple versions of EMSs and tabulators can more easily combine the results into one report and transfer information between systems.

Jurisdictions can name election objects (i.e., contests, units of geo-political geography) according to local, state, and national-level schemes to achieve greater uniformity in naming.

Potential improvements in the usability and accuracy of election reconciliations, audits, and analysis can be realized.

Consistency in election results reports across different voting systems will make reporting on election performance, e.g., for the EAC election survey and other election analyses, easier and more accurate.

1.3 Audience

The intended audience of this standard includes election officials, manufacturers and developers, as well as others in the election community and the general public. Election results reporting is deceptively complex, thus some background in election administration is useful in understanding the material in this standard. The standard also includes appropriate overview information where deemed useful.
1.4 Motivation and methodology for this standard

The IEEE VSSC was motivated to develop this standard primarily to reduce the inherent complexity for election officials in collecting election results and publishing them, especially on election night when time frames are tight and there are more opportunities for error and a greater need for automation. The process of reporting election results is a highly complicated activity that occurs over several different time frames and in multiple scenarios. The equipment involved and data produced often do not interoperate, adding more complexity to the process. Additionally, there are sometimes significant variations among different jurisdictions within a state as well among the states themselves in the way they perform election results reporting.

These complexities made it necessary for the VSSC to work with a community of election officials, analysts, and voting system manufacturers to analyze different reporting scenarios and their associated geo-political geographies throughout the United States, to analyze existing voting systems and how equipment in the future may operate, as well as to analyze how election results are themselves typically studied and used post-election. This resulted in the following three-step process:

— Development of three use cases for election reporting activities that correspond to the different time frames and reporting scenarios:

1) Pre-election – describes election data that is known ahead of the election; basically an export from an EMS of the contests, candidates, ballot initiatives, information about offices, and the geo-political geographies associated with the reporting jurisdiction.

2) Election night – addresses reporting of election results to varying levels of detail. The results can be summarized by contest and jurisdiction or broken down by individual reporting units such as precincts. The reports can be formatted in various ways, including as updates or corrections to previous reports, or as internal intermediate reports within a state or county.

3) Post-election – addresses updates and the final results compiled during the post-election canvass.

— Development of high-level requirements based on these use cases, and subsequent development of an election results data model that represents the requirements and defines how the election results data are optimally associated and organized.

— Lastly, generation of concrete data formats (in XML and JSON) from the model for reporting election results.

The advantages of using a UML data model include that the model is independent of a concrete format; if changes are needed to the format, one can make changes to the model and generate or derive a new version of the format using commercial products. Thus, the XML and JSON formats were generated from and follow closely the UML model. Both formats were chosen for this standard primarily because they are already in use in some states and supported by some EMSs.

1.5 Document overview

Clauses 1 through 3 deal with basic introductory material, references, definitions, and abbreviations. Clause 4 contains conformance clause information regarding which material in the standard is normative (required) or informative. Annex A contains useful references for related information about election results reporting.

Clause 5 contains an overview of the three use cases for election results reporting as well as the high-level requirements derived from them. Clause 6 describes the UML data model, which contains full documentation of the model and overviews from the perspective of each use case (so as to show readers how to understand and use the model).

One of the most complicated aspects of election results reporting is understanding and dealing with geo-political units of geography and how they are structured differently across states and jurisdictions. To assist
readers who may have less background in election administration, Annex B includes an overview of geo-political geographies, describing how they overlay each other and how results are tied to them. Annex B is also useful in understanding aspects of the UML data model and the XML and JSON formats, which are described in Annexes C and D.

The document should be read in the following order:

1. Annex B’s overview of geo-political geography.
2. The use cases in Clause 5.
3. The data model and overviews by use case in Clause 6.
4. The XML and JSON implementation example of the data model in Annexes C and D.

Readers will need to refer to the definitions found in Clause 3. Annex D includes other files associated with this standard:

1. The JSON implementation example.
2. The 1622.2 XML schema included with this standard.
3. The UML model in UML’s interchange format (XMI).
4. An XML instance file used for XML examples in this standard.
5. An XML instance file prepared by the State of Ohio showing 2014 primary results.

2. Normative references

The following referenced documents are indispensable for the application of this document (i.e., they must be understood and used, so each referenced document is cited in text and its relationship to this document is explained). For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

1. Extensible Markup Language (XML) 1.0 (Fifth Edition), W3C Recommendation November 26, 2008.

3. Definitions

For the purposes of this document, the following terms and definitions apply. The IEEE Standards Dictionary: Glossary of Terms and Definitions should be consulted for terms not defined in this clause.

**absentee ballot**: Ballot resulting from absentee voting.

**absentee voting**: Voting that can occur unsupervised at a location chosen by the voter and usually done ahead of election day.

NOTE—In some jurisdictions, absentee voting is also called early voting and vice versa.
affiliation: Association with a political party. See also: endorsement.

NOTE—Affiliation with a political party does not imply endorsement by that political party.

approval voting: Voting variation in which the voter can select as many candidates as desired in a contest, where the candidate with the most votes wins.

NOTE—With approval voting, there are no overvotes, as each vote for a candidate counts towards that candidate's tally. Approval voting also works with N-of-M voting, where the voter may choose any of the candidates and the N candidates with the most votes win.

ballot code: An identification code printed on a paper ballot to identify the ballot style (and sometimes the precinct) to the tabulator so it can associate the applicable contest and candidate list and ballot response locations needed to process vote selections.

ballot measure: Contest in which the choices are typically Yes and No. Syn: referendum.

ballot rotation: The process of varying the order of the contest choices within a given contest.

ballot style geography: Configuration of districts associated with any contest on the ballot that when combined make up a unique area of geography where all voters would receive the same ballot.

ballot style layout: The list of contests and candidates associated with a particular ballot and its associated precinct or split-precinct, including language used and the ordering of contests and candidates.

closed primary: Primary election in which only voters registered with a political party may vote in those party-specific contests associated with that party.

combined precinct: Two or more precincts assigned the same polling place.

contest: A single decision being put before the voters (e.g., the selection of candidates to fill a particular public office or the approval or disapproval of a constitutional amendment).

cross-party endorsement: Endorsement of a given contest choice by two or more political parties.

cumulative voting: Voting variation in which the voter is entitled to allocate a fixed number of votes (N) over a list of M contest choices or write-ins.

NOTE—Unlike N-of-M voting, cumulative voting allows the voter to allocate more than one vote to a given contest choice. The voter is not obliged to allocate all N votes.

direct record electronic (DRE): Typically a touchscreen vote-capture device.

early voting: Voting that occurs prior to election day at a polling location under the supervision of poll workers or election administrative staff.

district: As used in elections, an administrative division in which voters are entitled to vote in contests that are specific to that division, such as those for state senators and delegates.

election management system (EMS): Computer systems used to perform such tasks as preparing ballots, setting up tally systems, maintaining voter registration information, generating reports, and to consolidate, report, and display election results.

NOTE—This device receives results data from the vote-capture devices, accumulates the results, and reports the accumulated results.
endorsement: Approval by a political party (e.g., as the candidate that the party elects to field in a particular contest and/or as the candidate that should receive straight party votes). See also: affiliation.

NOTE—In some states, more than one party may endorse a contest selection.

group voting: A ballot variation used in Massachusetts during the Presidential Preference Primary election where a large number of delegates are elected from each town. Candidates can run as a group or as independent candidates. Each group has a single selection available to automatically select every candidate in the group. If a group is selected, any selections outside the group are additive and contribute to determination of overvote.

in-person voting: Voting that occurs at a polling place under the supervision of poll workers on election day. Syn: polling place voting.

NOTE—In some jurisdictions, in-person voting that occurs ahead of the election at a central location is sometimes referred to as in-person absentee voting.

instant runoff voting (IRV): Voting variation in which voters express their intent by ordering contest choices from strongest to weakest preference. Syn: ranked choice voting (RCV), ranked order voting.

NOTE—Implementations of IRV differ in whether voters are required to rank every choice and in the algorithm used to determine a winner or winners.

jurisdiction: Term as used in election contexts to signify a geographical area to which a practical authority has been granted to administer elections for political offices. Areas of jurisdiction apply to local, state, and federal levels.

NOTE—States, counties, cities, towns and townships are all examples of jurisdictions.

municipality: Term as used in election contexts to signify a jurisdiction such as city or town that has some form of local government for which it generally conducts elections.

N-of-M: Voting variation in which the voter is entitled to allocate a fixed number of votes (N) over a list of M contest choices or write-ins, with the constraint that at most 1 vote may be allocated to a given contest choice. See also: cumulative voting.

NOTE—This usually occurs when multiple seats are concurrently being filled in a governing body such as a city council or school board where candidates run at-large. The voter is not obliged to allocate all N votes. 1-of-M is N-of-M voting where N = 1.

nonpartisan primary: Election held to narrow the field of candidates in non-party-specific contests prior to the general election.

NOTE—A primary election may be comprised of a nonpartisan primary for some contests or measures and a partisan and/or open primary for others.

open primary: Primary held in a state where voters do not register as a party member. There are two variations. In one, the voter declares to the pollworker the party ballot that they choose and are issued a ballot only containing contests for that party (and nonpartisan contests). In the other, the ballot issues contains all eligible contest from all parties and the voter selects the party of choice, privately, by only selecting candidates in contests of the desired party. Selections in more than one party void the partisan section of the ballot.

overvote: Occurs when a voter selects more than one candidate in a 1-of-M contest or more than N candidates in an N-of-M contest. The vote for that contest is considered an overvote and not counted towards any candidate in that contest (unless approval voting applies for that contest). Usually the rest of a properly marked ballot is counted.
NOTE—Large numbers of overvotes can be indicative of confusing ballot layout or confusing instructions.

**party preference contest:** Voting variation on an open primary ballot that contains all party contests where the party preference contest appears at the head of the ballot that lists the parties whose contests appear on the ballot. When a party is selected, it acts as a filter such that only selections applicable to that party are tabulated on a paper ballot system or displayed on a voting terminal. *See also:* open primary; pick-your-party primary

**partisan primary:** Election held to determine which candidate(s) will represent a political party for particular offices in the general election.

**pick-your-party primary:** open primary ballot that contains all eligible contest from all parties but also has an extra contest at the top of the ballot containing a list of parties. A selection in this contest allows the voter to designate the party that is intended to be voted so that an inadvertent selection of candidates in more than one party’s contests does not result in spoiling/voiding the partisan section of their ballot.

**polling place:** Location at which voters cast their ballots in-person on vote-capture devices under the supervision of poll workers usually on election day. *Syn:* polling station or poll.

NOTE—A polling place is typically in 1-to-1 correspondence with a precinct except for combined precincts and vote centers.

**plurality voting:** Voting variation in which the voter can select at most one candidate in a contest, where the candidate with the most votes wins. If a voter selects more than one candidate in a contest, then the vote is considered an overvote and is not counted towards any of the candidates on that contest. If there are N seats open in a contest, then the voter may select up to, but not more than, N candidates, where the top N candidates receiving the most votes win; if a voter selects more than N candidates, then the vote is considered an overvote and not counted towards any of the candidates on that contest.

**precinct:** An election administration division corresponding to a contiguous geographic area that is the basis for determining the contests and measures on which the voters legally residing in that area are eligible to vote. *Syn:* a beat, box, polling district, ward. *See also:* election district; split precinct.

**primary election:** Election generally held to determine which candidate(s) will represent a political party for particular offices in the general election and/or to narrow the field of candidates in non-party-specific contests prior to the general election. In some cases such as for local and state central committee members for a particular party, certain contests serve as the sole election as opposed to a primary followed by a general election.

NOTE—From the functional viewpoint of the voting system, the defining features of a primary election are the presence of party-specific contests and a requirement to report separate totals for the different political parties.

**provisional ballot:** Ballot cast by a voter whose eligibility to vote is disputed by an election official. *Syn:* a challenged ballot.

**reporting context:** Geographic scope within which reported totals or counts are calculated (e.g., precinct or election district).

**reporting unit:** An administrative division that reports votes or to which votes are associated, e.g., state, county, city, precinct, etc.

**schema:** A file containing definitions of data elements and attributes with rules for usage, e.g., for XML.

**split-precinct:** Precinct serving voters from two or more administrative divisions, such as election districts, that may require different ballot styles. *Syn:* split.
straight party voting: Voting variation in which a vote in a designated, special contest (in which the choices are political parties) implies votes in accordance with the endorsements of the elected party in all other contests on the ballot in which straight party voting is allowed.

NOTE—There are different tabulation rules for processing paper ballots containing a straight party selection and direct selections of one or more candidates in individual contests that are state specific.

tabulator: A programmed device that counts votes.

town: An urban area that has a name, defined boundaries, and local government, and that is generally larger than a village and smaller than a city.

township: A subdivision of a county in most northeast and Midwest U.S. states, having the status of a unit of local government with varying governmental powers. Syn: civil township.

UOCAVA voter: From the Uniform and Overseas Citizens Assistance in Voting Act (UOCAVA); A U.S. citizen who is an active member of the Uniformed Services and the Merchant Marine, or the commissioned corps of the Public Health Service or the National Oceanic and Atmospheric Administration, their eligible family members, and U.S. citizens residing outside the United States.

undervote: Occurs when the voter does not select a candidate in a 1-of-M contest or selects fewer than N candidates in a N-of-M contest.

NOTE—Overvotes could indicate a conscious choice or the voter to not vote in the contest. As with overvotes, large numbers of undervotes can be indicative of confusing ballot layout or confusing instructions.

vote-capture device: Device that is used directly by a voter to cast a ballot.

vote center: A polling place that combines multiple precincts. Syn: a super precinct. See also: combined precinct.

voter turnout: The number of voters who have cast ballots as a percentage of the total number of voters who could cast ballots. Various states calculate this differently, sometimes using the total number of potentially eligible voters whether registered or not.

voting variation: A contest option or feature, such as approval voting, cumulative voting, instant-runoff voting, N-of-M voting, straight-party voting.

write-in: Vote for a candidate who is explicitly named by the voter in lieu of choosing a candidate who is already listed on the ballot.

NOTE—In some states, this does not preclude writing in the name of a candidate who is already listed on the ballot. Some states require write-in candidates to be registered prior to the elections to be considered a valid write-in selection.

3.1 Acronyms and abbreviations

EAC Election Assistance Commission
EMS election management system
FWAB Federal Write-in Absentee Ballot
JSON JavaScript object notation
UML unified modeling language
1  UOCAVA  Uniform and Overseas Citizens Assistance in Voting Act
2  VRDB   voter registration database
3  VVSG   voluntary voting systems guidelines
4  XML    extensible markup language
4. Conformance clause

This clause provides information regarding conformance to this standard. It identifies the normative material in the standard constituting requirements that must be satisfied in implementations claiming conformance to the standard.

The following clauses and annexes are normative:

- Clause 3, Definitions.
- Clause 6, UML model for election results reporting.
- Annex C, XML schema documentation and usage.

Conformant implementations of this standard shall observe the requirements of UML and XML usage found in the normative references of Clause 2, shall observe the same definitions of Clause 3, shall not deviate from the UML model of Clause 6, and shall validate to the XML schema specified in Annex C. A conformant implementation of this standard that includes support for XML file digital signatures shall include support for the XML Signature Syntax and Processing reference in Clause 2.
5. Use cases and derived requirements for election results reporting

This clause describes the election results reporting use cases and high-level requirements derived from them. The use cases and requirements are represented in the UML data model described in Clause 6 and implemented by the XML and JSON formats described in Annexes C and D. These use cases are for the following phases of election results reporting, which are described in the proceeding clauses:

- Pre-election
- Election night
- Post-election

5.1 Pre-election use case

The process of reporting election results starts well before election day, as the contests, candidates, ballot initiatives, and geo-political geographies associated with the reporting jurisdiction are defined. The pre-election use case describes this data to enable election officials to report on a variety of information about the election in order to determine whether it is organized correctly. The pre-election use case can also be considered as a full export of the election data contained in an EMS.

Pre-election information can come from any databases or devices that an election jurisdiction uses to manage elections, including voter registration databases, ballot programming systems, candidate filing systems, EMSs, campaign finance systems, etc. The data for pre-election includes the following:

a) Election information known ahead of time:
   1) Election date, place, jurisdiction.
   2) Number of registered voters and voters by party.

b) Contests and candidates on the ballot and their associated party affiliations and contact information.

c) Offices associated with contests and districts.

d) Geo-political geographies within the scope of the election report: the counties, cities, townships, precincts, etc., how they are organized and relate to precincts and split precincts, authorities and addresses.

e) Vote-capture device types and the specific devices associated with polling places.

f) Ballots containing ordered contest information.

g) Multiple identifiers for contests, geo-political geographies, offices, and parties:
   1) A national-level naming/type code for use across all states.
   2) A state-wide naming/type code for use within the state and across all its geographies.
   3) A local-level naming/type code for use as needed on a more local basis.

5.1.1 Standard codes for election objects

The naming or coding of election objects (e.g., contests, districts, offices, precincts, etc.) is generally not uniform across many states and jurisdictions. Jurisdictions in a state may code their contests or precincts or other objects in ways that are not unique across databases or across the jurisdictions within a state, which causes complications and work-arounds when combining the data or conducting state-wide or nation-wide analysis of elections. Local election results based on a non-uniform scheme will need to be translated into a broader coding scheme in order to aggregate the local results and analyze them. The translation may need to be done manually with a resultant greater potential for error.

The pre-election use case includes support for a coding scheme to enable election officials to code election objects in a uniform way. Each election object has up to three identifiers associated, as follows:
— Local code – used if there is a code for the object whose scope is within a county, city, or similar jurisdiction.
— State code – used if there is a code for the object whose scope is state-wide.
— National code – a code for the object whose scope is nationwide.

The national code would uniquely identify the contest, district, etc., and if used within states, their jurisdictions, databases, etc., would have significant benefits for combining, sharing, and reporting data. Accordingly, the UML model, the XML schema, and the JSON implementation example include attributes for these identifiers.

A future IEEE guideline is anticipated that will include the national codes and how to use them to form unique identifiers for election objects.

### 5.2 Election night reporting use case

The election night reporting use case addresses both the contest-level reporting of election results on election night as well as the potential addition of further details such as precinct-level results and ballot counts and breakdowns of counts by device type and ballot class.

The activities on election night are complicated and must be done quickly, thus the amount of detailed data reported will vary across certain states and jurisdictions depending on factors such as equipment involved, population, geography, etc. Across the U.S., election reporting is mostly managed in two ways:

— By the counties (and sometimes cities) directly, with the counties reporting outward to the public/media and possibly reporting upward to the state, or
— As part of a state-wide process, with the counties reporting upward to the state and the state reporting outward to the public/media.

Upon closing of the polls on election night, election officials transfer the vote totals from the vote-capture devices into tabulation devices or databases to be aggregated. From there, election results are reported from local jurisdictions upward to the city or county or state level, where the results continue to be aggregated in a process referred to as rolling up the votes and creating state or county roll-ups. As part of this process, internal, intermediate reports from different EMSs or databases may need to be combined. The roll-ups are then formatted and released to the media and public during election night until all results from the local jurisdictions are accounted for. The results are, at this stage, considered as unofficial.

The data for election night reporting includes the following:

a) Any or all information from the pre-election use case.
b) Aggregated contest results for offices and ballot measures and counts of write-ins.
c) Timestamp for date and time that the report was generated.
d) Further details as possible, including:
  1) Breakdowns of votes by various geo-political geographies such as precinct or split-precinct.
  2) Vote counts and ballot counts broken down by ballot types (absentee, early, etc.) and type of device (electronic, optical scan, etc.).
  3) Additional counts as available, e.g., the number of votes cast by party or the number of straight party selections.

Election night results generally do not contain all the details included in item (d), above, as a consequence of the pressure on election night to report results quickly but accurately. Therefore, this use centers on results that can be summarized at the highest levels by contest and jurisdiction. At the same time, if a jurisdiction
wishes and is able to report results in greater detail, this use case allows for results broken down by individual
reporting units such as precincts and by type of ballot and equipment used. The results can be formatted in
various ways, e.g., as updates or corrections to previous reports or as internal intermediate reports within a
state or county. They can also be formatted to refer to pre-election data elements by identifiers as opposed
to repeating the pre-election elements in every report.

5.3 Post-election reporting use case

Election officials generally return the day after the election to undertake a full scale re-canvass of the results
over a legislatively-determined time period, e.g., 14 or more days, in which more details about the election
results are analyzed. This process is generally referred to as the post-election canvass and results in the
certification of the election results. While election officials strive to collect/tabulate vote totals as accurately
as possible on election night, the unofficial returns have a potential to change as the post-election canvass
takes place.

The post-election reporting use case thus addresses the updates to the election night unofficial results. The
post-election results generally contain greater detail than election night results, including results by reporting
unit, by counts of different types of ballots (early, absentee, provisional, etc.), and by the type of vote-capture
device used by voters to cast their ballots. This use case is of interest especially by analysts and media
performing detailed analysis of election results and voting trends.

The data for post-election night reporting includes:

a) Any or all information from the pre-election use case.
b) All information from the election night reporting use case, updated to reflect any changes.
c) Ballot and vote counts associated with specific vote-capture devices that were located at polling
   places.

5.4 Requirements derived from use cases

From creation and analysis of the use cases, a number of high level requirements were derived and used to
develop the UML data model (and the resultant XML and JSON implementation example). These
requirements were useful in identifying the primary data elements that needed to be included in the model
(e.g., candidates, contests), their definitions, specific attributes, and then how the data elements are associated
with each other. The associations are important in that they impact how the XML and JSON formats are
structured and their ease of use. These high-level requirements for all use cases are summarized below:

a) The data model shall support a pre-election use case that permits jurisdictions to list all contests,
   associated candidates and their affiliations; all jurisdictions, districts, offices, precincts and voting
   locations; all voting devices; and all ballot identifiers and ballots.
b) The data model shall support an election night reporting use case in both a highly-aggregated mode
   (for reporting aggregated contest results with little or no further detail or breakdown) and in a highly-
detailed mode (for reporting contest and ballot counts broken down in a variety of ways, reported by
   precinct or, if possible, device type or by specific device), with variations in-between.
c) The data model shall support a post-election use case for reporting certified contest and ballot counts.
d) The data model shall include a mechanism to associate election districts with their constituent
   precincts and split-precincts, so as to support analysis of how voters in districts vote in other contests
   on the ballot.
e) The data model shall include the capacity for codes/types for a national, state, or local-level coding
   system for the following items:
   1) Contests.
   2) Geo-political units.
3) Political parties.
4) Devices.

f) The data model shall include enumerations of common values for codes and identifiers.

g) The data model shall support reporting on multiple types of elections, including:
1) Open and closed partisan primaries.
2) Runoffs.
3) Special elections.
4) General elections.

h) The data model shall support reporting results in a variety of different election report-style formats, including:
1) Summary contest.
2) Precinct-level.

i) The data model shall support reporting results in a variety of different file configurations, including:
1) One complete file of results.
2) A sequence of result files (when the results are split across multiple files).
3) Partial updates.
4) Corrections.

j) The data model shall support reporting contest counts for the following items:
1) Ballot measures.
2) Candidates.
3) Write-ins.
4) The number of straight party selections on ballots (if applicable).
5) The number of votes by political party (if applicable).

k) The data model shall support reporting contest and ballot counts and their summaries as follows:
1) By geo-political units of geography (e.g., county, township, city, precinct, etc.).
2) By type of ballot/voting (e.g., absentee, early, in-person, provisional).
3) By type of voting equipment used (e.g., electronic, optical scan, etc.).
4) By overvotes and undervotes for each contest.

l) The data model shall support reporting contest results by the following items:
1) Votes reported in the contest.
2) Votes reported for each candidate(s) or selection(s) in the contest.
3) Overvotes reported for the contest.
4) Undervotes reported for the contest.

m) The data model shall support the association of candidates with the following:
1) Political parties.
2) Multiple party endorsements.
3) Multiple listings, within a contest, of the same candidate associated with different parties.

n) The data model shall support the reporting of, by geo-political units of geography, the following items:
1) Persons who are eligible to vote in the election, i.e., the registration count(s).
2) Persons who actually participated in the election, i.e., the total turnout.
6. UML model for election results reporting

This clause presents the UML data model for election results reporting and includes a class diagram that shows graphically how the model is structured. This clause provides overviews of the model from the perspective of each use case, and then concludes with a full description of all elements of the model: its enumerations, classes, and attributes, and their definitions.

The UML model represents a format-independent description of the data involved in election results reporting (as per the three use cases of the standard). Its primary benefit is that it unambiguously defines and describes the data elements and how they are related without requiring readers to know the technical details of any particular data format implementation (e.g., XML). Using commercial tools, a data format can be generated from the model, thus if changes need to be made to a format, the model can be changed and the format can be re-generated.

Clause 6.1 includes a brief overview of UML associations so as to aid readers in understanding the class diagrams in Figure 4 and Figure 5; readers are advised to consult the normative reference in Clause 2 for a greater understanding of UML usage.

6.1 Class diagram summary

The UML data model can be shown graphically as a class diagram. Figure 4 shows a high-level view of the election results reporting class diagram (Figure 5 shows the class diagram in full detail including all attributes). Each class in either of the figures represents a major data element, e.g., Contest, Candidate, or Party. To aid understanding, classes that are highly-related to each other are shown in the same color.

There are 3 types of relationships between classes in the class diagram:

— **Directed Composition**: see Figure 4, ElectionReport and Contest. Read as, an election is composed of contests. A direction composition relationship has a closed diamond at one end and an arrow pointing to the composing class:

![Directed Composition example](image1.png)

Figure 1—Directed Composition example

— **Directed Association**: see Figure 4, Candidate and Party. Read as, a candidate (on the ballot) is associated with or linked to a party. A directed association has an arrow at one end, goes in one direction, and serves to link the class to another associated class, e.g., the party linked to the candidate:

![Directed Association example](image2.png)

Figure 2—Directed Association example

— **Type of, instance of**: see Figure 4, Contest and CandidateChoice. Read as, a candidate choice is a specific or concrete type of a contest. Contest is an abstract class; it is “implemented” by its concrete classes such as CandidateChoice; the names of abstract classes are shown in italics, e.g., Contest. An instance relationship has an open triangle at one end, and indicates that the class at the other end of the relationship is an instance of the class being pointed to (yes, the direction of the arrow seems backward):
6.2 Overviews by use case

UML models can be challenging at first to understand, thus the following clauses break down the model with high-level overviews from the perspective of each use case. A number of details of the full data model have been omitted in Figure 4 including various classes that are helpful but not required; the full model is shown in Figure 5.
6.2.1 Pre-election

A pre-election report can consist of any or all of the following items:

a) A description of the election (ElectionReport).

b) A listing of all ballot configurations (ElectionReport is composed of BallotStyle).

c) A listing of all candidates (ElectionReport is composed of Candidate).

d) A listing of all contests on the ballot (ElectionReport is composed of Contest), the geographical scope of each contest (Contest association with GeoPoliticalUnit), and if a primary election, the primary party associated with each contest (CandidateChoice association with Party).

e) A listing of all political units such as districts, precincts, etc., within the scope of the election (ElectionReport is composed of GeoPoliticalUnit).

f) A listing of all Parties (ElectionReport is composed of Party).

6.2.2 Election-night reporting

An election-night report can consist of any or all of the items below:

a) Any items from the pre-election use case.

b) For each contest of type office and type ballot measure:
   1) A ballot selection for each candidate (BallotSelection type=CandidateSelection) or ballot measure (BallotSelection type=BallotMeasureSelection) or straight party selection (BallotSelection type=StraightParty) and the number of votes received (Contest association with VoteCounts).
   2) The votes broken down by ballot class (absentee, early, etc.) and device type (BallotSelection association with VoteCounts).
   3) The votes broken down by geo-political units (county, city, precinct, device, etc.) (VoteCounts association with GeoPoliticalUnit).
   4) The geo-political unit associated with the contest, i.e., the district (Contest association with GeoPoliticalUnit).
   5) A summary of counts associated with the contest: write-ins, overvotes, undervotes, and total ballots; the summaries broken down by ballot class and device type and geo-political units (Contest association with TotalCounts).

   c) A count of straight party selections on ballots (if applicable) (Contest type=StraightParty).

   a) For a geo-political unit, the number of all ballots cast in that geo-political unit, broken down by ballot class and device type (GeoPoliticalUnit association with TotalCounts).

6.2.3 Post-election reporting

The post-election reporting use case is for the highest level of detail that a reporting jurisdiction may wish to provide, thus it could include the following:

b) Any or all items from the pre-election use case,

c) Any or all items from the election night reporting use case, and

d) For a geo-political unit, the number of ballots cast broken down by ballot class as well as device type (association between GeoPoliticalUnit and TotalCounts).

Election night reporting and post-election reporting share almost all data elements, but it is likely that, in reality, election night reporting will include a much smaller subset of the items that are possible, whereas post-election reporting will include a substantially more complete set.
Figure 5—Election results reporting class diagram – details
6.3 UML model documentation

This clause contains descriptions of all classes and their attributes and enumerations in the UML data model for election results reporting. Figure 5 shows the UML class diagram with full detail included; it is helpful to understand this diagram but at the same time not necessary in order to use the XML and JSON formats.

Note that attributes are shown in alphabetical order; other orderings are acceptable. Also, attributes beginning with a capital letter (e.g., VoteCounts) generally are elements in XML, whereas those that begin with a non-capitalized letter (e.g., ballotSelectionID) generally are attributes in XML.

6.3.1 Class BallotSelection (abstract), implemented by BallotMeasureSelection, CandidateSelection, and Party

Abstract class that serves as a selection in a contest on the ballot; its specific classes are for a candidate selection, a ballot measure selection, and for a party for straight party selections. Attributes for BallotSelection are global to its specific classes whereas the attributes for the specific classes are private to each class. BallotSelection is referenced by the Contest and OrderedContest classes.

Attributes for BallotSelection are listed in the table below:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VoteCounts</td>
<td>0 or more</td>
<td>VoteCounts</td>
<td>For associating votes with the ballot selection.</td>
</tr>
<tr>
<td>ballotSelectionID</td>
<td>0 or 1</td>
<td>string</td>
<td>ID for use as needed, e.g., for a mandated ID scheme.</td>
</tr>
</tbody>
</table>

Table 1—Attributes for BallotSelection

6.3.1.1 Class BallotSelection as implemented by BallotMeasureSelection

For a ballot selection involving a ballot measure. Inherits attributes from the BallotSelection class and includes other attributes as below:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>selection</td>
<td>once</td>
<td>string</td>
<td>String used to vote for or against the ballot measure, e.g., &quot;yes&quot;, &quot;no&quot;.</td>
</tr>
</tbody>
</table>

Table 2—Attributes for BallotMeasureSelection

6.3.1.2 Class BallotSelection as implemented by CandidateSelection

For a ballot selection involving a candidate. Multiple candidates can be associated with the selection in cases when the selection is for a ticket, e.g., the presidential ticket. Inherits attributes from the BallotSelection class and includes other attributes as below:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Candidate</td>
<td>1 or more</td>
<td>Candidate</td>
<td>For associating a candidate with the candidate selection on the ballot. The multiplicity is unlimited for cases where the ballot selection is for a ticket.</td>
</tr>
<tr>
<td>EndorsementParty</td>
<td>0 or more</td>
<td>Party</td>
<td>For associating one or more endorsing parties with the candidate selection.</td>
</tr>
<tr>
<td>isWriteIn</td>
<td>0 or 1</td>
<td>boolean</td>
<td>Indicates whether the candidate is a write-in, e.g., “yes” or “no”.</td>
</tr>
</tbody>
</table>

Table 3—Attributes for CandidateSelection
6.3.1.3 Class BallotSelection as implemented by Party

For use as a straight party selection. Party is also a stand-alone class; see Clause 6.3.12 for its description and attributes.

6.3.2 Class BallotStyle

Class for associating a specific ballot style with a reporting unit, e.g., a ballot style specific to a precinct. Referenced by the Election class.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPUnit</td>
<td>once</td>
<td>GPUnit</td>
<td>For associating a specific reporting unit with the ballot style.</td>
</tr>
<tr>
<td>OrderedContest</td>
<td>0 or more</td>
<td>OrderedContest</td>
<td>For associating contests in order as listed on ballot.</td>
</tr>
<tr>
<td>ballotStyleID</td>
<td>0 or 1</td>
<td>string</td>
<td>ID for use as needed, e.g., for a mandated ID scheme.</td>
</tr>
</tbody>
</table>

Table 4 — Attributes for BallotStyle

6.3.3 Class Candidate

Class for describing information about a candidate in a contest. Referenced by the Election and CandidateSelection classes.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Party</td>
<td>0 or 1</td>
<td>Party</td>
<td>For associating a party with the candidate.</td>
</tr>
<tr>
<td>Person</td>
<td>0 or 1</td>
<td>Person</td>
<td>Detailed information about the candidate.</td>
</tr>
<tr>
<td>ballotName</td>
<td>once</td>
<td>string</td>
<td>Candidate’s name as listed on the ballot.</td>
</tr>
<tr>
<td>candidateID</td>
<td>0 or 1</td>
<td>string</td>
<td>ID for use as needed, e.g., for a mandated ID scheme.</td>
</tr>
<tr>
<td>fileDate</td>
<td>0 or 1</td>
<td>dateTime</td>
<td>Date and time when candidate filed for a contest.</td>
</tr>
<tr>
<td>isIncumbent</td>
<td>0 or 1</td>
<td>boolean</td>
<td>Boolean to indicate whether the candidate is the incumbent for the office.</td>
</tr>
<tr>
<td>isTopTicket</td>
<td>0 or 1</td>
<td>boolean</td>
<td>Boolean to indicate whether the candidate is the top of a ticket that includes multiple candidates.</td>
</tr>
<tr>
<td>sequenceOrder</td>
<td>0 or 1</td>
<td>string</td>
<td>Order in which to list the candidate in the results.</td>
</tr>
<tr>
<td>status</td>
<td>0 or more</td>
<td>CandidateStatus</td>
<td>Registration status of the candidate, e.g., filed, qualified, etc.</td>
</tr>
</tbody>
</table>

Table 5 — Attributes for Candidate

6.3.4 Class Contact

Class for describing address-related and other contact information about a person or a reporting unit. Referenced by the Person and ReportingUnit.ReportingUnitContact classes.
### Table 6 — Attributes for Contact

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>addressNumber</td>
<td>0 or 1</td>
<td>string</td>
<td>Number of the residence on the street, e.g., 9047 of 9047 Main Street.</td>
</tr>
<tr>
<td>city</td>
<td>0 or more</td>
<td>string</td>
<td></td>
</tr>
<tr>
<td>country</td>
<td>0 or 1</td>
<td>string</td>
<td></td>
</tr>
<tr>
<td>email</td>
<td>0 or more</td>
<td>string</td>
<td></td>
</tr>
<tr>
<td>fax</td>
<td>0 or 1</td>
<td>string</td>
<td></td>
</tr>
<tr>
<td>hours</td>
<td>0 or more</td>
<td>string</td>
<td>Hours that the contact is available, could include days.</td>
</tr>
<tr>
<td>name</td>
<td>0 or 1</td>
<td>string</td>
<td>Name associated with the contact address.</td>
</tr>
<tr>
<td>phone</td>
<td>0 or more</td>
<td>string</td>
<td></td>
</tr>
<tr>
<td>postalCode</td>
<td>0 or 1</td>
<td>string</td>
<td>Zip code, etc.</td>
</tr>
<tr>
<td>stateAbbreviation</td>
<td>once</td>
<td>string</td>
<td>2-character U.S. Census Bureau abbreviation of the state, e.g., AS, AL, etc.</td>
</tr>
<tr>
<td>streetName</td>
<td>0 or 1</td>
<td>string</td>
<td></td>
</tr>
<tr>
<td>URL</td>
<td>0 or 1</td>
<td>anyURI</td>
<td>URL associated with the contact.</td>
</tr>
</tbody>
</table>

**6.3.5 Class Contest (abstract), implemented by BallotMeasure, CandidateChoice**

Abstract class that serves as a contest on the ballot; its specific classes are for ballot measures, offices, and straight party selections, which are generally treated as a contest on the ballot. Attributes for Contest are global to its specific classes whereas the attributes for the specific classes are private to each class. Referenced by the Election class.

Contest optionally references GPUnit using the Contest relationship, for the purpose of identifying a geo-political unit that has been defined for the scope of the contest. For example, for a contest for a state senate seat, the geo-political unit would be for the district associated with the contest. This relationship is similar to the relationship between Office and GPUnit.

Contest has two relationships with the TotalCounts class for the purpose of reporting on summary counts for the contest:

- ContestTotalCounts, for providing a contest scope-wide summary of counts associated with a contest: total number of ballots cast containing the contest, total number of overvotes, undervotes, and write-ins. Thus, the association between Counts and GPUnit would not be visited.

- ContestTotalCountsByGPUnit, for providing a contest scope-wide summary of counts associated with a contest, broken down by GPUnit. For example, this relationship would be used for reporting on the contest summaries by precinct. Thus, the association between Counts and GPUnit would be visited.

Attributes for Contest are listed in the table below:
<table>
<thead>
<tr>
<th>Attribute</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BallotSelection</td>
<td>0 or more</td>
<td>BallotSelection</td>
<td>For associating a ballot selection for the contest, i.e., a candidate, a ballot measure.</td>
</tr>
<tr>
<td>ContestGPScope</td>
<td>0 or 1</td>
<td>GPUnit</td>
<td>The ID of the geo-political unit associated with this contest.</td>
</tr>
<tr>
<td>ContestTotalCounts</td>
<td>0 or 1</td>
<td>TotalCounts</td>
<td>Vote summary counts (overvotes, undervotes, total ballots, etc.) optionally broken down by device type and ballot class; the scope of the counts is contest-wide, that is, not associated with a precinct or other GPUnit types.</td>
</tr>
<tr>
<td>ContestTotalCountsByGPUnit</td>
<td>0 or more</td>
<td>TotalCounts</td>
<td>Same as ContestTotalCounts but scope of counts is associated with a precinct or other GPUnit types.</td>
</tr>
<tr>
<td>abbreviation</td>
<td>0 or 1</td>
<td>string</td>
<td>Abbreviation for the contest.</td>
</tr>
<tr>
<td>localContestCode</td>
<td>0 or 1</td>
<td>string</td>
<td>Local code associated with the contest.</td>
</tr>
<tr>
<td>name</td>
<td>once</td>
<td>string</td>
<td>Title or name of the contest, e.g., &quot;Governor&quot; or &quot;Question on Legalization of Gambling&quot;.</td>
</tr>
<tr>
<td>nationalContestCode</td>
<td>0 or 1</td>
<td>string</td>
<td>National code associated with the contest.</td>
</tr>
<tr>
<td>reportedPrecincts</td>
<td>0 or 1</td>
<td>integer</td>
<td>Number of precincts that have completed reporting votes for this contest.</td>
</tr>
<tr>
<td>sequenceOrder</td>
<td>0 or 1</td>
<td>string</td>
<td>Order in which to list the candidate in the results.</td>
</tr>
<tr>
<td>stateContestCode</td>
<td>0 or 1</td>
<td>string</td>
<td>State code associated with the contest.</td>
</tr>
<tr>
<td>totalPrecincts</td>
<td>0 or 1</td>
<td>integer</td>
<td>Total number of precincts that have this contest on the ballot.</td>
</tr>
<tr>
<td>voteVariation</td>
<td>once</td>
<td>VoteVariation</td>
<td>Vote variation associated with the contest, e.g., N-of-M.</td>
</tr>
</tbody>
</table>

**Table 7 — Attributes for Contest**

### 6.3.5.1.1 Class Contest as implemented by BallotMeasure

For a contest specific to ballot measures (i.e., referenda). Inherits attributes from the Contest class and includes other attributes as below:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FullText</td>
<td>0 or 1</td>
<td>RichText</td>
<td>The full text of the ballot measure.</td>
</tr>
<tr>
<td>SummaryText</td>
<td>0 or 1</td>
<td>RichText</td>
<td>The summary text of the ballot measure.</td>
</tr>
</tbody>
</table>

**Table 8 — Attributes for BallotMeasure**

### 6.3.5.1.2 Class Contest as implemented by CandidateChoice

For a contest involving one or more candidates. Inherits attributes from the Contest class and includes other attributes as below:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office</td>
<td>0 or 1</td>
<td>Office</td>
<td>A reference to a description of the office associated with the contest.</td>
</tr>
<tr>
<td>PrimaryParty</td>
<td>0 or 1</td>
<td>Party</td>
<td>A reference to one or more parties associated with the contest.</td>
</tr>
<tr>
<td>numberElected</td>
<td>once</td>
<td>integer</td>
<td>Number of candidates that are elected in the contest (&quot;N&quot; of N-of-M).</td>
</tr>
<tr>
<td>votesAllowed</td>
<td>once</td>
<td>integer</td>
<td>Maximum number of votes/write-ins per voter in this contest.</td>
</tr>
</tbody>
</table>

**Table 9 — Attributes for CandidateChoice**

### 6.3.5.1.3 Class Contest as implemented by StraightParty

For maintaining a count of straight party selections on ballots. Inherits attributes from the Contest class.
No private attributes.

6.3.6 Class Counts (abstract), implemented by TotalCounts, VoteCounts

Abstract class that reports on specific and summary contest and ballot counts. Contains attributes to categorize the counts according to ballot classification (e.g., election day, early voting, etc.) and type of device on which the votes were cast. Attributes for Counts are global to its specific classes whereas the classes for the specific classes are private to each class.

Attributes for Counts are listed in the table below:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPUnit</td>
<td>0 or 1</td>
<td>GPUnit</td>
<td>The geo-political unit that is associated with the votes, e.g., a precinct, a county, a township, etc.</td>
</tr>
<tr>
<td>ballotType</td>
<td>0 or 1</td>
<td>BallotType</td>
<td>Enumerated ballot type applicable to the contest counts, e.g., election day, early voting, etc.</td>
</tr>
<tr>
<td>deviceManufacturer</td>
<td>0 or 1</td>
<td>string</td>
<td>Manufacturer of the vote-capture device(s) used.</td>
</tr>
<tr>
<td>deviceModel</td>
<td>0 or 1</td>
<td>string</td>
<td>Type defined by the reporting jurisdiction for the vote-capture device.</td>
</tr>
<tr>
<td>deviceType</td>
<td>0 or 1</td>
<td>DeviceType</td>
<td>Enumerated type for the vote-capture device.</td>
</tr>
</tbody>
</table>

Table 10 — Attributes for Counts

6.3.6.1 Class Counts as implemented by TotalCounts

For reporting on contest and geo-political unit summary vote counts. Referenced by the GPUnit.GPUnitTotalCounts, Contest.ContestTotalCounts, and Contest.ContestTotalCountsByGPUnit classes. Inherits attributes from Counts and includes other attributes as below:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ballotsCast</td>
<td>once</td>
<td>integer</td>
<td>Total number of ballots cast, either in a contest or associated with a geo-political unit.</td>
</tr>
<tr>
<td>overvotes</td>
<td>0 or 1</td>
<td>integer</td>
<td>Total number of overvotes, either in a contest or associated with a geo-political unit.</td>
</tr>
<tr>
<td>undervotes</td>
<td>0 or 1</td>
<td>integer</td>
<td>Total number of undervotes, either in a contest or associated with a geo-political unit.</td>
</tr>
<tr>
<td>writeIns</td>
<td>0 or 1</td>
<td>integer</td>
<td>Total number of write-ins cast, either in a contest or associated with a geo-political unit.</td>
</tr>
</tbody>
</table>

Table 11 — Attributes for TotalCounts

6.3.6.2 Class Counts as implemented by VoteCounts

For reporting on contest vote counts. Referenced by the BallotSelection class. Inherits attributes from Counts and includes other attributes as below:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>count</td>
<td>once</td>
<td>float</td>
<td>Count of contest votes cast; can include a factional component in special cases.</td>
</tr>
</tbody>
</table>

Table 12 — Attributes for VoteCounts

---

Footnote: Float is required for methods of proportional voting where the allowable votes are proportionally allocated to the number of candidates selected. For example, Peoria IL uses this for City Council contests: if there is an at large election with 5 seats and the voter has 5 votes
6.3.7 Class Election

Class for describing the status of the election and associated information. Referenced by the ElectionReport class.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BallotStyle</td>
<td>0 or more</td>
<td>BallotStyle</td>
<td>For associating one or more specific ballot styles with the election, e.g., to list all ballot styles used in the election.</td>
</tr>
<tr>
<td>Candidate</td>
<td>0 or more</td>
<td>Candidate</td>
<td>For associating candidates with the report.</td>
</tr>
<tr>
<td>Contest</td>
<td>1 or more</td>
<td>Contest</td>
<td>For associating one or more contests with the election.</td>
</tr>
<tr>
<td>ElectionGPScope</td>
<td>0 or 1</td>
<td>GPUnit</td>
<td>For associating the top-most geo-political unit that is reporting the results, e.g., a state or county, thereby identifying the geographical scope of the election results.</td>
</tr>
<tr>
<td>absenteeCountStatus</td>
<td>0 or 1</td>
<td>BallotCountStatus</td>
<td>Counting status for absentee ballots.</td>
</tr>
<tr>
<td>date</td>
<td>once</td>
<td>date</td>
<td>Calendar date of the election, e.g., &quot;November 4, 2014&quot;.</td>
</tr>
<tr>
<td>earlyCountStatus</td>
<td>0 or 1</td>
<td>BallotCountStatus</td>
<td>Counting status for ballots cast during early voting.</td>
</tr>
<tr>
<td>electionDayCountStatus</td>
<td>0 or 1</td>
<td>BallotCountStatus</td>
<td>Counting status for ballots cast on election day.</td>
</tr>
<tr>
<td>name</td>
<td>once</td>
<td>string</td>
<td>Title of the election, e.g., &quot;Montgomery County Maryland General Election&quot;.</td>
</tr>
<tr>
<td>provisionalCountStatus</td>
<td>0 or 1</td>
<td>BallotCountStatus</td>
<td>Counting status for provisional ballots.</td>
</tr>
<tr>
<td>type</td>
<td>once</td>
<td>ElectionType</td>
<td>Enumerated type of election, e.g., partisan primary, open primary, etc.</td>
</tr>
<tr>
<td>URL</td>
<td>0 or 1</td>
<td>anyURI</td>
<td>URL associated with the election, e.g., for a state's or county's election results website.</td>
</tr>
<tr>
<td>writeInCountStatus</td>
<td>0 or 1</td>
<td>BallotCountStatus</td>
<td>Counting status for write-in ballots.</td>
</tr>
</tbody>
</table>

Table 13 — Attributes for Election

6.3.8 Class ElectionReport

The root class; for describing various items pertaining to the status and format of the report and when generated.

to allot on the ballot, a single selection by the voter would give all 5 votes to that candidate, 2 selections would give 2½ votes each to both candidates, 3 selections would get 1 2/3 votes each, 4 selections 1¼ votes each and 5 selections 1 vote each.
### Table 14 — Attributes for ElectionReport

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Election</td>
<td>0 or more</td>
<td>Election</td>
<td>For associating an election with the report.</td>
</tr>
<tr>
<td>GPUnit</td>
<td>0 or more</td>
<td>GPUnit</td>
<td>For associating geo-political geographies with the report.</td>
</tr>
<tr>
<td>Office</td>
<td>0 or more</td>
<td>Office</td>
<td>For associating offices with the report.</td>
</tr>
<tr>
<td>Party</td>
<td>0 or more</td>
<td>Party</td>
<td>For associating parties with the report.</td>
</tr>
<tr>
<td>Person</td>
<td>0 or more</td>
<td>Person</td>
<td>For associating information about persons with the report.</td>
</tr>
<tr>
<td>date</td>
<td>once</td>
<td>dateTime</td>
<td>Identifies the date and time that the election report was generated.</td>
</tr>
<tr>
<td>format</td>
<td>once</td>
<td>ReportFormat</td>
<td>Format of the report, e.g., contest summary, precinct level results, etc.</td>
</tr>
<tr>
<td>issuer</td>
<td>once</td>
<td>string</td>
<td>Identification of the report issuer.</td>
</tr>
<tr>
<td>Message</td>
<td>0 or more</td>
<td>RichText</td>
<td>For including an arbitrary message with the report.</td>
</tr>
<tr>
<td>sequence</td>
<td>once</td>
<td>integer</td>
<td>Indicates the upper bound of the sequence.</td>
</tr>
<tr>
<td>sequenceEnd</td>
<td>once</td>
<td>integer</td>
<td>Indicates the upper bound of the sequence.</td>
</tr>
<tr>
<td>Signature</td>
<td>0 or 1</td>
<td>string</td>
<td>Placeholder for an optional digital signature, using the W3C digital signature standard.</td>
</tr>
<tr>
<td>stateAbbreviation</td>
<td>once</td>
<td>string</td>
<td>2-character U.S. Census Bureau abbreviation of the state whose results are being reported, e.g., AL, TX, MN, etc.</td>
</tr>
<tr>
<td>stateCode</td>
<td>once</td>
<td>string</td>
<td>2-character U.S. Census Bureau (FIPS) code for the state, e.g., 01 for AL.</td>
</tr>
<tr>
<td>status</td>
<td>once</td>
<td>ReportStatus</td>
<td>Status of the election report, e.g., test mode, unofficial, etc.</td>
</tr>
<tr>
<td>vendorApplicationID</td>
<td>once</td>
<td>string</td>
<td>An identifier of the vendor application generating the election report, e.g., X-EMS version 3.1.a.</td>
</tr>
</tbody>
</table>

#### 6.3.9 Class GPUnit (abstract), implemented by Device, District, ReportingUnit

Abstract class to describe a geo-politically bounded area of geography such as a city, district, jurisdiction, precinct or split-precinct, or a specific vote-capture device, for the purpose of associating vote counts and other information with the reporting unit. GPUnits can link to each other to form a model of a state's (or a county's, etc.) jurisdictions, districts, and precincts. Attributes for GPUnit are global to its specific classes whereas the attributes for the specific classes are private to each class. Referenced by the ElectionReport.GPUnit, Election.ElectionGPScope, Contest.ContestGPScope, VoteCounts.GPUnit, TotalCounts.GPUnit, and Office.OfficeGPScope classes.

Attributes for GPUnit are listed in the table above:
<table>
<thead>
<tr>
<th>Attribute</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPUnitTotalCounts</td>
<td>0 or more</td>
<td>TotalCounts</td>
<td>Ballot summary counts (overvotes, undervotes, total ballots, etc.) optionally broken down by device type and ballot class.</td>
</tr>
<tr>
<td>GPSubUnit</td>
<td>0 or more</td>
<td>GPUnit</td>
<td>For creating nested geo-political geographies, e.g., for creating GPUnits of type=precinct nested within a GPUnit of type=county.</td>
</tr>
<tr>
<td>GPSubUnitRef</td>
<td>0 or more</td>
<td>GPUnit</td>
<td>For creating a reference within a GPUnit to another geo-political unit.</td>
</tr>
<tr>
<td>PartyRegistration</td>
<td>0 or more</td>
<td>PartyRegistration</td>
<td>For associating a count of registered voters per party with the geo-political unit.</td>
</tr>
<tr>
<td>SpatialDimension</td>
<td>0 or more</td>
<td>SpatialDimension</td>
<td>For describing the unit’s spatial extent (a polygon that shows the related area) so as to visualize election results, understand the composition of districts, or to determine whether GPUnits are properly related.</td>
</tr>
<tr>
<td>localGeoCode</td>
<td>0 or 1</td>
<td>string</td>
<td>Local code for identifying the type of geo-political unit.</td>
</tr>
<tr>
<td>name</td>
<td>0 or 1</td>
<td>string</td>
<td>Name of the geo-political unit.</td>
</tr>
<tr>
<td>nationalGeoCode</td>
<td>0 or 1</td>
<td>string</td>
<td>National code for identifying the type of geo-political unit.</td>
</tr>
<tr>
<td>stateGeoCode</td>
<td>0 or 1</td>
<td>string</td>
<td>State code for identifying the type of geo-political unit.</td>
</tr>
<tr>
<td>URL</td>
<td>0 or 1</td>
<td>anyURI</td>
<td>URL associated with the geo-political unit, e.g., a jurisdiction’s website.</td>
</tr>
</tbody>
</table>

Table 15 — Attributes for GPUnit

6.3.9.1 Class GPUnit as implemented by Device

For describing a specific vote-capture device for the purpose of associating a vote count with the device. Inherits attributes from GPUnit and includes other attributes as below:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>deviceType</td>
<td>once</td>
<td>DeviceType</td>
<td>Enumerated type of device, e.g., DRE, opscan-precinct, etc.</td>
</tr>
<tr>
<td>manufacturer</td>
<td>0 or 1</td>
<td>string</td>
<td>Manufacturer of the device.</td>
</tr>
<tr>
<td>serialNumber</td>
<td>0 or 1</td>
<td>string</td>
<td>Device’s serial number or other unique identifier.</td>
</tr>
</tbody>
</table>

Table 16 — Attributes for Device

6.3.9.2 Class GPUnit as implemented by District

For describing a district for the purpose of associating a vote count with the district. Inherits attributes from GPUnit and includes other attributes as below:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>districtType</td>
<td>once</td>
<td>DistrictType</td>
<td>Enumerated type of district, e.g., congressional, etc.</td>
</tr>
</tbody>
</table>

Table 17 — Attributes for District

6.3.9.3 Class GPUnit as implemented by ReportingUnit

For describing a reporting unit, e.g., a geo-political unit that reports votes such as state, county, township, precinct, etc., for the purpose of associating a vote count with the reporting unit. ReportingUnit includes multiple instances of Person using the Authority attribute, for the purpose of providing one or more names of persons who serve as authorities for the reporting unit. ReportingUnit also includes an instance of Contact using the ReportingUnitContact attribute, for the purpose of providing one or more contact addresses for the...
reporting unit, such as an address of a vote center. ReportingUnit inherits attributes from GPUnit and includes other attributes as below:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authority</td>
<td>0 or more</td>
<td>Person</td>
<td>For associating one or more authorities responsible for the reporting unit.</td>
</tr>
<tr>
<td>ReportingUnitContact</td>
<td>0 or more</td>
<td>Contact</td>
<td>One or more contact addresses for the reporting unit that would be separate</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>from the contact addresses provided via the Person class.</td>
</tr>
<tr>
<td>hasReported</td>
<td>0 or 1</td>
<td>boolean</td>
<td>Boolean indicating whether the geo-political unit has completed reporting,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>e.g., “yes” or “no”.</td>
</tr>
<tr>
<td>registeredVoters</td>
<td>0 or 1</td>
<td>integer</td>
<td>Number of registered voters residing within the boundaries of the geo-political</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>unit.</td>
</tr>
<tr>
<td>totalParticipatingVoters</td>
<td>0 or 1</td>
<td>integer</td>
<td>Number of voters who have participated in the election, i.e., shown up at</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>the polls, including those who did not cast ballots.</td>
</tr>
<tr>
<td>reportedPrecincts</td>
<td>0 or 1</td>
<td>integer</td>
<td>For geo-political unit jurisdictions, number of associated precincts that</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>have completed reporting.</td>
</tr>
<tr>
<td>totalPrecincts</td>
<td>0 or 1</td>
<td>integer</td>
<td>For geo-political unit jurisdictions, total number of associated precincts.</td>
</tr>
<tr>
<td>reportingUnitType</td>
<td>once</td>
<td>ReportingUnitType</td>
<td>Enumerated type of reporting unit, e.g., state, jurisdiction, etc.</td>
</tr>
</tbody>
</table>

Table 18 — Attributes for ReportingUnit

6.3.10 Class Office

For describing the office associated with a contest or a district or jurisdiction. Referenced by the CandidateChoice and ElectionReport classes.

Office optionally references GPUnit using the Jurisdiction relationship, for the purpose of identifying a geo-political unit that has been defined for the scope of the office. For example, for an office for a state senate seat, the geo-political unit would be for the district associated with the office. This relationship is similar to the relationship between Contest and GPUnit.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OfficeGPScope</td>
<td>0 or 1</td>
<td>GPUnit</td>
<td>The ID of the geo-political unit associated with this office.</td>
</tr>
<tr>
<td>filingDate</td>
<td>0 or 1</td>
<td>dateTime</td>
<td>Date and time when a candidate must have filed for the contest for the</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>office.</td>
</tr>
<tr>
<td>incumbentRunning</td>
<td>0 or 1</td>
<td>boolean</td>
<td>Boolean to indicate whether the incumbent for the office is running for</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>re-election.</td>
</tr>
<tr>
<td>localOfficeCode</td>
<td>0 or 1</td>
<td>string</td>
<td>Local code associated with the office.</td>
</tr>
<tr>
<td>name</td>
<td>once</td>
<td>string</td>
<td>Name of the office.</td>
</tr>
<tr>
<td>nationalOfficeCode</td>
<td>0 or 1</td>
<td>string</td>
<td>National code associated with the office.</td>
</tr>
<tr>
<td>partisan</td>
<td>0 or 1</td>
<td>boolean</td>
<td>Boolean to indicate whether the office is partisan, e.g., “yes” or “no”.</td>
</tr>
<tr>
<td>stateOfficeCode</td>
<td>0 or 1</td>
<td>string</td>
<td>State code associated with the office.</td>
</tr>
<tr>
<td>termEndDate</td>
<td>0 or 1</td>
<td>date</td>
<td>Calendar date when the office term ends.</td>
</tr>
<tr>
<td>termStartDate</td>
<td>0 or 1</td>
<td>date</td>
<td>Calendar date when the office term ends.</td>
</tr>
<tr>
<td>unexpiredTerm</td>
<td>0 or 1</td>
<td>boolean</td>
<td>Boolean to indicate whether the office’s term is unexpired, e.g., “yes”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>or “no”.</td>
</tr>
</tbody>
</table>

Table 19 — Attributes for Office
6.3.11 Class OrderedContest

For listing the contests and corresponding ballot selections in the order in which they appear on the ballot, for the purposes of including in the election report a ballot style containing ordered contests and selections. Referenced by the BallotStyle class.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BallotSelection</td>
<td>0 or more</td>
<td>BallotSelection</td>
<td>For associating ballot selections with the ballot.</td>
</tr>
<tr>
<td>Contest</td>
<td>once</td>
<td>Contest</td>
<td>For associating ballot selections with the ballot.</td>
</tr>
</tbody>
</table>

Table 20 — Attributes for OrderedContest

6.3.12 Class Party

For describing information about a political party. Is also a specific type of the BallotSelection class for the purpose of tracking straight party selections; see Clause 6.3.1.3. Referenced by the ElectionReport, Candidate, CandidateChoice, PrimaryParty, CandidateSelection, EndorsementParty classes.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>abbreviation</td>
<td>0 or 1</td>
<td>string</td>
<td>Short name for the party, e.g., &quot;DEM&quot;.</td>
</tr>
<tr>
<td>localPartyCode</td>
<td>0 or 1</td>
<td>string</td>
<td>Local code associated with the party.</td>
</tr>
<tr>
<td>name</td>
<td>once</td>
<td>string</td>
<td>Official full name of the party, e.g., &quot;Republican&quot;.</td>
</tr>
<tr>
<td>nationalPartyCode</td>
<td>0 or 1</td>
<td>string</td>
<td>National code associated with the party.</td>
</tr>
<tr>
<td>statePartyCode</td>
<td>0 or 1</td>
<td>string</td>
<td>State code associated with the party.</td>
</tr>
</tbody>
</table>

Table 21 — Party

6.3.13 Class PartyRegistration

For tracking the number of registered voters per geo-political unit, i.e., for reporting on the number of registered voters in a precinct to be used as a comparison to the turnout and ballots cast. Referenced by the GPUnit class.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Party</td>
<td>once</td>
<td>Party</td>
<td>For associating a political party with the count.</td>
</tr>
<tr>
<td>count</td>
<td>once</td>
<td>integer</td>
<td>A count for tracking the number of registered voters.</td>
</tr>
</tbody>
</table>

Table 22 — Attributes for PartyRegistration

6.3.14 Class Person

For describing information about a person who may be a candidate, election official, etc. Referenced by the Candidate, ElectionReport, and ReportingUnit.Authority classes.

Person references Contact several times, to associate contact information that would be considered specific to the person or to associate possibly multiple work contact information, etc.
<table>
<thead>
<tr>
<th>Attribute</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact</td>
<td>0 or more</td>
<td>Contact</td>
<td>For associating contact information with the person.</td>
</tr>
<tr>
<td>ethnicity</td>
<td>0 or 1</td>
<td>EthnicityType</td>
<td>Person’s ethnicity.</td>
</tr>
<tr>
<td>firstName</td>
<td>0 or 1</td>
<td>string</td>
<td>Person’s first name.</td>
</tr>
<tr>
<td>gender</td>
<td>0 or 1</td>
<td>GenderType</td>
<td>Person’s gender.</td>
</tr>
<tr>
<td>lastName</td>
<td>once</td>
<td>string</td>
<td>Person’s last name.</td>
</tr>
<tr>
<td>middleName</td>
<td>0 or 1</td>
<td>string</td>
<td>Person’s middle name.</td>
</tr>
<tr>
<td>nickname</td>
<td>0 or 1</td>
<td>string</td>
<td>Nickname associated with the person.</td>
</tr>
<tr>
<td>prefix</td>
<td>0 or 1</td>
<td>string</td>
<td>A prefix associated with the person, e.g., Mr.</td>
</tr>
<tr>
<td>profession</td>
<td>0 or 1</td>
<td>string</td>
<td>Person’s profession.</td>
</tr>
<tr>
<td>suffix</td>
<td>0 or 1</td>
<td>string</td>
<td>A suffix associated with the person, e.g., Jr.</td>
</tr>
<tr>
<td>title</td>
<td>0 or 1</td>
<td>string</td>
<td>A title associated with the person.</td>
</tr>
</tbody>
</table>

**Table 23 — Attributes for Person**

6.3.15 Class SpatialDimension

For describing a GPUnit’s spatial layout, e.g., a map or a spatial extent (a polygon that shows the related area) so as to visualize election results, understand the composition of districts, or to determine whether GPUnits are properly related. Referenced by the GPUnit class.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SpatialExtent</td>
<td>0 or 1</td>
<td>SpatialExtent</td>
<td>For associating the GPUnit’s spatial extent information.</td>
</tr>
<tr>
<td>map</td>
<td>0 or 1</td>
<td>anyURI</td>
<td>A URL to a map of the GPUnit.</td>
</tr>
</tbody>
</table>

**Table 24 — Attributes for SpatialDimension**

6.3.16 Class SpatialExtent

For describing the GPUnit’s spatial extent data and the format used for the spatial extent.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordinates</td>
<td>once</td>
<td>RichText</td>
<td>The data coordinates constituting the spatial extent.</td>
</tr>
<tr>
<td>format</td>
<td>once</td>
<td>string</td>
<td>Format used for spatial extent, e.g., GML, KML, WKT, SHP, etc.</td>
</tr>
</tbody>
</table>

**Table 25 — Attributes for SpatialExtent**

6.3.17 Enumeration BallotCountStatus

Enumeration for various reporting-related statuses applicable to types of ballots in ElectionReport.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>completed</td>
<td>The reporting is complete.</td>
</tr>
<tr>
<td>in-process</td>
<td>The reporting is in process.</td>
</tr>
<tr>
<td>not-processed</td>
<td>The reporting has not started or is not underway.</td>
</tr>
<tr>
<td>unknown</td>
<td>The status of the reporting is unknown.</td>
</tr>
</tbody>
</table>

**Table 26 — Enumeration values for BallotCountStatus**
6.3.18 Enumeration BallotType

Enumeration for the types of ballots (or voting) associated with votes in Counts.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>absentee</td>
<td>For any/all types of absentee, generally when absentee is not broken out into specific types.</td>
</tr>
<tr>
<td>absentee-FWAB</td>
<td>A type of absentee; for Federal Write-in Absentee Ballots.</td>
</tr>
<tr>
<td>absentee-in-person</td>
<td>A type of absentee; for absentee ballots cast in-person, e.g., at a county office.</td>
</tr>
<tr>
<td>absentee-mail</td>
<td>A type of absentee; for postal mail absentee ballots.</td>
</tr>
<tr>
<td>absentee-UOCAVA</td>
<td>A type of absentee; for absentee ballots from UOCAVA voters.</td>
</tr>
<tr>
<td>early</td>
<td>For ballots cast during early voting periods.</td>
</tr>
<tr>
<td>election-day</td>
<td>For ballots cast on election day.</td>
</tr>
<tr>
<td>other</td>
<td></td>
</tr>
<tr>
<td>provisional</td>
<td>For challenged ballots.</td>
</tr>
<tr>
<td>total</td>
<td>Total of all ballots cast regardless of voting type.</td>
</tr>
<tr>
<td>UOCAVA</td>
<td>For ballots from UOCAVA voters.</td>
</tr>
</tbody>
</table>

Table 27 — Enumeration values for BallotType

6.3.19 Enumeration CandidateStatus

Enumeration for various statuses applicable to a candidate in Candidate.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>advanced-to-runoff</td>
<td>For advancing to a runoff or use with instant-runoff voting.</td>
</tr>
<tr>
<td>filed</td>
<td>Filed with the election authority but not necessarily qualified.</td>
</tr>
<tr>
<td>qualified</td>
<td>Qualified by the election authority to be on the ballot for a contest; used in an election day report.</td>
</tr>
<tr>
<td>winner</td>
<td>The contest winner.</td>
</tr>
<tr>
<td>withdrawn</td>
<td>Withdrawn from the contest.</td>
</tr>
<tr>
<td>writeIn</td>
<td>Candidate is a write-in</td>
</tr>
</tbody>
</table>

Table 28 — Enumeration values for CandidateStatus

6.3.20 Enumeration DeviceType

Enumeration for the type of device in Device and for the type of device associated with vote counts in Counts.
<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>electronic</td>
<td>DRE (Direct Record Electronic) and touchscreen devices such as tablets.</td>
</tr>
<tr>
<td>lever</td>
<td>Lever machines.</td>
</tr>
<tr>
<td>manual-count</td>
<td>Generally, hand-counted paper ballots.</td>
</tr>
<tr>
<td>mixed-systems</td>
<td>Used for systems, e.g., that print voter choices on an optical scan ballot (hybrid of a DRE and an optical scan system)</td>
</tr>
<tr>
<td>opscan-central</td>
<td>Optical scanner used at a central office with no opportunity for voter correction of mistakes.</td>
</tr>
<tr>
<td>opscan-precinct</td>
<td>Optical scanner used at a precinct or other location where voter correction of mistakes such as overvotes is possible.</td>
</tr>
<tr>
<td>punch-card</td>
<td>Punch card systems.</td>
</tr>
<tr>
<td>unknown</td>
<td></td>
</tr>
</tbody>
</table>

Table 29 — Enumeration values for DeviceType

6.3.21 Enumeration DistrictType

Enumeration for the type of district in District.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>congressional</td>
<td>District for the U.S. House of Representatives</td>
</tr>
<tr>
<td>local</td>
<td>A local district, e.g., water, school board, etc.</td>
</tr>
<tr>
<td>locality</td>
<td>A generic locality.</td>
</tr>
<tr>
<td>other</td>
<td></td>
</tr>
<tr>
<td>state-house</td>
<td>District for a state’s house.</td>
</tr>
<tr>
<td>state-senate</td>
<td>District for a state’s senate.</td>
</tr>
<tr>
<td>state-wide</td>
<td>District is state-wide.</td>
</tr>
</tbody>
</table>

Table 30 — Enumeration values for DistrictType

6.3.22 Enumeration ElectionType

Enumeration for the type of election in ElectionReport.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>general</td>
<td>The election held typically on Election Day.</td>
</tr>
<tr>
<td>other</td>
<td></td>
</tr>
<tr>
<td>partisan-primary-closed</td>
<td>Primary election that is for a specific party.</td>
</tr>
<tr>
<td>partisan-primary-open</td>
<td>Primary election that is open to all parties (non-partisan).</td>
</tr>
<tr>
<td>primary</td>
<td>A primary election, type not specified.</td>
</tr>
<tr>
<td>runoff</td>
<td>An election to decide a prior contest that ended with no candidate receiving a majority of the votes.</td>
</tr>
<tr>
<td>special</td>
<td>An election held out of sequence for special circumstances, e.g., to fill a vacated office.</td>
</tr>
</tbody>
</table>

Table 31 — Enumeration values for ElectionType

6.3.23 Enumeration EthnicityType

Enumeration for a person’s ethnicity in Person.
<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>asian</td>
<td></td>
</tr>
<tr>
<td>black</td>
<td></td>
</tr>
<tr>
<td>hispanic</td>
<td></td>
</tr>
<tr>
<td>moreThanOne</td>
<td></td>
</tr>
<tr>
<td>nativeAmerican</td>
<td></td>
</tr>
<tr>
<td>white</td>
<td></td>
</tr>
<tr>
<td>unknown</td>
<td></td>
</tr>
</tbody>
</table>

Table 32 — Enumeration values for EthnicityType

6.3.24 Enumeration GenderType

Enumeration for a person’s gender in Person.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>female</td>
<td></td>
</tr>
<tr>
<td>male</td>
<td></td>
</tr>
<tr>
<td>unknown</td>
<td></td>
</tr>
</tbody>
</table>

Table 33 — Enumeration values for GenderType

6.3.25 Enumeration ReportFormat

Enumeration for the format of the election results in Election.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>precinct-level</td>
<td>Contains counts from precincts in the reporting jurisdiction.</td>
</tr>
<tr>
<td>summary-contest</td>
<td>Contains only aggregated counts for candidates in a contest and for ballot measures.</td>
</tr>
</tbody>
</table>

Table 34 — Enumeration values for ReportFormat

6.3.26 Enumeration ReportingUnitType

Enumeration for the type of geo-political unit in ReportingUnit.
<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>audit-batch</td>
<td>For use in reporting batches of ballots that may cross precinct boundaries.</td>
</tr>
<tr>
<td>city</td>
<td></td>
</tr>
<tr>
<td>combined-precinct</td>
<td>One or more precincts that have been combined for the purposes of reporting.</td>
</tr>
<tr>
<td>county</td>
<td></td>
</tr>
<tr>
<td>jurisdiction</td>
<td></td>
</tr>
<tr>
<td>municipality</td>
<td></td>
</tr>
<tr>
<td>other</td>
<td>For other types of localities or other specialized use.</td>
</tr>
<tr>
<td>polling-place</td>
<td>Typically associated 1-to-1 with a precinct.</td>
</tr>
<tr>
<td>precinct</td>
<td></td>
</tr>
<tr>
<td>split-precinct</td>
<td></td>
</tr>
<tr>
<td>state</td>
<td></td>
</tr>
<tr>
<td>township</td>
<td>Synonymous with “town.”</td>
</tr>
<tr>
<td>vote-center</td>
<td></td>
</tr>
</tbody>
</table>

Table 35 — Enumeration values for ReportingUnitType

6.3.27 Enumeration ReportStatus

Table 36 — Enumeration values for ReportStatus

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>certified</td>
<td>The results have been certified by the election authority.</td>
</tr>
<tr>
<td>correction</td>
<td>The results are a correction to an earlier report.</td>
</tr>
<tr>
<td>pre-election</td>
<td>The file contains a definition of the election and associated jurisdictions, districts, and precincts.</td>
</tr>
<tr>
<td>recount</td>
<td>The results are a recount of an earlier election.</td>
</tr>
<tr>
<td>test</td>
<td>The results are issued as a test of the election definition.</td>
</tr>
<tr>
<td>unofficial-complete</td>
<td>The results are unofficial and complete.</td>
</tr>
<tr>
<td>unofficial-partial</td>
<td>The results are unofficial and partial.</td>
</tr>
</tbody>
</table>

6.3.28 Enumeration VoteVariation

Table 37 — Enumeration values for VoteVariation

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>approval</td>
<td>When voter can select as many candidates as desired in a contest up to a max number.</td>
</tr>
<tr>
<td>cumulative</td>
<td>When voter can allocate more than one vote to a given candidate.</td>
</tr>
<tr>
<td>IRV</td>
<td>Instant-runoff voting (IRV), for ranking candidates in order of preference rather than voting for a single candidate. Also known as alternative vote, transferable vote, ranked choice voting, or preferential voting.</td>
</tr>
<tr>
<td>N-of-M</td>
<td>Includes vote for 1, i.e., 1-of-M.</td>
</tr>
</tbody>
</table>
Annex A

(informative)

Bibliography

Bibliographical references are resources that provide additional or helpful material but do not need to be understood or used to implement this standard. Reference to these resources is made for informational use only.


Annex B

(informative)

Geo-political geography overview

This clause provides an overview of the geo-political geography in the United States as it relates to elections and election reporting. This overview provides background for the election administration-related material in this standard and is useful in understanding how geo-political geography is implemented in the UML model and the concrete data formats.

As it relates to the voting process in the US, units of geo-political geography includes jurisdictions, electoral districts, precincts, and several other geographical units associated with political boundaries. Vote counts can be associated with these units and, generally, the media and election analysts wish to obtain voting results broken out by these units, with precincts generally being the smallest unit and building block of geo-political geography. Ballot counts and vote counts for contests can be associated with a variety of different types of geo-political geography, ranging from aggregated counts associated with a county or state down to more detailed counts associated with a precinct and breakdowns of precinct.

Geo-political geography can be quite complex; some of these geographies form hierarchical relationships whereas others overlap, and some can change their boundaries every few years. This makes detailed reporting on elections and aggregation of the detailed results complicated. Cities and districts in particular can cut across precinct lines, splitting them into multiple parts (called split-precincts), each part requiring separate tracking. Quite often, different states or counties within the same state may report elections in different ways, associating results with geo-political units differently in each case.

The following clauses itemize three general types of geo-political geography that election officials generally recognize.

![Figure B.1—Governmental-based geographies](image)

---

6 Often, election analysts wish to examine how voters in a particular district may have voted not only in contests specific to that district but in other elections such as for statewide or national contests.

7 There may be other governmental geographies below the county level depending upon the state and county.
B.1 Governmental-based geography

Governmental-based geography refers to entities that have generally been set up from the beginning of time within the state and that tend to not change over time, with the exception of some cities. For many states, the governmental-based geography is hierarchical, as shown in Figure B.1.

Nearly all states have counties, although some use different words to describe them, e.g., parishes for Louisiana and boroughs for Alaska. Within the counties in 20 states are townships, which observe their county boundaries. In the six New England states, townships run the election process and there is no county government, thus election results are reported directly to the state. Townships in Michigan, Minnesota and Wisconsin also run their elections, but report their information to the county, which then reports to the state.

Governmental-based geographies generally do not cross the lines of the precincts that compose them; however cities can change their boundaries through annexations and, in some states, city boundaries can also cross county boundaries. Accordingly, changes to city boundaries may result in crossing the boundaries of one or more precincts, creating split-precincts and requiring a distinct ballot style per split-precinct. Reporting on election results for a city with split-precincts requires knowledge of which precincts and split-precincts compose the city.

Generally, governmental-based geographies are associated with offices that are elected jurisdiction-wide (such as for County Clerk, Supervisor, Treasurer, Assessor, Highway Commissioner, etc.) and thus do not require different ballot style areas within the geography for those offices, i.e., all voters in the jurisdiction vote for the office.

B.2 Political-based geographies

Political-based geographies are those that tend to be population-based and therefore will change with each U.S. Census every 10 years in a process known as re-districting. Political-based geographies are generally electoral district geographies where people are elected to an office that has jurisdiction within that geography, e.g., a U.S Congressional district. These political-based geographies can be categorized as follows:

- Congressional districts
- State senate districts
- State house districts (in some states, they compose the state senate districts)
- County districts
- City districts (sometimes called wards)

A general misconception about geo-political geographies is that they are largely hierarchical, however political-based geographies proves this wrong. For most states, these geographies often overlap each other as well as the other geographies, forming not a hierarchical tree but a lattice. As a result of re-districting, a district may cross the boundaries of a precinct and create one or more split-precincts, with a distinct ballot style per split-precinct; see Figure B.2. Depending on the number of districts and how they overlap, the resultant number of ballot styles created may grow substantially beyond the number of whole precincts.

---

8 The last new county to come into existence was Bloomfield, CO, in 2001.
9 Generally the states with townships are above the Mason-Dixon Line and extend westward to the state of Nebraska and eastward into six states of New England (Maine, New Hampshire, Vermont, Massachusetts, Rhode Island and Connecticut).
10 Multiple ballot styles are necessary, one for each split of the precinct, because each split is in a different city or county or district and thus each ballot style requires one or more different contests. It may be that all the other contests on the ballot are the same across the whole of the precinct.
B.3 Administrative-based geographies

Administrative-based geographies include precincts; they tend to be smaller territories that, sometimes, elect people or have policies that are adopted by a vote of the people in the area. These territories can be very small, sometimes only applying to a single house along a street, and thus difficult to track. They can involve territory that is non-contiguous in itself, e.g., for some of the taxing and special districts. They can change a number of times throughout a given year, even daily in some cases. These administrative-based geographies can be categorized as follows:

a) Taxing districts e.g., fire, water, sewer, transit, school, police, hospital, utilities
b) Special districts, e.g., unique areas brought together for a referendum
c) Election administrative areas
   1) Precincts, split-precincts, combined precincts
   2) Ballot style areas
   3) Polling places, vote centers

As noted earlier, precincts can be split as a result of re-districting by political-based geographies and through annexes to governmental-based geographies such as cities. Precincts can be split as well by changes to the other administrative-based geographies. This requires a unique ballot style per split-precinct, which adds complexity to election organization and results reporting. Generally, there is one polling place per precinct, but a number of states now use combined precincts and vote centers on election night, which associate multiple precincts with one polling place. This means that at a vote center handling multiple precincts that themselves may be split, there could be potentially many different ballot styles in use at the vote center, with each vote-capture device needing to display any one of the ballots depending on what precinct a voter is assigned to. This adds further complexity and places additional demands on election jurisdictions on their ability to report details of votes on election night and post-election.
Some states/counties prefer over time to heal split-precincts by combining them with other precincts or generally redrawing the precinct boundaries so that the number of ballot styles is reduced and election management and reporting is less complicated.

Figure B.3 shows an example of an actual governmental-based geography, Prince William County in Virginia, including the cities within its boundaries.

![Prince William County, VA](image)

Figure B.3—Prince William County, VA, and cities

Figure B.4 then shows the administrative-based geographies broken down by its precincts as drawn in 2012. There are 77 precincts, but note that some precincts are split: a part (split) of precinct 409 encompasses the city of Haymarket but does not match it exactly. This is the same with precinct 502 and the city of Occoquan or precinct 304 and the city of Quantico, therefore these precincts are split and analyzed as such in order to accurately understand the results from the cities vs. the entire precinct.
Figure B.4—Prince William County, precincts

Prince William County is located in the higher population-density northern part of the state and sufficiently large enough such that a number of different political-based districts subdivide the county. These include U.S. Congressional districts and Virginia State Senate and State House districts, as well as the county’s own supervisory (called Magisterial) districts, all shown in Figure B.5. None of these districts are nested within any other districts.
Figure B.5—Prince William County, congressional, state senate and house, and county magisterial districts\(^{11}\)

\(^{11}\) These figures show different districts whose boundaries overlay each other at various points. The figures are in grayscale so as to be easily printed and viewed. Grayscale does not show distinctions between the different districts as well as some color formats, however the point of the pictures is less to show the distinction between districts and more to illustrate that the number of different district boundaries add significant complexity.
When elections for all of these offices take place at the same time, an election administrator needs to overlay all the geographies on top of each other in order to determine the unique combination of territories that make up each different ballot combination or ballot style.

Figure B.6—Prince William County, all districts and precincts overlaid

Ibid.
Lastly, Figure B.6 shows all geographies overlaid on top of each other - note that the districts overlay each other at multiple points within the county and split a number of the precincts. For detailed reporting by precinct and to answer questions such as, how did voters in one district vote in contests at the state or national levels, a mapping must be maintained of all the precincts and split-precincts, and then how they each differently compose the various districts. The overlay of the districts and cities on top of the precincts results in, potentially, the need for approximately 140 different ballot styles within the county.
Annex C

(normative)

XML schema documentation and usage

This annex describes the election results reporting XML schema. The schema is generated from the UML model described in Clause 6; readers are advised to read Clause 6 first so as to better understand the material in this annex. For information about XML usage, readers are advised to consult the normative reference for XML usage referenced in Clause 2.

Clause C.1 contains a discussion of various features and usage of the schema. Clause C.2 contains documentation of specific elements and attributes in the schema. Clause C.3 contains a listing of the full schema.

C.1 Schema features and usage

This clause presents an overview of various features and usage of the schema, including

— How UML relationships are implemented in the XML schema
— The “object_id” unique identifier for internal referencing
— General layout of instance files
— How geo-political geography is implemented
— How contests and ballot selections are implemented
— How vote and summary counts are implemented
— Identifiers for national, state, and local coding schemes

No attempt is made to provide a complete overview of usage, but more to describe sufficient usage of certain elements such that readers can understand in general how all elements are to be used. Readers should consult the normative references for XML and XML digital signature usage in Clause 2.

C.1.1 Overview of UML relationships implemented in the generated XML schema

The XML schema is generated from the UML model, thus having some understanding of how the XML is generated will assist users of the schema and others who may wish to extend the model or schema for other purposes. This section provides a brief overview of the schema generation.

When XML is generated from the UML model, the classes in the model result in XML elements and the attributes generally result in XML attributes within the XML element. The exception to this is for UML attributes of type RichText, which result in XML attributes of type:string (these generally are to hold strings that can be lengthy and possibly require use of XML CDATA tags for escaping additional HTML or XML tags, such as for ballot measure text or spatial extent data).

The relationships between UML classes result in XML sub-elements that function differently depending upon the type of relationship. As a brief guide, from Figure 5 in Clause 6, Election and Contest, the directed composition relationship results in 0 or more XML sub-elements named Contest being created in Election. To make instance files easier to read by the human eye, collections of elements are generally wrapped by container elements named after the elements being wrapped, thus the directed composition relationship actually results in 0 or 1 ContestCollection sub-elements created in Election and ContestCollection then contains 1 or more Contest sub-elements, as follows:
Candidate, Contest, GPUnit, Office, Party, and Person elements are all generated from directed compositions and are wrapped in container elements; see Clause C.1.3 for further details.

For Candidate and Party in Figure 5, the directed association relationship results in 0 or 1 XML sub-element(s) named Party being created for Candidate. The Party sub-element links to a specific Party element that will be associated with that candidate, e.g., a Party element defined for the Independent Party (see Clause C.1.2 for more information on the object_id unique identifier). It is akin to linking, in this case, the candidate to the candidate’s party. This is shown as follows:

```
<!-- Definitions for Partys -->
<PartyCollection>
  ...
  <Party object_id="OID-IND" name="Independent"/>
  ...
</PartyCollection>
<!-- Definitions for Candidates -->
<CandidateCollection>
  ...
  <Candidate object_id="OID-C1" name="John Brown">
    <Party>OID-IND</Party>
  </Candidate>
```

“Instance of” relationships are slightly more complex. For Figure 5, Contest and CandidateChoice, CandidateChoice is an instance of Contest, i.e., it is a specific type of Contest and thus CandidateChoice is generated with Contest as an extension base and all attributes and elements of Contest are global to CandidateChoice. The XML syntax for using CandidateChoice is as follows:

```
<!-- Definitions for Contests -->
<ContestCollection>
  ...
  <Contest xsi:type="CandidateChoice" name="Governor" votesAllowed="1" object_id="OID-GOV">
    ...
  </Contest>
  ...
</ContestCollection>```

Lastly, if the relationship to a class has a name located at the destination class of the relationship (i.e., the endpoint of the relationship), then the element created uses that name. For example, in Figure 5, the directed association between Contest and TotalCounts is named ContestTotalCounts as its endpoint, and it is named thus so as to emphasize that the role of the TotalCounts class in this case is to provide total counts for a contest. The XML element generated is therefore named ContestTotalCounts but it is of type TotalCounts. The directed association between Candidate and Party has no name at its endpoint, thus the element generated is simply Party, of type Party.

C.1.2 “object_id” unique identifier for internal referencing

Many XML elements in the schema contain an attribute named “object_id” of type XSD:ID. This attribute is used for internal referencing within an XML instance, i.e., to link from one element to another. It is not intended to hold actual real-world identifiers of objects, i.e., an identifier used by an election jurisdiction for a specific candidate; other attributes are included where needed for real-world identifiers.
Type XSD:ID requires that the object_id be a unique legal XML value that does not contain a colon. Digits, the hyphen, and the period may not be used as the starting character. Each object_id’s value must be unique within the instance file.

For example, an election report likely will include a listing of different candidates that will appear in the various contests. The XML for creating a Candidate element and then referencing it in another element such as BallotSelection is:

```
<!—Definitions for Candidates -->
<CandidateCollection>
  <Candidate object_id="OID-C1" name="John Brown"/>
  <Candidate object_id="OID-C2" name="Thomas Paine"/>
  <Candidate object_id="OID-C3" name="John Hancock"/>
  ...
</CandidateCollection>
...<BallotSelection xsi:type="Candidate" object_id="OID-C1"/>
<BallotSelection xsi:type="Candidate" object_id="OID-C2"/>
<BallotSelection xsi:type="Candidate" object_id="OID-C3"/>
```

where “object_id” holds the value of a unique identifier, e.g., “OID-C1”, for “John Brown” and can be used to reference that candidate from within other elements.

### C.1.3 General layout of instance files

In general, instance files are built by creating collections of elements such for office descriptions, geopolitical geographies, candidates, contests, etc., and then linking the elements as necessary using the object_id attributes (just as relationships are constructed in UML models and class diagrams). An instance file will start with collections of these elements, with those elements that could be in a pre-election report coming first, followed by those elements that could be associated with an election. Most elements are optional, thus instance files will vary in content but generally follow the same structure, as follows:

```
— ElectionReport element (pre-election elements):
  — GPUnit elements
  — Office elements
  — Party elements
  — Person elements
— Election element (elements associated with an election):
  — Candidate elements
  — BallotStyle elements
  — Repeated sequences of Contest elements:
    — BallotSelection elements
    — Counts elements
```

To assist developers in building and viewing instance files, the schema includes elements to “wrap” or contain collections of the same element. As an example, in an instance file there could be many contest or candidate elements, thus the collection elements wrap these collections and can be expanded or collapsed in many XML viewers. An example in XML is:

```
<!—Definitions for Candidates -->
<CandidateCollection>
  <Candidate object_id="OID-C1" name="John Brown"/>
  <Candidate object_id="OID-C2" name="Thomas Paine"/>
  <Candidate object_id="OID-C3" name="John Hancock"/>
```
Elements for BallotStyle, Candidate, Office, Party, and Person are relatively straightforward, with the object_id elements being used in some cases to link specific elements. For example, an element for a candidate may link to a specific party element so as to link the candidate to a political party; likewise a candidate element may link to a person element so as to link extended information about the candidate.

Elements for Contest and GPUnit elements are more complicated; GPUnits are the most complicated since they are capable of modeling actual geo-political geography to complex levels of detail. The following clauses describe usage for these elements in more detail.

C.1.4 How geo-political geography is implemented

A primary feature of the schema is the geo-political geography element GPUnit, which can be used in a variety of ways to exactly mirror a jurisdiction’s geo-political geography (Annex B describes geo-political geography in more detail and is useful to consult for background). GPUnits are used in an election report to list the geo-political units of geography included within the geographic scope of the election results, i.e., the county(s), cities, precincts, etc., so that ballot and vote counts can be associated with them. GPUnits are optional and not necessarily needed for reporting highly aggregated results.

GPUnits have a type attribute to specify major types of geography:

- Device, for a specific device
- District, for specific types of districts, with subtypes including for congressional, state-senate, etc.
- ReportingUnit, for geographies that report election results or that could have vote counts associated with them, with subtypes including for state, county, precinct, split-precinct, etc.

They can be nested hierarchically or used in various ways to compose complex geo-political geographies across the different election results reporting structures in the U.S. The element’s structure is a compromise in that the model/schema could have utilized a series of classes/elements more specific to each particular subtype of geography, but at the cost of more complexity in the schema, less flexibility across the states, and less future flexibility in the standard.

As a brief overview, Figure C.1 shows an actual example of relatively-complicated geo-political geography in the state of Wisconsin, with each box on the diagram representing either a GPUnit element of type ReportingUnit or of type District, with the subtype attributes set accordingly to state, county, ward, congressional, etc. (note that in Wisconsin, a “ward” is the same as a precinct).

C.1.4.1 Defining GPUnits

An example of a collection of GPUnit elements is shown below in XML, modeled after Figure C.1:

```xml
<!--Definitions for GPUnits -->
<GPUnitCollection>
...  
<!-- Definitions for all precincts except Ward 13 -->
<GPUnit xsi:type="ReportingUnit" reportingUnitType="precinct" object_id="OID-WARD11" name="Ward 11"/>
<GPUnit xsi:type="ReportingUnit" reportingUnitType="precinct" object_id="OID-WARD10" name="Ward 10"/>
<GPUnit xsi:type="ReportingUnit" reportingUnitType="precinct" object_id="OID-WARD11" name="Ward 11"/>
<GPUnit xsi:type="ReportingUnit" reportingUnitType="precinct" object_id="OID-WARD12" name="Ward 12"/>
<GPUnit xsi:type="ReportingUnit" reportingUnitType="precinct" object_id="OID-WARD14" name="Ward 14"/>
<GPUnit xsi:type="ReportingUnit" reportingUnitType="precinct" object_id="OID-WARD15" name="Ward 15"/>
```

The schema includes two methods for defining GPUnits; either method can be used or they can be combined. The first method involves defining a series of GPUnits, however many are needed, to represent all the geo-political geographies that will be used in the election report, and linking the geographies together with sub-
elements as needed using the object_id attributes. The second method involves defining GPUnits for top-level geographies such as for counties or cities and then hierarchically nesting GPSUnit sub-elements (e.g., for precincts) within the top-level elements. The second method carries the advantage of automatically linking the elements together, but can only be used for hierarchical geo-political geographies. The following clauses describe these methods in more detail.

Figure C.1—GPUnits

C.1.4.2 Method One – Defining and associating GPUnits without nesting

The first method for associating one geography with another uses the GPSUnitRef sub-element: one uses this sub-element from within a GPUnit element so as to link it to another GPUnit, using the object_id attributes. An example of this from Figure C.1 is for associating the parent city with its combined wards:

```xml
<!- Definition for City of Wauwatosa and links to its combined wards -->
<GPUnit xsi:type="ReportingUnit" reportingUnitType="municipality" object_id="OID-WAUWATOSA"
   name="City of Wauwatosa">
   <GPSubUnitRef>OID-W1+13</GPSubUnitRef>
   <GPSubUnitRef>OID-W10-12</GPSubUnitRef>
</GPUnit>

<!- Definition for Combined Ward 1+13 and links to its wards -->
<GPUnit xsi:type="ReportingUnit" reportingUnitType="combined-precinct" object_id="OID-W1+13"
   name="Combined Ward 1+13">
   <GPSubUnitRef>OID-WARD1</GPSubUnitRef>
   <GPSubUnitRef>OID-WARD13</GPSubUnitRef>
</GPUnit>
```
Another example from Figure C.1 is for associating the wards with the districts that they compose, shown below in XML:

```
<GPUnit xsi:type="ReportingUnit" reportingUnitType="precinct" object_id="OID-WARD10" name="Ward 10"/>
<GPUnit xsi:type="ReportingUnit" reportingUnitType="precinct" object_id="OID-WARD11" name="Ward 11"/>
<GPUnit xsi:type="ReportingUnit" reportingUnitType="precinct" object_id="OID-WARD12" name="Ward 12"/>
... 

<GPUnit xsi:type="District" districtType="state-house" object_id="OID-HD13" name="House District 13">
  <GPSubUnitRef>OID-WARD10</GPSubUnitRef>
  <GPSubUnitRef>OID-WARD11</GPSubUnitRef>
  <GPSubUnitRef>OID-WARD12</GPSubUnitRef>
</GPUnit>
```

Although GPUnit elements can be nested in any direction or sequence, parent-to-child associations are assumed in the naming of GPSubUnitRef elements. This means, for example, that GPSubUnitRef elements for precincts are used as sub-elements within GPUnit elements for counties when one wishes to associate precincts with their county, or GPSubUnitRef sub-elements for precincts or split-precincts are used within GPUnit elements for districts when one wishes to associate precincts/split-precincts with a district that they compose.

C.1.4.3 Method Two – Defining and associating GPUnits using nesting

The second method for associating GPUnits is by nesting them when defining them. Nesting is done by using the GPSubUnit sub-element within the GPUnit element, which allows one to create sub-units of geography hierarchically from within a particular unit of geography. No GPSubUnitRef elements are needed; the nesting associates the unit with the sub-units.

One may wish to nest, for example, all split-precincts within the parent precinct, which then associates those split-precincts with that specific precinct. An example of nesting in XML from Figure C.1 is:

```
<GPUnit xsi:type="ReportingUnit" reportingUnitType="precinct" object_id="OID-WARD13" name="Ward 13">
  <GPSubUnitRef>OID-WARD13-S1</GPSubUnitRef>
  <GPSubUnit xsi:type="ReportingUnit" reportingUnitType="split-precinct" object_id="OID-WARD13-S1" name="Ward 13 Split 1"/>
  <GPSubUnitRef>OID-WARD13-S2</GPSubUnitRef>
  <GPSubUnit xsi:type="ReportingUnit" reportingUnitType="split-precinct" object_id="OID-WARD13-S2" name="Ward 13 Split 2"/>
</GPUnit>
```

As stated earlier, nesting works only for geo-political geographies that are hierarchical, thus it makes sense in associating hierarchical governmental geographies with each other such as for precincts and their county. Nesting does not make sense in associating governmental with political geographies, such as for a district and the precincts/split-precincts that compose the district. In this case, the use of GPSubUnitRef elements are required, as in method one.

C.1.5 How contests are implemented

Contests involve several elements, depending on what type of contest is involved and what sorts of counts are desired:

a) The Contest abstract element, to identify the name of the contest and other attributes and its type:
1) CandidateChoice, for a contest involving candidates
2) BallotMeasure, for a contest involving a ballot measure
3) StraightParty, for a contest involving a straight party selection

b) The BallotSelection abstract element, to identify a selection on the ballot for that contest and its type:
1) CandidateSelection, if the selection is for a candidate
2) BallotMeasureSelection, if the selection is for a ballot measure
3) Party, if the selection is for a party (could be for a straight party selection)

c) VoteCounts, to report the number of votes for a ballot selection
d) TotalCounts, to report summary counts for the contest, e.g., total ballots cast, overvotes, undervotes, etc.

CandidateChoice is used for contests involving candidates for an office and has several attributes associated with it including for the number of seats associated with the office and the number of selections a voter can make in the contest (both are generally 1).

StraightParty is included as a contest type because a number of states keep track of the number of straight party selections made by voters and straight party selection does not “fit” within the definition of a candidate choice contest, i.e., there are no candidates. However, some jurisdictions treat straight party selection as a candidate choice contest, thus the schema does not prevent usage of the CandidateChoice element being used for straight party selection.

Following is an example of a contest involving CandidateChoice that includes ballot selections and counts for two candidates:

```xml
...<Candidate object_id="OID-C1" name="John Brown"/>
<Candidate object_id="OID-C2" name="Thomas Paine"/>
</CandidateCollection>
...<Contest xsi:type="CandidateChoice" name="Governor" votesAllowed="1" object_id="OID-GOV">
  <BallotSelection xsi:type="CandidateSelection" object_id="OID-C1">
    <VoteCounts count="2716" object_id="OID-V-28394">
      <GPUnit>OID-W1+13</GPUnit>
    </VoteCounts>
    <VoteCounts count="932" object_id="OID-V-38595">
      <GPUnit>OID-W10-12</GPUnit>
    </VoteCounts>
  </BallotSelection>
  <BallotSelection xsi:type="CandidateSelection" object_id="OID-C2">
    <VoteCounts count="2392" object_id="OID-V-28394">
      <GPUnit>OID-W1+13</GPUnit>
    </VoteCounts>
    <VoteCounts count="749" object_id="OID-V-38595">
      <GPUnit>OID-W10-12</GPUnit>
    </VoteCounts>
  </BallotSelection>
</Contest>
...
```

In the example above, two vote counts for each candidate are included, with the counts specific to the geo-political geographies associated with combined precincts from Figure C.1. (Clause C.1.6 goes into more detail regarding how vote counts are associated with geo-political unit).

Contests for BallotMeasure and StraightParty are implemented as per CandidateChoice, albeit with different attributes.
C.1.6 How contest and summary counts are implemented

The previous clause discussed briefly the abstract Counts element. This clause goes into more detail, showing how counts can be associated with contests and with geo-political unit. The schema includes the capability to report counts according to the following:

a) Specific vote counts for contests, e.g., for candidates, ballot measures, and straight party selections, optionally associated with a specific geo-political unit:
   1) Specific vote counts broken out by geo-political geographies, e.g., precincts.
   2) Specific vote counts broken out by the class of ballot, by the general class of device, and by the specific type device and manufacturer.

b) Summary vote counts for contests that apply to the contest as a whole:
   1) Total number of ballots cast containing the contest.
   2) Total number of overvotes and undervotes in the contest.
   3) Total number of write-ins in the contest.
   4) Summary vote counts broken out by geo-political geographies, e.g., precincts.
   5) Summary vote counts broken out by the class of ballot, by the class of device, and by specific device and manufacturer.

c) Summary ballot counts for geo-political geographies that apply to the geography as a whole:
   1) Total number of ballots cast at that geography.
   2) Total number of overvotes and undervotes on all ballots cast at that geography.
   3) Total number of write-ins on all ballots cast at that geography.
   4) Summary ballot counts for geographies broken out by the class of ballot, by the class of device, and by specific device and manufacturer.

Thus, for item (a) above, one can simply report aggregated vote counts for, say, candidates in a contest, or one could optionally go to greater levels of detail, reporting how many votes were cast for the candidate by class of ballot, e.g., absentee, and/or by general class of device, e.g., DRE, and/or by specific type of device and manufacturer. For item (b) above, one could optionally report the number of overvotes or undervotes for the contest also at an aggregated or itemized level of detail. The following clauses go into more detail on how to report counts according to these three primary classes.

C.1.6.1 Reporting specific vote counts for contests

Reporting specific vote counts for contest can be done at an aggregated level or at greater levels of detail, and in either case associating the count(s) with a particular geo-political unit such as a county or precinct.

To report an aggregated vote count for a contest, one uses the element VoteCounts and simply reports only the count, as follows:

```xml
<Contest xsi:type="CandidateChoice" name="Governor" votesAllowed="1" object_id="OID-GOV">
  <BallotSelection xsi:type="CandidateSelection" object_id="OID-C1">
    <VoteCounts count="2716" object_id="V-28394"/>
  </BallotSelection>
<BallotSelection xsi:type="CandidateSelection" object_id="OID-C2">
  <VoteCounts count="3141" object_id="V-57830"/>
</BallotSelection>
</Contest>
```

To go into greater level of detail, one could optionally break out the vote counts by ballot class (or any of the other attributes in the Counts element):

```xml
<Contest xsi:type="CandidateChoice" name="Governor" votesAllowed="1" object_id="OID-GOV">
  <BallotSelection xsi:type="CandidateSelection" object_id="OID-C1">
    <VoteCounts count="2000" ballotType="election-day" object_id="V-28334"/>
  </BallotSelection>
</Contest>
```
For associating vote counts with geo-political geographies, one uses the GPUUnit sub-element in the Counts element, which links to a GPUUnit element that has been defined for the geography in question. For example, to associate a vote count (that is associated with a particular ballot selection in a contest) with the City of Wauwatosa municipality, the XML is simply:

```xml
<GPUnit xsi:type="ReportingUnit" reportingUnitType="municipality" object_id="OID-WAUWATOSA" name="City of Wauwatosa"/>
```

### C.1.6.2 Reporting summary vote counts for contests

For reporting summary vote counts for a contest, one uses the ContestTotalCounts or ContestTotalCountsByGPUnit sub-elements in the Contest element. These sub-elements are of type TotalCounts, with the attributes used for total number of ballots cast containing the contest, total number of overvotes and undervotes in the contest, and total number of write-ins in the contest. One can further break out the summary counts by class of ballot, general class of device, or specific type of device and manufacturer. The difference between the two sub-elements is that ContestTotalCounts is used for a contest scope-wide summary, i.e., a summary that applies to the contest as a whole, whereas ContestTotalCountsByGPUnit is used to provide the summaries broken down by geo-political geographies, e.g., precincts.

Following is an example of vote totals for a contest using both sub-elements, with ContestTotalCounts being used to report summary vote counts by ballot class and general device type, and ContestTotalCountsByGPUnit being further broken down by precinct:

```xml
<Contest xsi:type="CandidateChoice" name="Governor" votesAllowed="1" object_id="OID-GOV"/>
...<ContestTotalCounts ballotsCast="888033" deviceType="unknown" overvotes="6013" undervotes="2841" ballotType="total" writeIns="982" object_id="c29364"/>
<ContestTotalCounts ballotsCast="287033" deviceType="opscan-precinct" overvotes="2000" undervotes="400" ballotType="election-day" writeIns="510" object_id="c27364"/>
<ContestTotalCounts ballotsCast="200000" deviceType="opscan-central" overvotes="510" undervotes="440" ballotType="election-day" writeIns="200" object_id="c26364"/>
<ContestTotalCounts ballotsCast="75000" deviceType="electronic" overvotes="100" undervotes="300" ballotType="absentee" writeIns="30" object_id="c25364"/>
...<ContestTotalCountsByUnit ballotsCast="800000" deviceType="electronic" overvotes="600" undervotes="200" ballotType="total" writeIns="100" object_id="c24364"/>
<GPUnit OID=WARD11/GPUnit>
<ContestTotalCountsByUnit>
<ContestTotalCountsByUnit ballotsCast="10000" deviceType="opscan-central" overvotes="600" undervotes="200" ballotType="total" writeIns="100" object_id="c23364"/>
<GPUnit OID=WARD10/GPUnit>
<ContestTotalCountsByUnit>
<ContestTotalCountsByUnit ballotsCast="10000" deviceType="opscan-precinct" overvotes="600" undervotes="200" ballotType="total" writeIns="100" object_id="c22364"/>
<GPUnit OID=WARD11/GPUnit>
<ContestTotalCountsByUnit>
</Contest>
```

Some jurisdictions report items such as overvotes and undervotes as candidates in a contest as opposed to reporting them separately as a summary of counts. This schema does not prevent one from treating overvotes, undervotes, or other types of counts as candidates in a contest, thus one would report their specific vote counts as shown in Clause C.1.6.1.
C.1.6.3 Reporting summary ballot and other counts for geo-political geographies

Lastly, for reporting counts of ballots cast and related summary counts for precincts, counties, and other geo-political geographies that report votes, one uses the GPUnitTotalCounts sub-element in the GPUnit element. This sub-element is structured exactly as the TotalCounts element, with the attributes used for counts that apply to the GPUnit as a whole: number of ballots cast, number of overvotes and undervotes, and number of write-ins. These counts can furthermore be broken down by ballot class, general type of voting device, and specific type of device and manufacturer.

Following is an example of the GPUnitTotalCounts sub-elements being used to report on ballot counts for a GPUnit precinct element:

```xml
<GPUnit xsi:type="ReportingUnit" reportingUnitType="precinct" object_id="OID-WARD10" name="Ward 10">
  <GPUnitTotalCounts ballotsCast="2033" deviceType="opscan-precinct" overvotes="200" undervotes="112" ballotType="election-day" writeIns="25"/>
  <GPUnitTotalCounts ballotsCast="1100" deviceType="opscan-central" overvotes="510" undervotes="440" ballotType="election-day" writeIns="30"/>
  <GPUnitTotalCounts ballotsCast="750" deviceType="electronic" overvotes="0" undervotes="30" ballotType="absentee" writeIns="30"/>
</GPUnit>
```

C.1.7 Use of codes for national, state, and local-level identification of election objects

As described in Clause 5.1.1, the schema includes support for optionally coding or naming certain election objects using up to 3 types of codes that can be categorized as for national, state, and local use. For example, an office for State Senator can be coded according to any of these schemes:

```xml
<Contest xsi:type="Office" nationalOfficeCode="132" stateOfficeCode="033" localOfficeCode="485"/>
```

Those elements supporting the 3 levels of codes are

- Contest
- GPUnit (Device, District, ReportingUnit)
- Office
- Party

C.2 XML schema documentation

The following clauses provide detailed discussion of the elements and attributes included in the XML schema. Clause C.3 includes a full listing of the schema. Much of the discussion is repeated from the UML data model discussion details in Clause 6.3 but changed where appropriate to be specific to XML schema format.

C.2.1 Element BallotMeasure (extension base Contest)

For a contest specific to ballot measures (i.e., referenda). Inherits attributes and elements from Contest.

Elements:

<table>
<thead>
<tr>
<th>Element</th>
<th>Required</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FullText</td>
<td>no</td>
<td>string</td>
<td>The full text of the ballot measure.</td>
</tr>
<tr>
<td>SummaryText</td>
<td>no</td>
<td>string</td>
<td>The summary text of the ballot measure.</td>
</tr>
</tbody>
</table>

Table C.1—Elements for BallotMeasure

Usage and Definition:
<Contest xsi:type="BallotMeasure" ... >
<xsd:complexType name="BallotMeasure">
  <xsd:complexContent>
    <xsd:extension base="Contest">
      <xsd:sequence>
        <xsd:element name="FullText" type="xsd:string" minOccurs="0"/>
        <xsd:element name="SummaryText" type="xsd:string" minOccurs="0"/>
      </xsd:sequence>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>

C.2.2 Element BallotMeasureSelection (extension base BallotSelection)

For a ballot selection involving a ballot measure; used as an xsi:type of BallotSelection to link a ballot selection for a ballot measure to a vote count. BallotMeasureSelection implements BallotSelection as an extension base and thus inherits attributes and elements from BallotSelection.

Attributes:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Required</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>selection</td>
<td>yes</td>
<td>string</td>
<td>String used to vote for or against the ballot measure, e.g., &quot;yes&quot;, &quot;no&quot;.</td>
</tr>
</tbody>
</table>

Usage and Definition:

<BallotSelection xsi:type="BallotMeasureSelection" ... >
<xsd:complexType name="BallotMeasureSelection">
  <xsd:complexContent>
    <xsd:extension base="BallotSelection">
      <xsd:attribute name="selection" type="xsd:string" use="required"/>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>

C.2.3 Element BallotSelection (abstract)

Serves to define a ballot selection in a contest and link it with a vote count. Used as a sub-element of the Contest element for each ballot selection in a contest; it references the VoteCounts element to link a count of votes to the ballot selection. There are three types of ballot selections:

- BallotMeasureSelection, used for a ballot selection involving a ballot measure
- CandidateSelection, used for a candidate selection
- Party, used for the party associated with a straight party selection

The corresponding elements implement these types by including BallotSelection as an extension base; BallotSelection references them as xsi:types of BallotSelection. Accordingly, the syntax for each of the elements is:

<BallotSelection xsi:type="BallotMeasureSelection" ... >
<BallotSelection xsi:type="CandidateSelection" ... >
<BallotSelection xsi:type="Party" ... >
Party is also referenced directly by other elements; see Clause C.2.18. See also Clause C.1.5 for additional information about BallotSelection usage.

Attributes:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Required</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ballotSelectionID</td>
<td>no</td>
<td>string</td>
<td>ID for use as needed, e.g., for a mandated ID scheme.</td>
</tr>
<tr>
<td>object_id</td>
<td>yes</td>
<td>xsd:ID</td>
<td>Unique identifier for this XML object.</td>
</tr>
</tbody>
</table>

Table C.3—Attributes for BallotSelection

Elements:

<table>
<thead>
<tr>
<th>Element</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VoteCounts</td>
<td>0..1</td>
<td>VoteCounts</td>
<td>For associating votes with the ballot selection.</td>
</tr>
</tbody>
</table>

Table C.4—Elements for BallotSelection

Definition:

```xml
<xsd:complexType name="BallotSelection" abstract="true">
  <xsd:sequence>
    <xsd:element name="VoteCounts" type="VoteCounts" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element name="GPUnit" type="xsd:IDREF"/>
  </xsd:sequence>
  <xsd:attribute name="ballotSelectionID" type="xsd:string"/>
  <xsd:attribute name="object_id" type="xsd:ID" use="required"/>
</xsd:complexType>
```

C.2.4 Element BallotStyle and BallotStyleCollection

For defining a ballot style and/or ballot style ID and associating it with a GPUnit element that represents a low-level reporting unit such as a precinct. BallotStyleCollection wraps a collection of BallotStyle elements and Election includes BallotStyleCollection as a sub-element.

Attributes:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Required</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ballotStyleID</td>
<td>no</td>
<td>string</td>
<td>ID for use as needed, e.g., for a mandated ID scheme.</td>
</tr>
<tr>
<td>object_id</td>
<td>yes</td>
<td>xsd:ID</td>
<td>Unique identifier for this XML object.</td>
</tr>
</tbody>
</table>

Table C.5—Attributes for BallotStyle

Elements:

<table>
<thead>
<tr>
<th>Element</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPUnit</td>
<td>1..1</td>
<td>xsd:IDREF</td>
<td>Unique identifier for a GPUnit element. For associating a specific reporting unit with the ballot style.</td>
</tr>
<tr>
<td>OrderedContest</td>
<td>0..*</td>
<td>OrderedContest</td>
<td>For associating contests in order as listed on ballot.</td>
</tr>
</tbody>
</table>

Table C.6—Elements for BallotStyle

Definition:

```xml
<xsd:complexType name="BallotStyle">
  <xsd:sequence>
    <xsd:element name="OrderedContest" type="OrderedContest" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element name="GPUnit" type="xsd:IDREF"/>
  </xsd:sequence>
</xsd:complexType>
```
**C.2.5 Element Candidate and CandidateCollection**

For defining information about a candidate in a contest. CandidateCollection wraps a collection of Candidate elements and Election includes CandidateCollection as a subelement. CandidateSelection links to Candidate via Candidate’s object_id attribute so as to associate a candidate with a ballot selection.

### Attributes:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Required</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ballotName</td>
<td>yes</td>
<td>string</td>
<td>Candidate’s name as listed on the ballot.</td>
</tr>
<tr>
<td>candidateID</td>
<td>no</td>
<td>string</td>
<td>ID for use as needed, e.g., for a mandated ID scheme.</td>
</tr>
<tr>
<td>fileDate</td>
<td>no</td>
<td>dateTime</td>
<td>Date and time when candidate filed for a contest.</td>
</tr>
<tr>
<td>isIncumbent</td>
<td>no</td>
<td>boolean</td>
<td>Boolean to indicate whether the candidate is the incumbent for the office.</td>
</tr>
<tr>
<td>isTopTicket</td>
<td>no</td>
<td>boolean</td>
<td>Boolean to indicate whether the candidate is the top of a ticket that includes multiple candidates.</td>
</tr>
<tr>
<td>lastName</td>
<td>no</td>
<td>string</td>
<td>Candidate’s last name.</td>
</tr>
<tr>
<td>object_id</td>
<td>yes</td>
<td>xsd:ID</td>
<td>Unique identifier for this XML object.</td>
</tr>
<tr>
<td>sequenceOrder</td>
<td>no</td>
<td>string</td>
<td>Order in which to list the candidate in the results.</td>
</tr>
<tr>
<td>status</td>
<td>no</td>
<td>CandidateStatus</td>
<td>Registration status of the candidate, e.g., filed, qualified, etc.</td>
</tr>
</tbody>
</table>

**Table C.7—Attributes for Candidate**

### Elements:

<table>
<thead>
<tr>
<th>Element</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Party</td>
<td>0..1</td>
<td>xsd:IDREF</td>
<td>Unique identifier for a Party element. For associating a party with the candidate.</td>
</tr>
<tr>
<td>Person</td>
<td>0..1</td>
<td>xsd:IDREF</td>
<td>Unique identifier for a Person element. For associating detailed information about the candidate.</td>
</tr>
</tbody>
</table>

**Table C.8—Elements for Candidate**

### Definition:

```xml
<xs:complexType name="Candidate">
    <xs:sequence>
        <xs:element name="Party" type="xsd:IDREF" minOccurs="0"/>
        <xs:element name="Person" type="xsd:IDREF" minOccurs="0"/>
    </xs:sequence>
    <xs:attribute name="ballotName" type="xsd:string" use="required"/>
    <xs:attribute name="candidateID" type="xsd:string"/>
    <xs:attribute name="fileDate" type="xsd:dateTime"/>
    <xs:attribute name="isIncumbent" type="xsd:boolean"/>
    <xs:attribute name="isTopTicket" type="xsd:boolean"/>
    <xs:attribute name="object_id" type="xsd:ID" use="required"/>
    <xs:attribute name="sequenceOrder" type="xsd:integer"/>
    <xs:attribute name="status" type="CandidateStatus"/>
</xs:complexType>
```

```xml
<xs:complexType name="CandidateCollection">
    <xs:sequence>
        <xs:element name="BallotStyle" type="BallotStyle" minOccurs="1" maxOccurs="unbounded"/>
    </xs:sequence>
</xs:complexType>
```
C.2.6 Element CandidateChoice (extension base Contest)

For a contest involving one or more candidates. Inherits attributes from Contest.

Attributes:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Required</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>numberElected</td>
<td>yes</td>
<td>integer</td>
<td>Number of candidates that are elected in the contest (&quot;N&quot; of N-of-M).</td>
</tr>
<tr>
<td>votesAllowed</td>
<td>yes</td>
<td>integer</td>
<td>Maximum number of votes/write-ins per voter in this contest.</td>
</tr>
</tbody>
</table>

Table C.9— Attributes for CandidateChoice

Elements:

<table>
<thead>
<tr>
<th>Element</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office</td>
<td>0 or 1</td>
<td>xsd:IDREF</td>
<td>Unique identifier for an Office element. For associating an office description with the contest.</td>
</tr>
<tr>
<td>PrimaryParty</td>
<td>0 or 1</td>
<td>xsd:IDREF</td>
<td>Unique identifier for a Party element. For associating a party with the contest.</td>
</tr>
</tbody>
</table>

Table C.10— Elements for CandidateChoice

Usage and Definition:

```xml
<Contest xsi:type="CandidateChoice" ... />
```

C.2.7 Element CandidateSelection (extension base BallotSelection)

For a ballot selection involving one or more candidates; used as an xsi:type of BallotSelection to link a ballot selection for the candidate(s) to a vote count. CandidateSelection implements BallotSelection as an extension base and thus inherits attributes and elements from BallotSelection. Multiple CandidateSelection sub-elements could be used when the ballot selection is for a ticket, e.g., the Presidential ticket.

Attributes:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Required</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>isWriteIn</td>
<td>no</td>
<td>0 or 1</td>
<td>boolean</td>
<td>Indicates whether the candidate is a write-in, e.g., “yes” or “no”.</td>
</tr>
</tbody>
</table>

Table C.11— Attributes for CandidateSelection

Elements:
## Element Occurs Type Description

<table>
<thead>
<tr>
<th>Element</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Candidate</td>
<td>1..*</td>
<td>xsd:IDREF</td>
<td>Unique identifier for a Candidate element. For associating a candidate with the candidate selection on the ballot. The multiplicity is unlimited for cases where the ballot selection is for a ticket.</td>
</tr>
<tr>
<td>EndorsementParty</td>
<td>0..*</td>
<td>xsd:IDREF</td>
<td>Unique identifier for a Party element. For associating one or more endorsing parties with the candidate selection</td>
</tr>
</tbody>
</table>

### Table C.12— Elements for CandidateSelection

#### Usage and Definition:

```
<BallotSelection xsi:type="CandidateSelection" ... >
  <xsd:complexType name="CandidateSelection">
    <xsd:complexContent>
      <xsd:extension base="BallotSelection">
        <xsd:sequence>
          <xsd:element name="Candidate" type="xsd:IDREF" maxOccurs="unbounded"/>
          <xsd:element name="EndorsementParty" type="xsd:IDREF" minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
        <xsd:attribute name="isWriteIn" type="xsd:boolean"/>
      </xsd:extension>
    </xsd:complexContent>
  </xsd:complexType>
```

### C.2.8 Element Contact

For defining address-related and other contact information about a person or a reporting unit. Person and GPUnit (xsi:type="ReportingUnit") include Contact as a sub-element.

#### Attributes:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Required</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>addressNumber</td>
<td>no</td>
<td>string</td>
<td>Number of the residence on the street, e.g., 9047 of 9047 Main Street.</td>
</tr>
<tr>
<td>city</td>
<td>no</td>
<td>string</td>
<td></td>
</tr>
<tr>
<td>country</td>
<td>no</td>
<td>string</td>
<td></td>
</tr>
<tr>
<td>email</td>
<td>no</td>
<td>string</td>
<td></td>
</tr>
<tr>
<td>fax</td>
<td>no</td>
<td>string</td>
<td></td>
</tr>
<tr>
<td>hours</td>
<td>yes</td>
<td>string</td>
<td>Hours that the contact is available, could include days.</td>
</tr>
<tr>
<td>name</td>
<td>no</td>
<td>string</td>
<td>Name associated with the contact address.</td>
</tr>
<tr>
<td>object_id</td>
<td>yes</td>
<td>xsd:ID</td>
<td>Unique identifier for this XML object.</td>
</tr>
<tr>
<td>phone</td>
<td>no</td>
<td>string</td>
<td></td>
</tr>
<tr>
<td>postalCode</td>
<td>no</td>
<td>string</td>
<td>Zip code, etc.</td>
</tr>
<tr>
<td>stateAbbreviation</td>
<td>yes</td>
<td>string</td>
<td>2-character U.S. Census Bureau abbreviation of the state, e.g., AS, AL, etc.</td>
</tr>
<tr>
<td>streetName</td>
<td>no</td>
<td>string</td>
<td></td>
</tr>
<tr>
<td>URL</td>
<td>no</td>
<td>anyURI</td>
<td>URL associated with the contact.</td>
</tr>
</tbody>
</table>

### Table C.13— Attributes for Contact

#### Definition:

```
<xsd:complexType name="Contact">
  <xsd:attribute name="addressNumber" type="xsd:string"/>
  <xsd:attribute name="city" type="xsd:string"/>
  <xsd:attribute name="country" type="xsd:string"/>
  <xsd:attribute name="email" type="xsd:string"/>
  <xsd:attribute name="fax" type="xsd:string"/>
  <xsd:attribute name="hours" type="xsd:string"/>
  <xsd:attribute name="object_id" type="xsd:ID" use="required"/>
```
C.2.9 Element Contest (abstract) and ContestCollection

Serves to define a contest and link it with the ballot selections for that contest and then to the votes for each of ballot selection. ContestCollection wraps collections of Contest elements and Election includes ContestCollection as a sub-element. There are 3 types of contests:

- BallotMeasure, used for a contest involving a ballot measure
- CandidateChoice, used for a contest involving one or more candidates for an office
- StraightParty, used for a contest for a straight party selection on the ballot

The corresponding elements implement these types by including contest as an extension base; Contest references them as xsi:types of Contest. Accordingly, the syntax for each of the elements is:

```xml
<Contest xsi:type="BallotMeasure" … />
<Contest xsi:type="CandidateChoice" … />
<Contest xsi:type="StraightParty" … />
```

Contest includes an optional ContestGPScope sub-element, used to link to a GPUnit defined as the geographical scope of the contest. For example, for a contest for a state senate seat, ContestGPScope would link to a GPUnit element defined for the district associated with the contest. Office also includes an OfficeGPScope sub-element that serves the same purpose.

Contest includes two optional sub-elements of type TotalCounts for reporting on summary counts for the contest:

- ContestTotalCounts, for providing a geographical scope-wide summary of counts associated with a contest, including total number of ballots cast containing the contest, total number of overvotes, undervotes, and write-ins. The geographical scope of the contest, if defined, would be linked via the ContestGPScope sub-element or by including a link to Office and including the Office Jurisdiction sub-element. ContestTotalCounts does NOT include the optional GPUnit sub-element.
- ContestTotalCountsByGPUnit, for providing a geographical scope-wide summary of counts associated with a contest, broken down by individual GPUnits. ContestTotalCountsByGPUnit DOES include the optional GPUnit sub-element to link to a GPUnit defined for a lower level reporting unit within the scope of the contest.

Clause C.1.5 describes usage for Contest in more detail.

Attributes:
<table>
<thead>
<tr>
<th>Attribute</th>
<th>Required</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>abbreviation</td>
<td>no</td>
<td>string</td>
<td>Abbreviation for the contest.</td>
</tr>
<tr>
<td>localContestCode</td>
<td>no</td>
<td>string</td>
<td>Local code for identifying an ID associated with the contest.</td>
</tr>
<tr>
<td>name</td>
<td>yes</td>
<td>string</td>
<td>Title or name of the contest, e.g., “Governor” or “Question on Legalization of Gambling”.</td>
</tr>
<tr>
<td>nationalContestCode</td>
<td>no</td>
<td>string</td>
<td>National code for identifying an ID associated with the contest.</td>
</tr>
<tr>
<td>object_id</td>
<td>yes</td>
<td>xsd:ID</td>
<td>Unique identifier for this XML object.</td>
</tr>
<tr>
<td>reportedPrecincts</td>
<td>no</td>
<td>integer</td>
<td>Number of precincts that have completed reporting votes for this contest.</td>
</tr>
<tr>
<td>sequenceOrder</td>
<td>no</td>
<td>string</td>
<td>Order in which to list the candidate in the results.</td>
</tr>
<tr>
<td>stateContestCode</td>
<td>no</td>
<td>string</td>
<td>State code for identifying an ID associated with the contest.</td>
</tr>
<tr>
<td>totalPrecincts</td>
<td>no</td>
<td>integer</td>
<td>Total number of precincts that have this contest on the ballot.</td>
</tr>
<tr>
<td>voteVariation</td>
<td>no</td>
<td>VoteVariation</td>
<td>Vote variation associated with the contest, e.g., N-of-M.</td>
</tr>
</tbody>
</table>

Table C.14—Attributes for Contest

Elements:

<table>
<thead>
<tr>
<th>Element</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BallotSelection</td>
<td>0..*</td>
<td>BallotSelection</td>
<td>For associating a ballot selection for the contest, i.e., a candidate, a ballot measure.</td>
</tr>
<tr>
<td>ContestGPScope</td>
<td>0..1</td>
<td>xsd:IDREF</td>
<td>Unique identifier for a GPUnit element. For associating a geo-political unit with this contest.</td>
</tr>
<tr>
<td>ContestTotalCounts</td>
<td>0..*</td>
<td>TotalCounts</td>
<td>Vote summary counts (overvotes, undervotes, total ballots, etc.) optionally broken down by device type and ballot class; the scope of the counts is contest-wide.</td>
</tr>
<tr>
<td>ContestTotalCountsByGPUnit</td>
<td>0..*</td>
<td>TotalCounts</td>
<td>Same as ContestTotalCounts but scope of counts is associated with a GPUnit.</td>
</tr>
</tbody>
</table>

Table C.15—Elements for Contest

Definition:

```xml
<xsd:complexType name="Contest" abstract="true">
  <xsd:sequence>
    <xsd:element name="BallotSelection" type="BallotSelection" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element name="ContestGPScope" type="xsd:IDREF" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="ContestTotalCounts" type="TotalCounts" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="ContestTotalCountsByGPUnit" type="TotalCounts" minOccurs="0" maxOccurs="unbounded"/>
  </xsd:sequence>
  <xsd:attribute name="object_id" type="xsd:ID" use="required"/>
  <xsd:attribute name="abbreviation" type="xsd:string"/>
  <xsd:attribute name="name" type="xsd:string" use="required"/>
  <xsd:attribute name="nationalContestCode" type="xsd:string"/>
  <xsd:attribute name="reportedPrecincts" type="xsd:integer"/>
  <xsd:attribute name="sequenceOrder" type="xsd:integer"/>
  <xsd:attribute name="stateContestCode" type="xsd:string"/>
  <xsd:attribute name="totalPrecincts" type="xsd:integer"/>
  <xsd:attribute name="voteVariation" type="VoteVariation"/>
</xsd:complexType>
```

```xml
<xsd:complexType name="ContestCollection">
  <xsd:sequence>
    <xsd:element name="Contest" type="Contest" minOccurs="1" maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>
```
C.2.10 Element Counts (abstract)

For breaking down contest summary counts and geo-political unit counts into greater detail and linking the contest summary counts to geo-political units defined within the geographic scope of the contest. Contains attributes to categorize the counts according to ballot classification (e.g., election day, early voting, etc.) and type of device on which the votes were cast, and an element to link the counts to a GPUnit.

Counts is not referenced directly by other elements; other elements directly reference those elements that include Counts as an extension base and thus, attributes for Counts are inherited by these elements:

- TotalCounts for reporting on contest and geo-political unit summary vote counts
- VoteCounts for reporting on contest vote counts

Clause C.1.6 describes usage for Counts in more detail.

Attributes:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Required</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ballotType</td>
<td>no</td>
<td>BalloType</td>
<td>Enumerated ballot class applicable to the contest counts, e.g., election day, early voting, etc.</td>
</tr>
<tr>
<td>deviceManufacturer</td>
<td>no</td>
<td>string</td>
<td>Manufacturer of the vote-capture device(s) used.</td>
</tr>
<tr>
<td>deviceModel</td>
<td>no</td>
<td>string</td>
<td>Type defined by the reporting jurisdiction for the vote-capture device.</td>
</tr>
<tr>
<td>deviceType</td>
<td>no</td>
<td>DeviceType</td>
<td>Enumerated type for the vote-capture device.</td>
</tr>
<tr>
<td>object_id</td>
<td>no</td>
<td>xsd:ID</td>
<td>Unique identifier for this XML object.</td>
</tr>
</tbody>
</table>

Table C.16—Attributes for Counts

Elements:

<table>
<thead>
<tr>
<th>Element</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPUnit</td>
<td>0 or 1</td>
<td>xsd:IDREF</td>
<td>Unique identifier for a GPUnit element. For associating counts with a geo-political unit, e.g., a precinct, a county, a township, etc.</td>
</tr>
</tbody>
</table>

Table C.17—Elements for Counts

Definition:

```xml
<xsd:complexType name="Counts" abstract="true">
  <xsd:sequence>
    <xsd:element name="GPUnit" type="xsd:IDREF" minOccurs="0"/>  
    <xsd:attribute name="object_id" type="xsd:ID" use="required"/>
    <xsd:attribute name="ballotType" type="BalloType"/>
    <xsd:attribute name="deviceManufacturer" type="xsd:string"/>
    <xsd:attribute name="deviceModel" type="xsd:string"/>
    <xsd:attribute name="deviceType" type="DeviceType"/>
  </xsd:sequence>
</xsd:complexType>
```

C.2.11 Element Device (extension base GPUnit)

For defining a specific vote-capture device for the purpose of linking the device to a vote count or to summary counts, or linking a ballot style to the device. Includes GPUnit as an extension base and thus inherits attributes and elements from GPUnit. Is referenced as

```xml
<GPUnit xsi:type="Device" … />```
Attributes:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Required</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>deviceType</td>
<td>yes</td>
<td>DeviceType</td>
<td>Enumerated type of device, e.g., DRE, opscan-precinct, etc.</td>
</tr>
<tr>
<td>manufacturer</td>
<td>no</td>
<td>string</td>
<td>Manufacturer of the device.</td>
</tr>
<tr>
<td>serialNumber</td>
<td>no</td>
<td>string</td>
<td>Device's serial number or other unique identifier.</td>
</tr>
</tbody>
</table>

Table C.18—Attributes for Device

Usage and Definition:

```xml
<GPUnit xsi:type="Device" … />
```

C.2.12 Element District (extension base GPUnit)

For defining a geo-political unit of type district. Includes GPUnit as an extension base and thus inherits attributes and elements from GPUnit. Is referenced as:

Attributes:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Required</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>districtType</td>
<td>yes</td>
<td>DistrictType</td>
<td>Enumerated type of district.</td>
</tr>
</tbody>
</table>

Table C.19—Attributes for District

Usage and Definition:

```xml
<GPUnit xsi:type="District" … />
```

C.2.13 Element Election

For describing the status of the election and associated information.

Attributes:
<table>
<thead>
<tr>
<th>Attribute</th>
<th>Required</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>absenteeVotingStatus</td>
<td>no</td>
<td>BallotCountStatus</td>
<td>Counting status for absentee ballots.</td>
</tr>
<tr>
<td>date</td>
<td>yes</td>
<td>date</td>
<td>Calendar date of the election, e.g., &quot;November 4, 2014&quot;.</td>
</tr>
<tr>
<td>earlyVotingStatus</td>
<td>no</td>
<td>BallotCountStatus</td>
<td>Counting status for ballots cast during early voting.</td>
</tr>
<tr>
<td>electionDayVotingStatus</td>
<td>no</td>
<td>BallotCountStatus</td>
<td>Counting status for ballots cast on election day.</td>
</tr>
<tr>
<td>name</td>
<td>yes</td>
<td>string</td>
<td>Title of the election, e.g., &quot;Montgomery County Maryland General Election&quot;.</td>
</tr>
<tr>
<td>object_id</td>
<td>no</td>
<td>xsd:ID</td>
<td>Unique identifier for this XML object.</td>
</tr>
<tr>
<td>provisionalVotingStatus</td>
<td>no</td>
<td>BallotCountStatus</td>
<td>Counting status for provisional ballots.</td>
</tr>
<tr>
<td>type</td>
<td>yes</td>
<td>ElectionType</td>
<td>Enumerated type of election, e.g., partisan primary, open primary, etc.</td>
</tr>
<tr>
<td>URL</td>
<td>no</td>
<td>anyURI</td>
<td>URL associated with the election, e.g., for a state's or county's election results website.</td>
</tr>
<tr>
<td>writeInVotingStatus</td>
<td>no</td>
<td>BallotCountStatus</td>
<td>Counting status for write-in ballots.</td>
</tr>
</tbody>
</table>

Table C.20 — Attributes for Election

Elements:

<table>
<thead>
<tr>
<th>Element</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BallotStyleCollection</td>
<td>0..1</td>
<td>BallotStyleCollection</td>
<td>For defining a collection of ballot styles associated with the election.</td>
</tr>
<tr>
<td>CandidateCollection</td>
<td>0..1</td>
<td>CandidateCollection</td>
<td>For defining a collection of candidates associated with the election.</td>
</tr>
<tr>
<td>ContestCollection</td>
<td>0..1</td>
<td>ContestCollection</td>
<td>For defining a collection of contests associated with the election.</td>
</tr>
<tr>
<td>ElectionGPScope</td>
<td>0..1</td>
<td>xsd:IDREF</td>
<td>Unique identifier for a GPUnit element. For associating the top-most geo-political unit that is reporting the results, e.g., a state or county, thereby identifying the geographical scope of the election results.</td>
</tr>
</tbody>
</table>

Table C.21 — Elements for Election

Definition:

```xml
<xsd:complexType name="Election">
  <xsd:sequence>
    <xsd:element name="BallotStyleCollection" type="BallotStyleCollection" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="CandidateCollection" type="CandidateCollection" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="ContestCollection" type="ContestCollection" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="ElectionGPScope" type="xsd:IDREF" minOccurs="0"/>
  </xsd:sequence>
  <xsd:attribute name="absenteeCountStatus" type="BallotCountStatus"/>
  <xsd:attribute name="date" type="xsd:date" use="required"/>
  <xsd:attribute name="earlyCountStatus" type="BallotCountStatus"/>
  <xsd:attribute name="electionDayCountStatus" type="BallotCountStatus"/>
  <xsd:attribute name="name" type="xsd:string" use="required"/>
  <xsd:attribute name="object_id" type="xsd:ID" use="required"/>
  <xsd:attribute name="provisionalCountStatus" type="BallotCountStatus"/>
  <xsd:attribute name="type" type="ElectionType" use="required"/>
  <xsd:attribute name="writeInCountStatus" type="BallotCountStatus"/>
  <xsd:attribute name="URL" type="xsd:anyURI"/>
</xsd:complexType>
```

C.2.14 Element ElectionReport

The root element; for describing various items pertaining to the status and format of the report and when generated. The optional Signature element is used for an XML digital signature, which is described in the normative reference in Clause 2. Signature must be the last element of ElectionReport.
Attributes:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Required</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>date</td>
<td>yes</td>
<td>dateTime</td>
<td>Identifies the date and time that the election report was generated.</td>
</tr>
<tr>
<td>format</td>
<td>yes</td>
<td>ReportFormat</td>
<td>Format of the report, e.g., contest summary, precinct level results, etc.</td>
</tr>
<tr>
<td>issuer</td>
<td>yes</td>
<td>string</td>
<td>Identification of the report issuer.</td>
</tr>
<tr>
<td>object_id</td>
<td>no</td>
<td>xsd:ID</td>
<td>Unique identifier for this XML object.</td>
</tr>
<tr>
<td>sequence</td>
<td>yes</td>
<td>integer</td>
<td>If this report is part of a sequence of files, its number in the sequence. Otherwise 0.</td>
</tr>
<tr>
<td>sequenceEnd</td>
<td>yes</td>
<td>integer</td>
<td>Indicates the upper bound of the sequence.</td>
</tr>
<tr>
<td>stateAbbreviation</td>
<td>yes</td>
<td>string</td>
<td>2-character U.S. Census Bureau abbreviation of the state whose results are being reported, e.g., AL, TX, MN, etc.</td>
</tr>
<tr>
<td>stateCode</td>
<td>yes</td>
<td>string</td>
<td>2-character U.S. Census Bureau (FIPS) code for the state, e.g., 01 for AL.</td>
</tr>
<tr>
<td>status</td>
<td>yes</td>
<td>ReportStatus</td>
<td>Status of the election report, e.g., test mode, unofficial, etc.</td>
</tr>
<tr>
<td>vendorApplicationID</td>
<td>yes</td>
<td>string</td>
<td>An identifier of the vendor application generating the election report, e.g., X-EMS version 3.1.a.</td>
</tr>
</tbody>
</table>

Table C.22—Attributes for ElectionReport

Elements:

<table>
<thead>
<tr>
<th>Element</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Election</td>
<td>0..*</td>
<td>Election</td>
<td>For associating elections with the report.</td>
</tr>
<tr>
<td>GPUnitCollection</td>
<td>0..1</td>
<td>GPUnitCollection</td>
<td>For associating geo-political geographies with the report.</td>
</tr>
<tr>
<td>Message</td>
<td>0..1</td>
<td>string</td>
<td>For including an arbitrary message with the report.</td>
</tr>
<tr>
<td>OfficeCollection</td>
<td>0..1</td>
<td>OfficeCollection</td>
<td>For associating office descriptions with the report.</td>
</tr>
<tr>
<td>PartyCollection</td>
<td>0..1</td>
<td>PartyCollection</td>
<td>For associating parties with the report.</td>
</tr>
<tr>
<td>PersonCollection</td>
<td>0..1</td>
<td>PersonCollection</td>
<td>For associating persons with the report.</td>
</tr>
<tr>
<td>Signature</td>
<td>0..1</td>
<td>ref</td>
<td>Reference to the Signature element of the W3C digital signature schema imported into this schema.</td>
</tr>
</tbody>
</table>

Table C.23—Elements for ElectionReport

Definition:

```xml
<xsd:complexType name="ElectionReport">
    <xsd:sequence>
        <xsd:element name="Message" type="xsd:string" minOccurs="0" maxOccurs="1"/>
        <xsd:element name="GPUnitCollection" type="GPUnitCollection" minOccurs="0" maxOccurs="1"/>
        <xsd:element name="PartyCollection" type="PartyCollection" minOccurs="0" maxOccurs="1"/>
        <xsd:element name="PersonCollection" type="PersonCollection" minOccurs="0" maxOccurs="1"/>
        <xsd:element name="Election" type="Election" minOccurs="0"/>
        <xsd:element ref="ds:Signature" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute name="object_id" type="xsd:ID" use="required"/>
    <xsd:attribute name="date" type="xsd:dateTime" use="required"/>
    <xsd:attribute name="format" type="ReportFormat" use="required"/>
    <xsd:attribute name="issuer" type="xsd:string" use="required"/>
    <xsd:attribute name="sequence" type="xsd:integer" use="required"/>
    <xsd:attribute name="sequenceEnd" type="xsd:integer" use="required"/>
    <xsd:attribute name="stateAbbreviation" type="xsd:string" use="required"/>
    <xsd:attribute name="stateCode" type="xsd:string"/>
    <xsd:attribute name="status" type="ReportStatus" use="required"/>
    <xsd:attribute name="vendorApplicationID" type="xsd:string" use="required"/>
</xsd:complexType>
```
C.2.15 Element GPUnit (abstract) and GPUnitCollection

For defining geo-political geographies such as cities, districts, jurisdictions, precincts or split-precincts, or specific vote-capture devices, for the purpose of associating vote counts and other information with the geography or device. GPUnitCollection wraps collections of GPUnit elements; ElectionReport includes GPUnitCollection as a sub-element. Election, Contest, and Office optionally reference a GPUnit defined as the jurisdiction of the election, contest, or office respectively. TotalCounts and VoteCounts reference GPUnit to link vote or summary counts to a geo-political unit. BallotStyle references GPUnit to link a ballot style to its corresponding geo-political unit (likely a precinct). Lastly, GPUnit references TotalCounts to link to summary counts for the corresponding geo-political unit (again, likely a precinct or lower-level unit).

GPUnits can reference each other to form a model of a state's (or a county's, etc.) jurisdictions, districts, precincts, and so forth. There are three types of geo-political geographies:

- Device, for associating vote counts with a specific vote-capture device
- District, for associating vote counts with various types of district
- ReportingUnit, for associating vote counts with geo-political geographies such as cities, precincts, etc., that report vote counts

The corresponding elements implement these types by including GPUnit as an extension base; GPUnit references them as xsi:types of GPUnit. Accordingly, the syntax for each of the elements is:

```xml
<GPUnit xsi:type="Device" ... />
<GPUnit xsi:type="District" ... />
<GPUnit xsi:type="ReportingUnit" ... />
```

Clause C.1.4 describes usage of GPUnit elements in greater detail. Clause C.1.6 describes how vote and ballot counts are associated with GPUnit elements.

Attributes:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Required</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>localGeoCode</td>
<td>no</td>
<td>string</td>
<td>Local code for identifying the type of geo-political unit.</td>
</tr>
<tr>
<td>name</td>
<td>no</td>
<td>string</td>
<td>Name of the geo-political unit.</td>
</tr>
<tr>
<td>nationalGeoCode</td>
<td>no</td>
<td>string</td>
<td>National code for identifying the type of geo-political unit.</td>
</tr>
<tr>
<td>object_id</td>
<td>no</td>
<td>xsd:ID</td>
<td>Unique identifier for this XML object.</td>
</tr>
<tr>
<td>stateGeoCode</td>
<td>no</td>
<td>string</td>
<td>State code for identifying the type of geo-political unit.</td>
</tr>
<tr>
<td>URL</td>
<td>no</td>
<td>anyURI</td>
<td>URL associated with the geo-political unit, e.g., a jurisdiction's website.</td>
</tr>
</tbody>
</table>

Table C.24— Attributes for GPUnit

Elements:
### Table C.25—Elements for GPUnit

<table>
<thead>
<tr>
<th>Element</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPUnitTotalCounts</td>
<td>0..*</td>
<td>TotalCounts</td>
<td>Ballot summary counts (overvotes, undervotes, total ballots, etc.) optionally broken down by device type and ballot class.</td>
</tr>
<tr>
<td>GPSubUnit</td>
<td>0..*</td>
<td>GPUnit</td>
<td>For creating nested geo-political units, e.g., for creating geo-political units of type=precinct from within a county's unit such that the precinct units are nested.</td>
</tr>
<tr>
<td>GPSubUnitRef</td>
<td>0..*</td>
<td>xsd:IDREF</td>
<td>Unique identifier for a GPUnit element. For creating a reference within a geo-political unit to another geo-political unit.</td>
</tr>
<tr>
<td>PartyRegistration</td>
<td>0..1</td>
<td>PartyRegistration</td>
<td>For associating a count of registered voters per party with the geo-political unit.</td>
</tr>
<tr>
<td>SpatialDimension</td>
<td>0..1</td>
<td>SpatialDimension</td>
<td>For describing the unit’s spatial extent (a polygon that shows the related area) so as to visualize election results, understand the composition of districts, or to determine whether GPUnits are properly related.</td>
</tr>
</tbody>
</table>

#### C.2.16 Element Office and OfficeCollection

For describing the office associated with a contest or a district or jurisdiction. OfficeCollection wraps a collection of Office elements and ElectionReport includes OfficeCollection as a sub-element. Candidate and Contest link to Office.

Office includes an optional OfficeGPScope sub-element, which links to a GPUnit for the purpose of identifying the geographical scope of the office. For example, for an office for a state senate seat, the geopolitical unit would be for the district associated with that office. This sub-element is similar to the ContestGPScope sub-element included in the Contest element.

Contains attributes as defined in the following table:
Contains elements as defined in the following table:

<table>
<thead>
<tr>
<th>Element</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OfficeGPScope</td>
<td>0..1</td>
<td>xsd:IDREF</td>
<td>Unique identifier for a GPUnit element. For associating a geo-political unit with the office.</td>
</tr>
</tbody>
</table>

Table C.27— Elements for Office

C.2.17 Element OrderedContest

For listing the contests and corresponding ballot selections in the order in which they appear on the ballot, for the purposes of including in the election report a ballot style containing ordered contests and selections. Referenced by BallotStyle, which links the ballot to a GPUnit such as for a precinct.

Attributes:
Table C.28— Attributes for OrderedContest

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Required</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>object_id</td>
<td>yes</td>
<td>xsd:ID</td>
<td>Unique identifier for this XML object.</td>
</tr>
</tbody>
</table>

Elements:

Table C.29— Elements for OrderedContest

<table>
<thead>
<tr>
<th>Element</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BallotSelection</td>
<td>0..*</td>
<td>xsd:IDREF</td>
<td>Unique identifier for a BallotSelection element. For associating ballot selections with the ballot.</td>
</tr>
<tr>
<td>Contest</td>
<td>1..1</td>
<td>xsd:IDREF</td>
<td>Unique identifier for a Contest element. For associating ballot selections with the ballot.</td>
</tr>
</tbody>
</table>

Definition:

```xml
<xsd:complexType name="OrderedContest">
  <xsd:sequence>
    <xsd:element name="Contest" type="xsd:IDREF"/>
    <xsd:element name="BallotSelection" type="xsd:IDREF" minOccurs="0" maxOccurs="unbounded"/>
  </xsd:sequence>
  <xsd:attribute name="object_id" type="xsd:ID" use="required"/>
</xsd:complexType>
```

C.2.18 Element Party (extension base BallotSelection) and PartyCollection

Used in two ways: for a ballot selection in a straight-party contest, and to describe a political party that can then be referenced in other elements.

Used for a ballot selection in a straight-party contest, it is an xsi:type of BallotSelection. Accordingly, it implements BallotSelection as an extension base and thus inherits attributes and elements from BallotSelection. Its syntax for this usage is:

```
<BallotSelection xsi:type="Party" ... />
```

Used to define information about a political party, PartyCollection wraps a collection of Party sub-elements and ElectionReport includes PartyCollection as a sub-element. Candidate, PartyRegistration, and Person link to Party via its object_id attribute (inherited from BallotSelection).

Attributes:

Table C.30— Attributes for Party

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Required</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>abbreviation</td>
<td>no</td>
<td>string</td>
<td>Short name for the party, e.g., &quot;DEM&quot;.</td>
</tr>
<tr>
<td>localPartyCode</td>
<td>no</td>
<td>string</td>
<td>Local code for identifying the party.</td>
</tr>
<tr>
<td>name</td>
<td>yes</td>
<td>string</td>
<td>Official full name of the party, e.g., &quot;Republican&quot;.</td>
</tr>
<tr>
<td>nationalPartyCode</td>
<td>no</td>
<td>string</td>
<td>National code for identifying the party.</td>
</tr>
<tr>
<td>statePartyCode</td>
<td>no</td>
<td>string</td>
<td>State code for identifying the party.</td>
</tr>
</tbody>
</table>

Definition:

```xml
<xsd:complexType name="Party">
  <xsd:complexContent>
    <xsd:extension base="BallotSelection">
      <xsd:attribute name="abbreviation" type="xsd:string"/>
      <xsd:attribute name="localPartyCode" type="xsd:string"/>
    </xsd:extension>
</xsd:complexType>
```
C.2.19 Element PartyRegistration

For tracking the number of registered voters per geo-political unit, i.e., for reporting on the number of registered voters in a precinct to be used as a comparison to the turnout and ballots cast. Referenced by GPUnit.

Attributes:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Required</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>count</td>
<td>yes</td>
<td>integer</td>
<td>A count for tracking the number of registered voters.</td>
</tr>
<tr>
<td>object_id</td>
<td>yes</td>
<td>xsd:ID</td>
<td>Unique identifier for this XML object.</td>
</tr>
</tbody>
</table>

Table C.31—Attributes for PartyRegistration

Contains elements as defined in the following table:

<table>
<thead>
<tr>
<th>Element</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Party</td>
<td>1..1</td>
<td>xsd:IDREF</td>
<td>Unique identifier for a Party element. For associating a political party with the count.</td>
</tr>
</tbody>
</table>

Table C.32—Elements for PartyRegistration

Definition:

```xml
<xsd:complexType name="PartyRegistration">
  <xsd:sequence>
    <xsd:element name="Party" type="xsd:IDREF"/>
  </xsd:sequence>
  <xsd:attribute name="object_id" type="xsd:ID" use="required"/>
  <xsd:attribute name="count" type="xsd:integer" use="required"/>
</xsd:complexType>
```

C.2.20 Element Person and PersonCollection

For describing information about a person who may be a candidate, election official, etc. PersonCollection wraps a collection of person elements and ElectionReport includes PersonCollection as a sub-element. Candidate references Person and GPUnit references Person using Authority. Person optionally includes Contact as a sub-element to associate contact information that would be considered specific to the person.

Attributes:
<table>
<thead>
<tr>
<th>Attribute</th>
<th>Required</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ethnicity</td>
<td>no</td>
<td>EthnicityType</td>
<td>Person’s ethnicity.</td>
</tr>
<tr>
<td>firstName</td>
<td>no</td>
<td>string</td>
<td>Person’s first name.</td>
</tr>
<tr>
<td>gender</td>
<td>no</td>
<td>GenderType</td>
<td>Person’s gender.</td>
</tr>
<tr>
<td>lastName</td>
<td>yes</td>
<td>string</td>
<td>Person’s last name.</td>
</tr>
<tr>
<td>middleName</td>
<td>no</td>
<td>string</td>
<td>Person’s middle name.</td>
</tr>
<tr>
<td>nickname</td>
<td>no</td>
<td>string</td>
<td>Nickname associated with the person.</td>
</tr>
<tr>
<td>object_id</td>
<td>yes</td>
<td>xsd:ID</td>
<td>Unique identifier for this XML object.</td>
</tr>
<tr>
<td>prefix</td>
<td>no</td>
<td>string</td>
<td>A prefix associated with the person, e.g., Mr.</td>
</tr>
<tr>
<td>profession</td>
<td>no</td>
<td>string</td>
<td>Person’s profession.</td>
</tr>
<tr>
<td>suffix</td>
<td>no</td>
<td>string</td>
<td>A suffix associated with the person, e.g., Jr.</td>
</tr>
<tr>
<td>title</td>
<td>no</td>
<td>string</td>
<td>A title associated with the person.</td>
</tr>
</tbody>
</table>

**Table C.33—Attributes for Person**

Elements:

<table>
<thead>
<tr>
<th>Element</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact</td>
<td>1..*</td>
<td>Contact</td>
<td>For associating contact information with the person.</td>
</tr>
<tr>
<td>Party</td>
<td>0..1</td>
<td>xsd:IDREF</td>
<td>Unique identifier for a Party element. For associating a political party with the person.</td>
</tr>
</tbody>
</table>

**Table C.34—Elements for Person**

Definition:

```xml
<xsd:complexType name="Person">
  <xsd:sequence>
    <xsd:element name="Contact" type="Contact" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element name="Party" type="xsd:IDREF" minOccurs="0"/>
  </xsd:sequence>
  <xsd:attribute name="object_id" type="xsd:ID" use="required"/>
  <xsd:attribute name="ethnicity" type="EthnicityType"/>
  <xsd:attribute name="firstName" type="xsd:string"/>
  <xsd:attribute name="gender" type="GenderType"/>
  <xsd:attribute name="lastName" type="xsd:string" use="required"/>
  <xsd:attribute name="middleName" type="xsd:string"/>
  <xsd:attribute name="nickname" type="xsd:string"/>
  <xsd:attribute name="prefix" type="xsd:string"/>
  <xsd:attribute name="profession" type="xsd:string"/>
  <xsd:attribute name="suffix" type="xsd:string"/>
  <xsd:attribute name="title" type="xsd:string"/>
</xsd:complexType>
```

**C.2.21 Element ReportingUnit (extension base GPUnit)**

For describing a reporting unit, e.g., a geo-political unit that reports votes such as state, county, township, precinct, etc., for the purpose of associating a vote count with the reporting unit. Inherits attributes and elements from GPUnit.

ReportingUnit optionally links to Person for the purpose of providing one or more names of persons who serve as authorities for the reporting unit. ReportingUnit also includes optional multiple ReportingUnitContact sub-elements of type Contact for the purpose of providing one or more contact addresses for the reporting unit, such as an address of a vote center.
Attributes:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Required</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>hasReported</td>
<td>no</td>
<td>boolean</td>
<td>Boolean indicating whether the geo-political unit has completed reporting.</td>
</tr>
<tr>
<td>registeredVoters</td>
<td>no</td>
<td>integer</td>
<td>Number of registered voters residing within the boundaries of the geo-political unit.</td>
</tr>
<tr>
<td>reportedPrecincts</td>
<td>no</td>
<td>integer</td>
<td>For geo-political unit jurisdictions, number of associated precincts that have completed reporting.</td>
</tr>
<tr>
<td>reportingUnitType</td>
<td>yes</td>
<td>ReportingUnitType</td>
<td>Enumerated type of reporting unit, e.g., state, jurisdiction, etc.</td>
</tr>
<tr>
<td>totalParticipatingVoters</td>
<td>no</td>
<td>integer</td>
<td>Number of voters who have participated in the election, i.e., shown up at the polls, including those who did not cast ballots.</td>
</tr>
<tr>
<td>totalPrecincts</td>
<td>no</td>
<td>integer</td>
<td>For geo-political unit jurisdictions, total number of associated precincts.</td>
</tr>
</tbody>
</table>

Table C.35—Attributes for ReportingUnit

Elements:

<table>
<thead>
<tr>
<th>Element</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authority</td>
<td>0..*</td>
<td>xsd:IDREF</td>
<td>The object_id of one or more Person elements describing an authority responsible for the reporting unit.</td>
</tr>
<tr>
<td>ReportingUnitContact</td>
<td>0..*</td>
<td>Contact</td>
<td>One or more contact addresses for the reporting unit that would be separate from the contact addresses provided via the Person elements.</td>
</tr>
</tbody>
</table>

Table C.36—Elements for ReportingUnit

Usage and Definition:

```xml
<GPUnit xsi:type="ReportingUnit" ... />
```

C.2.22 Element SpatialDimension

For describing a GPUnit’s spatial layout, e.g., a map or a spatial extent (a polygon that shows the related area) so as to visualize election results, understand the composition of districts, or to determine whether GPUnits are properly related.

Attributes:
### Table C.37 — Attributes for SpatialDimension

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Required</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>object_id</td>
<td>no</td>
<td>xsd:ID</td>
<td>Unique identifier for this XML object.</td>
</tr>
<tr>
<td>map</td>
<td>no</td>
<td>anyURI</td>
<td>A URL to a map of the GPUnit.</td>
</tr>
</tbody>
</table>

### Table C.38 — Elements for SpatialDimension

<table>
<thead>
<tr>
<th>Element</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SpatialExtent</td>
<td>0..*</td>
<td>SpatialExtent</td>
<td>For associating the GPUnit’s spatial extent information.</td>
</tr>
</tbody>
</table>

### Usage and Definition:

```xml
<xsd:complexType name="SpatialDimension">
    <xsd:sequence>
        <xsd:element name="SpatialExtent" type="SpatialExtent" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute name="object_id" type="xsd:ID" use="required"/>
    <xsd:attribute name="map" type="xsd:anyURI"/>
</xsd:complexType>
```

### C.2.23 Class SpatialExtent

For describing the GPUnit’s spatial extent data and the format used for the spatial extent.

#### Attributes:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Required</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>object_id</td>
<td>yes</td>
<td>xsd:ID</td>
<td>Unique identifier for this XML object.</td>
</tr>
<tr>
<td>format</td>
<td>yes</td>
<td>string</td>
<td>Format used for spatial extent, e.g., GML, KML, WKT, SHP, etc.</td>
</tr>
</tbody>
</table>

### Table C.39 — Attributes for SpatialExtent

### Table C.40 — Elements for SpatialExtent

<table>
<thead>
<tr>
<th>Element</th>
<th>Occurs</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordinates</td>
<td>1..1</td>
<td>string</td>
<td>The data coordinates constituting the spatial extent.</td>
</tr>
</tbody>
</table>

### Usage and Definition:

```xml
<xsd:complexType name="SpatialExtent">
    <xsd:sequence>
        <xsd:element name="Coordinates" type="xsd:string"/>
    </xsd:sequence>
    <xsd:attribute name="object_id" type="xsd:ID" use="required"/>
    <xsd:attribute name="format" type="xsd:string" use="required"/>
</xsd:complexType>
```

### C.2.24 Element StraightParty (extension base Contest)

For maintaining a count of straight party selections on ballots. Inherits attributes from Contest.

No private attributes or elements.
Usage and Definition:

```xml
<Contest xsi:type="StraightParty" ... />
```

```xml
<xsd:complexType name="StraightParty">
  <xsd:complexContent>
    <xsd:extension base="Contest">
      <xsd:extension>
        <xsd:complexType>
          <xsd:complexContent>
            <xsd:extension base="Contest">
              <xsd:attribute name="ballotsCast" type="xsd:integer"/>
              <xsd:attribute name="overvotes" type="xsd:integer"/>
              <xsd:attribute name="undervotes" type="xsd:integer"/>
              <xsd:attribute name="writeIns" type="xsd:integer"/>
            </xsd:extension>
          </xsd:complexContent>
        </xsd:complexType>
      </xsd:extension>
    </xsd:complexContent>
  </xsd:complexType>
</xsd:complexType>
```

**C.2.25 Element TotalCounts (extension base Counts)**

For reporting on contest-wide or geo-political unit-wide summary counts. Includes Counts as an extension base and thus inherits attributes and elements from Counts, which can be used for breaking down contest and geo-political unit summary counts into greater detail and linking the contest summary counts to geo-political units defined within the geographic scope of the contest.

Contest includes two optional sub-elements of type TotalCounts for reporting on summary counts for the contest:

- ContestTotalCounts, for providing a geographical scope-wide summary of counts associated with a contest, including total number of ballots cast containing the contest, total number of overvotes, undervotes, and write-ins. TotalCounts, in this case, does NOT include the optional GPUnit sub-element inherited from Counts.

- ContestTotalCountsByGPUnit, for providing a summary of counts associated with a contest broken down by individual GPUnits. TotalCounts, in this case, DOES include the optional GPUnit sub-element to link to a GPUnit defined for a lower level reporting unit within the geographic scope of the contest.

GPUnit includes an optional sub-element of type TotalCounts called TotalCountsByGPUnit for reporting on a GPUnit-wide summary of ballots cast, etc. TotalCounts, in this case, does NOT include the optional GPUnit sub-element inherited from Counts.

**Attributes:**

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Required</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ballotsCast</td>
<td>yes</td>
<td>integer</td>
<td>Total number of ballots cast, either in a contest or associated with a geo-political unit.</td>
</tr>
<tr>
<td>overvotes</td>
<td>no</td>
<td>integer</td>
<td>Total number of overvotes, either in a contest or associated with a geo-political unit.</td>
</tr>
<tr>
<td>undervotes</td>
<td>no</td>
<td>integer</td>
<td>Total number of undervotes, either in a contest or associated with a geo-political unit.</td>
</tr>
<tr>
<td>writeIns</td>
<td>no</td>
<td>integer</td>
<td>Total number of write-ins cast, either in a contest or associated with a geo-political unit.</td>
</tr>
</tbody>
</table>

**Table C.41—Attributes for TotalCounts**

Usage and Definition:

```xml
<xsd:complexType name="TotalCounts">
  <xsd:complexContent>
    <xsd:extension base="Counts">
      <xsd:attribute name="ballotsCast" type="xsd:integer"/>
      <xsd:attribute name="overvotes" type="xsd:integer"/>
      <xsd:attribute name="undervotes" type="xsd:integer"/>
      <xsd:attribute name="writeIns" type="xsd:integer"/>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```
C.2.26 Element VoteCounts (extension base Counts)

For reporting on vote counts for ballot selections in a contest. BallotSelection includes VoteCounts as a sub-element to link a ballot selection to votes reported for that ballot selection. Includes Counts as an extension base and thus inherits attributes and elements from Counts, which can be used for breaking down the vote counts into greater detail and linking them to geo-political units defined within the geographic scope of the contest.

Attributes:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Required</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>count</td>
<td>yes</td>
<td>float</td>
<td>Count of contest votes cast; can include a fractional component in special cases.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>completed</td>
<td>The reporting is complete.</td>
</tr>
<tr>
<td>in-process</td>
<td>The reporting is in process</td>
</tr>
<tr>
<td>not-processed</td>
<td>The reporting has not started or is not underway.</td>
</tr>
<tr>
<td>unknown</td>
<td>The status of the reporting is unknown.</td>
</tr>
</tbody>
</table>

C.2.27 Simple Type: BallotCountStatus

Enumeration for various reporting-related statuses applicable to types of ballots in ElectionReport.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
</table>

C.2.28 Simple Type: BallotType

Enumeration for the types of ballots (or voting style) associated with votes in Counts.
<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>absentee</td>
<td>For any/all types of absentee, generally when absentee is not broken out into specific types.</td>
</tr>
<tr>
<td>absentee-FWAB</td>
<td>A type of absentee; for Federal Write-in Absentee Ballots.</td>
</tr>
<tr>
<td>absentee-in-person</td>
<td>A type of absentee; for absentee ballots cast in-person, e.g., at a county office.</td>
</tr>
<tr>
<td>absentee-mail</td>
<td>A type of absentee; for postal mail absentee ballots.</td>
</tr>
<tr>
<td>absentee-UOCAVA</td>
<td>A type of absentee; for absentee ballots from UOCAVA voters.</td>
</tr>
<tr>
<td>early</td>
<td>For ballots cast during early voting periods.</td>
</tr>
<tr>
<td>election-day</td>
<td>For ballots cast on election day.</td>
</tr>
<tr>
<td>other</td>
<td></td>
</tr>
<tr>
<td>provisional</td>
<td>For challenged ballots.</td>
</tr>
<tr>
<td>total</td>
<td>Total of all ballots cast regardless of voting type.</td>
</tr>
<tr>
<td>UOCAVA</td>
<td>For ballots from UOCAVA voters.</td>
</tr>
</tbody>
</table>

Table C.44—Values for BallotType

C.2.29 Simple Type: CandidateStatus

Enumeration for various statuses applicable to a candidate in Candidate.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>advanced-to-runoff</td>
<td>For advancing to a runoff or use with instant-runoff voting.</td>
</tr>
<tr>
<td>filed</td>
<td>Filed with the election authority but not necessarily qualified.</td>
</tr>
<tr>
<td>qualified</td>
<td>Qualified by the election authority to be on the ballot for a contest; used in an election day report.</td>
</tr>
<tr>
<td>winner</td>
<td>The contest winner.</td>
</tr>
<tr>
<td>withdrawn</td>
<td>Withdrawn from the contest.</td>
</tr>
</tbody>
</table>

Table C.45—Values for CandidateStatus

Definition:

```xml
<xsd:simpleType name="CandidateStatus">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="advanced-to-runoff"/>
    <xsd:enumeration value="filed"/>
    <xsd:enumeration value="qualified"/>
    <xsd:enumeration value="winner"/>
    <xsd:enumeration value="withdrawn"/>
  </xsd:restriction>
</xsd:simpleType>
```
C.2.30 Simple Type: DeviceType

Enumeration for the type of device in Device and for the type of device associated with vote counts in Counts.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>electronic</td>
<td>DRE (Direct Record Electronic) and touchscreen devices such as tablets.</td>
</tr>
<tr>
<td>lever</td>
<td>Lever machines.</td>
</tr>
<tr>
<td>manual-count</td>
<td>Generally, hand-counted paper ballots.</td>
</tr>
<tr>
<td>mixed-systems</td>
<td>Used for systems, e.g., that print voter choices on an optical scan ballot (hybrid of a DRE and an optical scan system)</td>
</tr>
<tr>
<td>opscan-central</td>
<td>Optical scanner used at a central office with no opportunity for voter correction of mistakes.</td>
</tr>
<tr>
<td>opscan-precinct</td>
<td>Optical scanner used at a precinct or other location where voter correction of mistakes such as overvotes is possible.</td>
</tr>
<tr>
<td>punch-card</td>
<td>Punch card systems.</td>
</tr>
<tr>
<td>unknown</td>
<td>Table C.46—Values for DeviceType</td>
</tr>
</tbody>
</table>

Definition:

```xml
<xsd:simpleType name="DeviceType">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="electronic"/>
    <xsd:enumeration value="lever"/>
    <xsd:enumeration value="manual-count"/>
    <xsd:enumeration value="mixed-systems"/>
    <xsd:enumeration value="opscan-central"/>
    <xsd:enumeration value="opscan-precinct"/>
    <xsd:enumeration value="punch-card"/>
    <xsd:enumeration value="unknown"/>
  </xsd:restriction>
</xsd:simpleType>
```

C.2.31 Simple Type: DistrictType

Enumeration for the type of district in District.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>congressional</td>
<td>District for the U.S. House of Representatives</td>
</tr>
<tr>
<td>local</td>
<td>A local district, e.g., water, school board, etc.</td>
</tr>
<tr>
<td>other</td>
<td></td>
</tr>
<tr>
<td>state-house</td>
<td>District for a state’s house.</td>
</tr>
<tr>
<td>state-senate</td>
<td>District for a state’s senate.</td>
</tr>
</tbody>
</table>

Table C.47—Values for DistrictType

Definition:

```xml
<xsd:simpleType name="DistrictType">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="congressional"/>
    <xsd:enumeration value="local"/>
    <xsd:enumeration value="locality"/>
    <xsd:enumeration value="other"/>
    <xsd:enumeration value="state-house"/>
    <xsd:enumeration value="state-senate"/>
  </xsd:restriction>
</xsd:simpleType>
```
C.2.32 Simple Type: ElectionType

Enumeration for the type of election in ElectionReport.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>general</td>
<td>The election held typically on Election Day.</td>
</tr>
<tr>
<td>other</td>
<td></td>
</tr>
<tr>
<td>partisan-primary-closed</td>
<td>Primary election that is for a specific party.</td>
</tr>
<tr>
<td>partisan-primary-open</td>
<td>Primary election that is open to all parties (non-partisan).</td>
</tr>
<tr>
<td>primary</td>
<td>A primary election, type not specified.</td>
</tr>
<tr>
<td>runoff</td>
<td>An election to decide a prior contest that ended with no candidate receiving a majority of the votes.</td>
</tr>
<tr>
<td>special</td>
<td>An election held out of sequence for special circumstances, e.g., to fill a vacated office.</td>
</tr>
</tbody>
</table>

Table C.48—Values for ElectionType

C.2.33 Simple Type: EthnicityType

Enumeration for a person’s ethnicity in Person.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>asian</td>
<td></td>
</tr>
<tr>
<td>black</td>
<td></td>
</tr>
<tr>
<td>hispanic</td>
<td></td>
</tr>
<tr>
<td>nativeAmerican</td>
<td></td>
</tr>
<tr>
<td>white</td>
<td></td>
</tr>
<tr>
<td>unknown</td>
<td></td>
</tr>
</tbody>
</table>

Table C.49—Values for EthnicityType

C.2.34 Simple Type: GenderType

Enumeration for a person’s gender in Person.
<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>female</td>
<td></td>
</tr>
<tr>
<td>male</td>
<td></td>
</tr>
<tr>
<td>unknown</td>
<td></td>
</tr>
</tbody>
</table>

Table C.50—Values for GenderType

Definition:

```xml
<xs:simpleType name="GenderType">
  <xs:restriction base="xs:string">
    <xs:enumeration value="female"/>
    <xs:enumeration value="male"/>
    <xs:enumeration value="unknown"/>
  </xs:restriction>
</xs:simpleType>
```

C.2.35 Simple Type: ReportFormat

Enumeration for the format of the election results in Election.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>precinct-level</td>
<td>Contains counts from precincts in the reporting jurisdiction.</td>
</tr>
<tr>
<td>summary-contest</td>
<td>Contains only aggregated counts for candidates in a contest and for ballot measures.</td>
</tr>
</tbody>
</table>

Table C.51—Values for ReportFormat

Definition:

```xml
<xs:simpleType name="ReportFormat">
  <xs:restriction base="xs:string">
    <xs:enumeration value="precinct-level"/>
    <xs:enumeration value="summary-contest"/>
  </xs:restriction>
</xs:simpleType>
```

C.2.36 Simple Type: ReportingUnitType

Enumeration for the type of geo-political unit in ReportingUnit.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>audit-batch</td>
<td>For use in reporting batches of ballots that may cross precinct boundaries.</td>
</tr>
<tr>
<td>city</td>
<td></td>
</tr>
<tr>
<td>combined-precinct</td>
<td>One or more precincts that have been combined for the purposes of reporting.</td>
</tr>
<tr>
<td>county</td>
<td></td>
</tr>
<tr>
<td>jurisdiction</td>
<td></td>
</tr>
<tr>
<td>municipality</td>
<td></td>
</tr>
<tr>
<td>other</td>
<td>For other types of localities or other specialized use.</td>
</tr>
<tr>
<td>polling-place</td>
<td>Typically associated 1-to-1 with a precinct.</td>
</tr>
<tr>
<td>precinct</td>
<td></td>
</tr>
<tr>
<td>split-precinct</td>
<td></td>
</tr>
<tr>
<td>state</td>
<td></td>
</tr>
<tr>
<td>township</td>
<td>Synonymous with “town.”</td>
</tr>
<tr>
<td>vote-center</td>
<td></td>
</tr>
</tbody>
</table>

Table C.52—Values for ReportingUnitType
Definition:

```xml
<xsd:simpleType name="ReportingUnitType">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="audit-batch"/>
    <xsd:enumeration value="city"/>
    <xsd:enumeration value="combined-precinct"/>
    <xsd:enumeration value="county"/>
    <xsd:enumeration value="jurisdiction"/>
    <xsd:enumeration value="municipality"/>
    <xsd:enumeration value="other"/>
    <xsd:enumeration value="polling-place"/>
    <xsd:enumeration value="precinct"/>
    <xsd:enumeration value="split-precinct"/>
    <xsd:enumeration value="state"/>
    <xsd:enumeration value="township"/>
    <xsd:enumeration value="vote-center"/>
  </xsd:restriction>
</xsd:simpleType>
```

**C.2.37 Simple Type: ReportStatus**

Enumeration for the status of the election results in Election.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>certified</td>
<td>The results have been certified by the election authority.</td>
</tr>
<tr>
<td>correction</td>
<td>The results are a correction to an earlier report.</td>
</tr>
<tr>
<td>pre-election</td>
<td>The file contains a definition of the election and associated jurisdictions, districts, and precincts.</td>
</tr>
<tr>
<td>recount</td>
<td>The results are a recount of an earlier election.</td>
</tr>
<tr>
<td>test</td>
<td>The results are issued as a test of the election definition.</td>
</tr>
<tr>
<td>unofficial-complete</td>
<td>The results are unofficial and complete.</td>
</tr>
<tr>
<td>unofficial-partial</td>
<td>The results are unofficial and partial.</td>
</tr>
</tbody>
</table>

**Table C.53—Values for ReportStatus**

Definition:

```xml
<xsd:simpleType name="ReportStatus">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="certified"/>
    <xsd:enumeration value="correction"/>
    <xsd:enumeration value="pre-election"/>
    <xsd:enumeration value="recount"/>
    <xsd:enumeration value="test"/>
    <xsd:enumeration value="unofficial-complete"/>
    <xsd:enumeration value="unofficial-partial"/>
  </xsd:restriction>
</xsd:simpleType>
```

**C.2.38 Simple Type: VoteVariation**

Enumeration for contest algorithm or rules for contest.
Table C.54— Values for VoteVariation

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>approval</td>
<td>When voter can select as many candidates as desired in a contest up to a max number.</td>
</tr>
<tr>
<td>cumulative</td>
<td>When voter can allocate more than one vote to a given candidate.</td>
</tr>
<tr>
<td>IRV</td>
<td>Instant-runoff voting (IRV), for ranking candidates in order of preference rather than voting for a single candidate. Also known as alternative vote, transferable vote, ranked choice voting, or preferential voting.</td>
</tr>
<tr>
<td>N-of-M</td>
<td>Includes vote for 1, i.e., 1-of-M.</td>
</tr>
</tbody>
</table>

Definition:

```xml
<?xml version="1.0" encoding="UTF-8"?>
<xsd:simpleType name="VoteVariation">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="approval"/>
    <xsd:enumeration value="cumulative"/>
    <xsd:enumeration value="IRV"/>
    <xsd:enumeration value="N-of-M"/>
  </xsd:restriction>
</xsd:simpleType>
```

C.3 Complete schema listing

```xml
<?xml version="1.0" encoding="UTF-8"?>
  targetNamespace="http://www.w3.org/2000/09/xmldsig#">
  <xsd:element name="ElectionReport" type="ElectionReport"/>
  <xsd:element name="BallotCountStatus">
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="completed"/>
      <xsd:enumeration value="in-process"/>
      <xsd:enumeration value="not-processed"/>
      <xsd:enumeration value="unknown"/>
    </xsd:restriction>
  </xsd:element>
  <xsd:element name="BallotType">
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="absentee"/>
      <xsd:enumeration value="absentee-FWAB"/>
      <xsd:enumeration value="absentee-in-person"/>
      <xsd:enumeration value="absentee-mail"/>
      <xsd:enumeration value="absentee-UOCAVA"/>
      <xsd:enumeration value="early"/>
      <xsd:enumeration value="election-day"/>
      <xsd:enumeration value="other"/>
      <xsd:enumeration value="provisional"/>
      <xsd:enumeration value="total"/>
      <xsd:enumeration value="UOCAVA"/>
    </xsd:restriction>
  </xsd:element>
  <xsd:element name="CandidateStatus">
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="advanced-to-runoff"/>
      <xsd:enumeration value="filed"/>
      <xsd:enumeration value="qualified"/>
      <xsd:enumeration value="winner"/>
      <xsd:enumeration value="withdrawn"/>
      <xsd:enumeration value="writein"/>
    </xsd:restriction>
  </xsd:element>
</xsd:schema>
```
<xsd:simpleType name="DeviceType">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="manual-count"/>
    <xsd:enumeration value="mixed-systems"/>
    <xsd:enumeration value="opscan-central"/>
    <xsd:enumeration value="opscan-precinct"/>
    <xsd:enumeration value="punch-card"/>
    <xsd:enumeration value="unknown"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="DistrictType">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="congressional"/>
    <xsd:enumeration value="local"/>
    <xsd:enumeration value="state-house"/>
    <xsd:enumeration value="state-senate"/>
    <xsd:enumeration value="statewide"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="ElectionType">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="general"/>
    <xsd:enumeration value="partisan-primary-closed"/>
    <xsd:enumeration value="partisan-primary-open"/>
    <xsd:enumeration value="primary"/>
    <xsd:enumeration value="runoff"/>
    <xsd:enumeration value="special"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="EthnicityType">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="asian"/>
    <xsd:enumeration value="black"/>
    <xsd:enumeration value="hispanic"/>
    <xsd:enumeration value="moreThanOne"/>
    <xsd:enumeration value="nativeAmerican"/>
    <xsd:enumeration value="white"/>
    <xsd:enumeration value="unknown"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="GenderType">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="female"/>
    <xsd:enumeration value="male"/>
    <xsd:enumeration value="unknown"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="ReportFormat">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="precinct-level"/>
    <xsd:enumeration value="summary-contest"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="ReportStatus">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="certified"/>
    <xsd:enumeration value="pre-election"/>
    <xsd:enumeration value="recount"/>
    <xsd:enumeration value="test"/>
    <xsd:enumeration value="unofficial-complete"/>
    <xsd:enumeration value="unofficial-partial"/>
  </xsd:restriction>
</xsd:simpleType>
<xsd:simpleType name="ReportingUnitType">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="audit-batch"/>
    <xsd:enumeration value="combined-precinct"/>
    <xsd:enumeration value="county"/>
    <xsd:enumeration value="jurisdiction"/>
    <xsd:enumeration value="municipality"/>
    <xsd:enumeration value="other"/>
    <xsd:enumeration value="polling-place"/>
    <xsd:enumeration value="precinct"/>
    <xsd:enumeration value="split-precinct"/>
    <xsd:enumeration value="state"/>
    <xsd:enumeration value="township"/>
    <xsd:enumeration value="vote-center"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="VoteVariation">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="approval"/>
    <xsd:enumeration value="cumulative"/>
    <xsd:enumeration value="IRV"/>
    <xsd:enumeration value="N-of-M"/>
  </xsd:restriction>
</xsd:simpleType>

<!-- ========= Interfaces Defined ========= -->
<!-- ========= Interfaces Extended ========= -->
<!-- ========= Classes ========= -->
<xsd:complexType name="BallotMeasure">
  <xsd:complexContent>
    <xsd:extension base="Contest">
      <xsd:sequence>
        <xsd:element name="FullText" type="xsd:string" minOccurs="0"/>
        <xsd:element name="SummaryText" type="xsd:string" minOccurs="0"/>
      </xsd:sequence>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>

<xsd:complexType name="BallotMeasureSelection">
  <xsd:complexContent>
    <xsd:extension base="BallotSelection">
      <xsd:attribute name="selection" type="xsd:string" use="required"/>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>

<xsd:complexType name="BallotSelection" abstract="true">
  <xsd:complexContent>
    <xsd:element name="VoteCounts" type="VoteCounts" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:attribute name="object_id" type="xsd:ID" use="required"/>
    <xsd:attribute name="ballotSelectionID" type="xsd:string"/>
  </xsd:complexContent>
</xsd:complexType>

<xsd:complexType name="BallotStyle">
  <xsd:complexContent>
    <xsd:element name="OrderedContest" type="OrderedContest" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element name="GPUnit" type="GPUnitIDRef"/>
    <xsd:attribute name="object_id" type="xsd:ID" use="required"/>
    <xsd:attribute name="ballotStyleID" type="xsd:string"/>
  </xsd:complexContent>
</xsd:complexType>

<xsd:complexType name="BallotStyleCollection">
  <xsd:complexContent>
    <xsd:element name="BallotStyle" type="BallotStyle" minOccurs="1" maxOccurs="unbounded"/>
  </xsd:complexContent>
</xsd:complexType>

<xsd:complexType name="Candidate">
  <xsd:complexContent>
    <xsd:element name="Party" type="xsd:IDRef" minOccurs="0"/>
    <xsd:element name="Person" type="xsd:IDRef" minOccurs="0"/>
    <xsd:element name="Office" type="xsd:IDRef" minOccurs="0" maxOccurs="unbounded"/>
  </xsd:complexContent>
</xsd:complexType>
<xsd:complexType name="ContestChoice">
  <xsd:complexContent>
    <xsd:sequence>
      <xsd:element name="Office" type="xsd:IDREF" minOccurs="0"/>
      <xsd:element name="PrimaryParty" type="xsd:IDREF" minOccurs="0"/>
      <xsd:element name="EndorsementParty" type="xsd:IDREF" minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
    <xsd:attribute name="isTopTicket" type="xsd:boolean"/>
    <xsd:attribute name="isIncumbent" type="xsd:boolean"/>
    <xsd:attribute name="status" type="CandidateStatus"/>
  </xsd:complexContent>
</xsd:complexType>

<xsd:complexType name="CandidateChoice">
  <xsd:complexContent>
    <xsd:sequence>
      <xsd:element name="Office" type="xsd:IDREF" minOccurs="0"/>
      <xsd:element name="PrimaryParty" type="xsd:IDREF" minOccurs="0"/>
      <xsd:element name="EndorsementParty" type="xsd:IDREF" minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
    <xsd:attribute name="numberElected" type="xsd:integer" use="required"/>
    <xsd:attribute name="votesAllowed" type="xsd:integer" use="required"/>
  </xsd:complexContent>
</xsd:complexType>

<xsd:complexType name="CandidateCollection">
  <xsd:complexContent>
    <xsd:sequence>
      <xsd:element name="Candidate" type="Candidate" minOccurs="1" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexContent>
</xsd:complexType>

<xsd:complexType name="CandidateSelection">
  <xsd:complexContent>
    <xsd:sequence>
      <xsd:element name="Candidate" type="xsd:IDREF" minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
    <xsd:attribute name="isWritten" type="xsd:boolean"/>
  </xsd:complexContent>
</xsd:complexType>

<xsd:complexType name="Contact">
  <xsd:complexContent>
    <xsd:sequence>
      <xsd:element name="Office" type="xsd:IDREF" minOccurs="0"/>
      <xsd:element name="PrimaryParty" type="xsd:IDREF" minOccurs="0"/>
      <xsd:element name="EndorsementParty" type="xsd:IDREF" minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
    <xsd:attribute name="object_id" type="xsd:ID" use="required"/>
    <xsd:attribute name="URL" type="xsd:anyURI"/>
    <xsd:attribute name="addressNumber" type="xsd:string"/>
    <xsd:attribute name="city" type="xsd:string"/>
    <xsd:attribute name="country" type="xsd:string"/>
    <xsd:attribute name="email" type="xsd:string"/>
    <xsd:attribute name="fax" type="xsd:string"/>
    <xsd:attribute name="hours" type="xsd:string"/>
    <xsd:attribute name="name" type="xsd:string"/>
    <xsd:attribute name="phone" type="xsd:string"/>
    <xsd:attribute name="postalCode" type="xsd:string"/>
    <xsd:attribute name="stateAbbreviation" type="xsd:string"/>
    <xsd:attribute name="streetName" type="xsd:string"/>
  </xsd:complexContent>
</xsd:complexType>

<xsd:complexType name="Contest" abstract="true">
  <xsd:complexContent>
    <xsd:sequence>
      <xsd:element name="BallotSelection" type="BallotSelection" minOccurs="0" maxOccurs="unbounded"/>
      <xsd:element name="ContestGPScope" type="xsd:IDREF" minOccurs="0"/>
      <xsd:element name="ContestTotalCounts" type="TotalCounts" minOccurs="0" maxOccurs="unbounded"/>
      <xsd:element name="ContestTotalCountsByGPUnit" type="TotalCounts" minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
    <xsd:attribute name="object_id" type="xsd:ID" use="required"/>
    <xsd:attribute name="abbreviation" type="xsd:string"/>
    <xsd:attribute name="localContestCode" type="xsd:string"/>
    <xsd:attribute name="name" type="xsd:string" use="required"/>
    <xsd:attribute name="nationalContestCode" type="xsd:string"/>
    <xsd:attribute name="reportedPrecincts" type="xsd:integer"/>
    <xsd:attribute name="sequenceOrder" type="xsd:integer"/>
    <xsd:attribute name="stateContestCode" type="xsd:string"/>
    <xsd:attribute name="totalPrecincts" type="xsd:integer"/>
  </xsd:complexContent>
</xsd:complexType>
<xsd:complexType name="ElectoralResults">
  <xsd:sequence>
    <xsd:element name="ElectionReport" type="xsd:string"/>
    <xsd:element name="Election" type="xsd:string"/>
    <xsd:element name="ContestCollection" type="xsd:string"/>
    <xsd:element name="BallotStyleCollection" type="xsd:string"/>
    <xsd:element name="GPUnitCollection" type="xsd:string"/>
    <xsd:element name="GPUnit" type="xsd:string"/>
  </xsd:sequence>
</xsd:complexType>
<xsd:attribute name="vendorApplicationID" type="xsd:string" use="required"/>
</xsd:complexType>
<xsd:complexType name="GPUnit" abstract="true">
    <xsd:sequence>
        <xsd:element name="GPSubUnit" type="xsd:IDREF" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="GPUnitTotalCounts" type="TotalCounts" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="PartyRegistration" type="PartyRegistration" minOccurs="0"/>
        <xsd:element name="SpatialDimension" type="SpatialDimension" minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
<xsd:attribute name="object_id" type="xsd:ID" use="required"/>
<xsd:attribute name="URL" type="xsd:anyURI"/>
<xsd:attribute name="localGeoCode" type="xsd:string"/>
<xsd:attribute name="name" type="xsd:string"/>
<xsd:attribute name="nationalGeoCode" type="xsd:string"/>
<xsd:attribute name="stateGeoCode" type="xsd:string"/>
</xsd:complexType>
<xsd:complexType name="GPUnitCollection">
    <xsd:sequence>
        <xsd:element name="GPUnit" type="GPUnit" minOccurs="1" maxOccurs="unbounded"/>
    </xsd:sequence>
</xsd:complexType>
<xsd:complexType name="Office">
    <xsd:sequence>
        <xsd:element name="OfficeGPScope" type="xsd:IDREF" minOccurs="0"/>
    </xsd:sequence>
<xsd:attribute name="object_id" type="xsd:ID" use="required"/>
<xsd:attribute name="filingDate" type="xsd:dateTime"/>
<xsd:attribute name="incumbentRunning" type="xsd:boolean"/>
<xsd:attribute name="localOfficeCode" type="xsd:string"/>
<xsd:attribute name="name" type="xsd:string" use="required"/>
<xsd:attribute name="nationalOfficeCode" type="xsd:string"/>
<xsd:attribute name="partisan" type="xsd:boolean"/>
<xsd:attribute name="stateOfficeCode" type="xsd:string"/>
<xsd:attribute name="termEndDateTime" type="xsd:date"/>
<xsd:attribute name="termStartDate" type="xsd:date"/>
<xsd:attribute name="unexpiredTerm" type="xsd:boolean"/>
</xsd:complexType>
<xsd:complexType name="OfficeCollection">
    <xsd:sequence>
        <xsd:element name="Office" type="Office" minOccurs="1" maxOccurs="unbounded"/>
    </xsd:sequence>
</xsd:complexType>
<xsd:complexType name="OrderedContest">
    <xsd:sequence>
        <xsd:element name="Contest" type="xsd:IDREF"/>
    </xsd:sequence>
<xsd:attribute name="object_id" type="xsd:ID" use="required"/>
</xsd:complexType>
<xsd:complexType name="Party">
    <xsd:complexTypeContent base="BallotSelection">
        <xsd:attribute name="abbreviation" type="xsd:string"/>
        <xsd:attribute name="localPartyCode" type="xsd:string"/>
        <xsd:attribute name="name" type="xsd:string"/>
        <xsd:attribute name="nationalPartyCode" type="xsd:string"/>
        <xsd:attribute name="statePartyCode" type="xsd:string"/>
    </xsd:complexTypeContent>
</xsd:complexType>
<xsd:complexType name="PartyCollection">
    <xsd:sequence>
        <xsd:element name="Party" type="Party" minOccurs="1" maxOccurs="unbounded"/>
    </xsd:sequence>
</xsd:complexType>
<xsd:complexType name="PartyRegistration">
    <xsd:sequence>
        <xsd:element name="Party" type="xsd:IDREF"/>
    </xsd:sequence>
</xsd:complexType>
<xsd:complexType name="VoteCounts">
  <xsd:complexContent>
    <xsd:extension base="Counts">
      <xsd:attribute name="count" type="xsd:float" use="required"/>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
Annex D
(normative)

JSON implementation example and other files associated with this standard

Other files associated with this standard are available using the URL below:

Note – this URL will be created subject to this draft’s approval. The files currently are available at
http://grouper.ieee.org/groups/1622/groups/2/index.html

The files are:

- The JSON implementation example example files and associated documentation.
- The 1622.2 XML schema included with this standard.
- The UML model in UML’s interchange format (XMI).
- An XML instance file prepared by the State of Ohio showing 2014 primary results.

The Ohio XML instance file is digitally signed using the World Wide Web Consortium’s (W3C’s) XML signature syntax and processing for signatures. The W3C schema is imported into the 1622.2 schema and instance files. The W3C digital signature is placed inside the Signature sub-element of the ElectionReport root element using the options specified in the instance files. The Signature element must be the last element of the root XML element, which is ElectionReport. The instance file has been signed using the Ohio Secretary of State’s digital signature certificate.