ClearVote 2.1

ClearDesign Ballot Definition File Guide

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Document history

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Preface

This section defines the purpose of this document. It contains the following subsections.

- About this document
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About this document

This document describes the content of the ClearDesign ballot definition file (BDF).

A ClearVote® system can comprise the ClearAccess®, ClearAudit®, ClearCast®, ClearCount®, and ClearDesign® products. Jurisdictions are not required to purchase all products. You can ignore references to any ClearVote products that are not part of your voting system. Also ignore implementation options that are not relevant to your policies and procedures.

Scope of this document

This document contains the following chapters:

- Chapter 1. Contents of a BDF
- Chapter 2. Contents of individual CSV files

Intended audience

The document is for state and federal election officials and their voting system test laboratories as part of the Technical Data Package (TDP) required to certify the ClearVote system for use. This document is also used by Clear Ballot personnel who support election officials and staff.

Contact us

Clear Ballot Group welcomes your feedback on our documentation. Please send comments to Documentation@ClearBallot.com.

If you have questions about using your product, contact your Clear Ballot representative.

Chapter 1. Contents of a BDF

This chapter describes a BDF and provides a high-level overview of its contents.

1.1 What is a BDF?

A ballot definition file (BDF) is a zipped file created by the ClearDesign election management system (EMS) that describes an election. The ClearCount and ClearCast systems use the BDF to create an election database. Most files in the BDF zipped file are standard comma-separated values (CSV) files. Each CSV file corresponds to a table created in the election database. Each record in a CSV file describes one record in the corresponding database table.

1.2 What is a BDFx?

By default, ClearDesign 2.0 and later produces an encrypted BDF file called BDFx. The BDFx contains the functionality of a BDF, but with encryption added for security.

Encryption reduces the vulnerability of brute-force attacks on the file's password. ClearDesign uses the PBKDF2 (Password-Based Key Derivation Function 2) encryption mechanism, which is part of the RSA Laboratory Public-Key Cryptography Standards (PKCS).

The encrypted BDFx ends in "bdfx.zip." This zipped file contains an unencrypted config.json file and the encrypted election.bdfx content.

A configuration option for an election enables you to turn off encryption so that you can generate an unencrypted BDF.

1.3 CSV files contained in a BDF

Table 1-1 lists and describes each CSV file contained in a BDF or BDFx.

For a description of the contents of theindividual CSV files, see "Contents of individual CSV files" on page 10.

Table 1-1. CSV files contained in a BDF or BDFx

File	Description
ballotmapper.csv	Each record describes a single vote target in the election.
cards.csv	Each record describes the card number of a given BallotStyleID on a multicard ballot.
choices.csv	Each record describes a single choice in a single contest.

Table 1-1. CSV files contained in a BDF or BDFx (continued)

File	Description
config.json	This file contains one record for each of the CSV files. Each record names the file and specifies the HMAC signature that verifies that the contents of the file have not been altered.
contestmap.csv	Each record describes the geometric location of a given contest appearing on a given ballot style.
contests.csv	Each record describes a single contest in the election.
districtcats.csv	Each record describes a single district category in the election.
districtmap.csv	This file provides the many-to-many mapping between a particular (precinct, ballot style) tuple and the districts that correspond to it.
districts.csv	Each record describes a single district and the district category to which it belongs.
language.csv	Each record maps a language name to a language ID.
messages.csv	Each record maps a message ID to a language and the message text.
metadata.csv	This single record describes the attributes of an election.
parties.csv	Each record describes a single party.
precincts.csv	Each record describes a whole precinct or a combination of precinct and style.
regvoters.csv	Each record contains the number of registered voters for a given precinct and ballot style.
votecentermap.csv	Each record maps a ballot style and precinct to a given vote center.
votecenters.csv	Each record specifies the VoteCenterCategoryName and the VoteCenterName that is associated with each VoteCenterID.
votergroups.csv	Each record describes a single counter group.

1.4 The config.json files

An unencrypted BDF zipped file contains a config.json file that contains a separate record for each CSV file. Each record names the file and contains the HMAC signature. The HMAC signature verifies that the file contents have not been altered. An HMAC signature is basically a FIPS 140-2-compliant message digest of a password concatenated with the file contents.

Table 1-2 describes the content of the config.json file contained in an unencrypted BDF.

Table 1-2. Contents of the config.json file in an unencrypted BDF

Field	Description
format	"CLEARBALLOT_BDF" This value confirms that this file is a Clear Ballot BDF.
version	The version of the BDF. This value changes whenever the BDF format changes.
application_name	"ClearDesign" The name of the application that created the BDF.
application_version	The version of the application that created the BDF.
media_date	The creation date, in ISO format, of the BDF.
media_version	The version of the election. The value changes whenever the content of the BDF changes.
media_copy	This value is set to 0 when the version changes and increments each time a BDF is created from the application.
election_code	The PBKDF2 seed and the encoded randomly generated election key. The election key is encoded using Advanced Encryption Standard (AES), where the key is the PBKDF2 hash of the user-entered election password and the seed.
pollworker_code	The PBKDF2 seed and the encoded randomly generated election key. The election key is encoded using AES, where the key is the PBKDF2 hash of the user-entered poll worker password and the seed.
<filename>.csv <filename>.csv … <filename>.csv	The value associated with each named file is an initial vector (IV) and an HMAC, separated by a vertical bar '|'. The HMAC is calculated using a FIPS 140-2 approved message digest algorithm. The inputs to the digest are the single password used for every CSV file in this zipped file, the individual IV for a given CSV file, and the text of the CSV file.
media_hash	The media_hash is the SHA256 hash, stored as a hexadecimal string, of all the data in the following files (in order of hashing): parties.csv, precincts.csv, contests.csv, choices.csv, contestmap.csv, ballotmapper.csv, votergroups.csv, cards.csv, districtmap.csv, districtcats.csv, districts.csv, regvoters.csv, votecenters.csv, votecentermap.csv, language.csv, and messages.csv.

Table 1-3 describes the content of the config.json file contained in an encrypted BDFx.

Table 1-3. Contents of the config.json file in an encrypted BDFx

Field	Description
jurisdictionName	The name of the jurisdiction. The user who creates the election supplies this value in the Jurisdiction Name field of the Election dialog.
format	"CLEARBALLOT_BDFX" This value confirms that this file is an encrypted Clear Ballot BDFx.
electionName	The name of the election. The user who creates the election supplies this value in the Election Name field of the Election dialog.
creationDate	The date, in ISO format, that the election was created. Example: 2018-12-21T19:06:44.581146
electionDate	The date, in YYYY-MM-DD format, scheduled for the election.
applicationName	"ClearDesign" The name of the application that created the BDFx.
applicationVersion	The version of the application. Example: 2.0.0b
mediaDate	The creation date, in ISO format, of the BDFx. Example: "2018-12-18T20:24:12"
mediaCopy	This value is set to 0 when the version changes and increments each time a BDFx is created from the application.
version	Increments when the data in the BDFx changes.
mediaVersion	The version of the election. The value changes whenever the content of the BDF changes.

Chapter 2. Contents of individual CSV files

This chapter provides tables containing the contents of each individual CSV file contained in a BDF or a BDFx.

2.1 Contents of ballotmapper.csv

Table 2-1. ballotmapper.csv

Field	Description
BallotStyleID	A unique number that identifies a blank (unvoted) ballot. This value identifies the unique combination of contests and candidate order. The ClearDesign EMS copies this value from the ballot's code channel.
Side	"1"—the front of a ballot card "2"—the back of a ballot card
vx	The virtual horizontal coordinate of a choice's vote target center on a card.
vy	The virtual vertical coordinate of a choice's vote target center on a card.
ContestID	A unique integer identifying a given contest.
ChoiceID	A unique integer identifying a particular choice, such as a candidate. A candidate can run in a contest under two different parties. In this situation, the same ChoiceID is specified for each party.
PartyID	A unique integer that represents a political party. The PartyID field contains a comma-separated list of integers, each representing a political party, when the value of the Cross Endorse Type field for the election is *On Ballot Once*. Example: 0,2,3 In this list, the first PartyID value is always 0, which represents the undetermined party.
ChoiceZone_UL_vx	The horizontal virtual coordinate of the upper left corner of a choice zone.
ChoiceZone_UL_vy	The vertical virtual coordinate of the upper left corner of a choice zone.
ChoiceZone_LR_vx	The horizontal virtual coordinate of the lower right corner of a choice zone.

Table 2-1. ballotmapper.csv (continued)

Field	Description
ChoiceZone_LR_vy	The vertical virtual coordinate of the lower right corner of a choice zone.
Flags	Flags that describe the attributes of a vote target. (Any bit not listed here is currently undefined and must be zero.) 0x00000001 True if the vote target is an oval-less write-in. "1" = automatically set when contests.ContestType = "J" (judge initials)

2.2 Contents of cards.csv

Table 2-2. cards.csv

Field	Description
CardNumber	Card number in a multicard ballot, starting with the number 1. For single-card ballots, this value is always 1.
BallotStyleID	A unique number that identifies a blank (unvoted) ballot. This value identifies the unique combination of contests and candidate order. The ClearDesign EMS copies this value from the ballot's code channel.

2.3 Contents of choices.csv

Table 2-3. choices.csv

Field	Description
ChoiceID	A unique integer identifying a particular choice, such as a candidate. A candidate can run in a contest under two different parties. In this situation, the same ChoiceID is specified for each party.
ContestID	A unique integer identifying a given contest.
ChoiceName	A unique identifier that indicates the choice. One of the following: • A candidate's name • "write-in" for write-in choices • "Yes" or "No" for ballot questions
ChoiceShortName	A short version of ChoiceName (used in some reports).

Table 2-3. choices.csv (continued)

Field	Description
ChoiceOrder	A number that controls the order in which the Choices appear in reports generated by the ClearVote products.
ChoiceType	A unique identifier that indicates the type of choice. One of the following: "W"—write-in "C"— normal "J"—judge initials (automatically set when contests.ContestType = "J" (judge initials)
ChoiceImportID	A unique ID for each record from the import data source, such as a state voter-registration system.
ChoiceExportID	A unique ID for each record used by an external system, such as a statewide results-reporting system.

2.4 Contents of contestmap.csv

Table 2-4. contestmap.csv

Field	Description
BallotStyleID	A unique number that identifies a blank (unvoted) ballot. This value identifies the unique combination of contests and candidate order. The ClearDesign EMS copies this value from the ballot's code channel.
Side	"1"— the front of a ballot card "2"— the back of a ballot card
ContestID	A unique integer identifying a given contest.
ContestZone_UL_vx	The horizontal virtual coordinate of the upper left corner of a contest zone.
ContestZone_UL_vy	The vertical virtual coordinate of the upper left corner of a contest zone.
ContestZone_LR_vx	The horizontal virtual coordinate of the lower right corner of a contest zone.
ContestZone_LR_vy	The vertical virtual coordinate of the lower right corner of a contest zone.

2.5 Contents of contests.csv

Table 2-5. contests.csv

Field	Description
ContestID	A unique integer identifying a given contest.
ContestName	Text that names the contest.
ContestShortName	A short version of the contest name (used in some reports).
ContestFullName	The full version of the contest name.
VoteRule	The maximum number of choices a voter can vote for in the contest.
ContestType	A unique identifier that indicates the type of contest. One of the following: "C" = Normal contest with candidates "Q" = Question (for example, a referendum) "E" = A question asking for retention (for example, a judge) "R" = Recall contest ("Do you want to recall {Candidate}?") "S" = Straight-party selection contest "P" = Party preference, also known as "pick-a-party" "J" = Judge initials contest
PartyID	A unique integer that represents a political party. The PartyID field contains a comma-separated list of integers, each representing a political party, when the value of the Cross Endorse Type field for the election is *On Ballot Once*. Example: 0,2,3 In this list, the first PartyID value is always 0, which represents the undetermined party.
StraightPartyContestID	A unique index assigned to the straight-party contest controlling this particular contest.
PrimaryPartyContestID	The unique ID of the primary party contest controlling this particular contest.
ContestOrder	A number used to control the order in which contests display in reports.

Table 2-5. contests.csv (continued)

Field	Description
ReturnOverVoted	A flag indicating that a ClearCast voter is to be warned if the contest is overvoted. One of the following: "2" = Reject "1" = Warn "0" -= No blank = Inherit from metadata.csv
ReturnUnderVoted	A flag indicating that a ClearCast voter is to be warned if the contest is undervoted. One of the following: "2" = Reject "1" = Warn "0" -= No blank = Inherit from metadata.csv
ReturnBlankVoted	A flag indicating that a ClearCast voter is to be warned if the contest was not voted. One of the following: "2" = Reject "1" = Warn "0" = No blank = Inherit from metadata.csv
ContestImportID	A unique ID for each record from the import data source, such as a state voter-registration system.
ContestExportID	A unique ID for each record used by an external system, such as a statewide results-reporting system.
DistrictID	A unique ID for the district associated with the contest.

2.6 Contents of districtcats.csv

Table 2-6. districtcats.csv

Field	Description
DistrictCategoryID	A unique ID for the district category.
DistrictCategoryName	The unique name of the district category.
DistrictCategoryShortName	The short version of the DistrictCategoryName (used in some reports).
DistrictCategoryOrder	A number used to control the order in which the district categories appear in some reports.
DistrictCategoryImportID	A unique ID for each record from the import data source, such as a state voter-registration system.
DistrictCategoryExportID	A unique ID for each record used by an external system, such as a statewide results-reporting system.

2.7 Contents of districtmap.csv

Table 2-7. districtmap.csv

Field	Description
DistrictID	A unique ID for the district.
PrecinctID	A unique integer identifying a single precinct. This number comes from the code channel. The jurisdiction chooses this number. This number does not increase monotonically, but it is unique.
BallotStyleID	A unique number that identifies a blank (unvoted) ballot. This value identifies the unique combination of contests and candidate order. The ClearDesign EMS copies this value from the ballot's code channel.

2.8 Contents of districts.csv

Table 2-8. districts.csv

Field	Description
DistrictID	A unique ID for the district.
DistrictCategoryID	A unique ID for the district category.
DistrictName	The unique name of the district.
DistrictShortName	The short version of the DistrictName (used in some reports).
DistrictOrder	A number used to control the order in which the districts appear in some reports.
DistrictImportID	A unique ID for each record from the import data source, such as a state voter-registration system.
DistrictExportID	A unique ID for each record used by an external system, such as a statewide results-reporting system.

2.9 Contents of language.csv

Table 2-9. language.csv

Field	Description
LanguageID	A unique index assigned to each language. Used to link a language and a message.
LanguageName	The name of the language.

2.10 Contents of messages.csv

Table 2-10. messages.csv

Field	Description
MessageID	A unique index assigned to each message.
LanguageID	A unique index assigned to each language. Used to link a language and a message.
MessageText	The text of the message.

2.11 Contents of metadata.csv

Table 2-11. metadata.csv

Field	Description
JurisdictionName	The name of the voting jurisdiction.
ElectionName	The name of the election.
ElectionDate	The date the election will be held.
ElectionOfficialName	The name of the person responsible for the management and oversight of the election.
ElectionOfficialTitle	The title of the election official.
parser	The name of the ballot type to be tabulated within the ClearVote systems. One of the following: • CBG1 • Dominion • ESS1 • ESS2 • Hart • Premier • Sequoia Note: The value CBG1 indicates an election authored in the ClearDesign EMS.
TextRotation	The degrees that the ballot needs to be rotated to make the text readable. 0 =portrait ballots 270 = landscape ballots
StraightPartyType	The straight-party voting rule. One of the following: • "exclusive" • "override" • "combine" • "additive"
SmallVoteSubtotalThreshold	The threshold below which vote subtotals should not be displayed. Default: 10
PollOpenReportCopies	The number of reports for the ClearCast voting stations to print by default when the polls open.

Table 2-11. metadata.csv (continued)

Field	Description
PollCloseReportCopies	The number of results reports for the ClearCast voting stations to print by default when the polls close.
ReturnOverVotedContest	A flag indicating that a ClearCast voter is to be warned about an overvoted contest.
ReturnUnderVotedContest	A flag indicating that a ClearCast voter is to be warned about an undervoted contest. This applies only to contests with a vote for more than 1.
ReturnBlankVotedContest	A flag indicating that a ClearCast voter is to be warned about a blank-voted contest.
ReturnBlankVotedCard	A flag indicating that a ClearCast voter is to be warned about a blank-voted card.
ReturnOverVotedSTV	A flag indicating that a ClearCast voter is to be warned about an overvoted straight-party contest.
ReturnOverVotedPrimaryPreference	A flag indicating that a ClearCast voter is to be warned about an overvoted primary preference contest.

2.12 Contents of parties.csv

Each row in the parties.csv file represents a political party.

Table 2-12. parties.csv

Field	Description
PartyID	A unique integer representing a political party. The value 0 represents the undetermined party.
PartyShortName	The short version of the party's name (used in some reports).
PartyName	The long version of a party's name.
PartyOrder	A number used to control the order in which the parties appear in some reports.
PartyAbbreviation	An abbreviation for the party (used in some reports).

Table 2-12. parties.csv (continued)

Field	Description
PartyImportID	A unique ID for each record from the import data source, such as a state voter-registration system.
PartyExportID	A unique ID for each record used by an external system, such as a statewide results-reporting system.
PartyType	A unique identifier for the type of party. One of the following: • "P"—partisan • "N"—nonpartisan

2.13 Contents of precincts.csv

Table 2-13. precincts.csv

Field	Description
PrecinctID	A unique integer identifying a single precinct. This number comes from the code channel. The jurisdiction chooses this number. This number does not increase monotonically, but it is unique.
BallotStyleID	A unique number that identifies a blank (unvoted) ballot. This value identifies the unique combination of contests and candidate order. The ClearDesign EMS copies this value from the ballot's code channel.
PrecinctReportingName	A short version of the PrecinctName (used in some reports).
PrecinctName	The long version of the name of the precinct.
PrecinctOrder	A number used to control the order in which the precincts appear in some reports.
PrecinctType	A unique identifier for the type of precinct. One of the following: • "S"—standard • "C"—consolidated
PrecinctImportID	A unique ID for each record from the import data source, such as a state voter-registration system.
PrecinctExportID	A unique ID for each record used by an external system, such as a statewide results-reporting system.

Table 2-13. precincts.csv (continued)

Field	Description
BlankBallotFileName	The name of the input PDF file used to produce this record. This item is used only by the Clear Ballot Automarking Tool (and not by the ClearVote products).

2.14 Contents of regvoters.csv

Table 2-14. regvoters.csv

Field	Description
PrecinctID	A unique integer identifying a single precinct. This number comes from the code channel. The jurisdiction chooses this number. This number does not increase monotonically, but it is unique.
BallotStyleID	A unique number that identifies a blank (unvoted) ballot. This value identifies the unique combination of contests and candidate order. The ClearDesign EMS copies this value from the ballot's code channel.
RegVoters	The number of registered voters for this BallotStyleID and PrecinctID.

2.15 Contents of votecenters.csv

Table 2-15. votecenters.csv

Field	Description
VoteCenterID	A unique ID assigned to the vote center.
PrecinctID	A unique integer identifying a single precinct. This number comes from the code channel. The jurisdiction chooses this number. This number does not increase monotonically, but it is unique.
BallotStyleID	A unique number that identifies a blank (unvoted) ballot. This value identifies the unique combination of contests and candidate order. The ClearDesign EMS copies this value from the ballot's code channel.

2.16 Contents of votergroups.csv

Table 2-16. votergroups.csv

Field	Description
VoterGroupID	An abbreviation that identifies a counter group, which is a category of vote totals used by the jurisdiction. Examples: AB = Absentee ED = Election Day EV = Early voting
VoterGroupName	A descriptive name associated with the VoterGroupID. Examples: Absentee, Election Day, Early voting
IsReporting	A flag indicating whether the counter group reports its tabulation results on Election Day.