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Test Report for EAC 2005 VVSG Certification Testing
Clear Ballot Group ClearVote 2.2 Voting System

EAC Project Number: CBG-CV-22

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U.S. Election Assistance Commission

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SIGNATURES

Approved by: Michael L. Walker 12/03/2021
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REVISIONS

Revision	Description	Date
00	Initial Release	10/08/2021
01	Revision 01 based on EAC comments	11/19/2021
02	Revision 02 based on EAC comments	12/03/2021

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1.0 INTRODUCTION

The purpose of this Test Report is to document the procedures that Pro V&V, Inc. followed to perform certification testing during a system modification campaign for the Clear Ballot Group (CBG) ClearVote 2.2 Voting System to the requirements set forth for voting systems in the U.S. Election Assistance Commission (EAC) 2005 Voluntary Voting System Guidelines (VVSG), Version 1.0. Certification testing of ClearVote 2.2 was performed to ensure the applicable requirements of the EAC VVSG 1.0 and the EAC Testing and Certification Program Manual, Version 2.0 were met. Additionally, all EAC Request for Interpretations (RFI) and Notices of Clarification (NOC) relevant to the system under test were incorporated in the test campaign.

Prior to submitting the voting system for testing, CBG submitted an application package to the EAC for certification of the ClearVote 2.2 Voting System. The application was accepted by the EAC and the project was assigned the unique Project Number of CBG-CV-22.

The ClearVote 2.2 EAC-approved test plan (TP-01-01-CBG-004-01.00), as published on the EAC's website at www.eac.gov, was utilized as the guiding document during test performance. Since test plan approval, and as testing progressed, minor system modifications, such as revised system documentation, were incorporated. This test report reflects all testing completed and details the final versions of all technical documentation and system components and supersedes the approved test plan.

1.1 Description and Overview of EAC System Being Modified

The EAC Certified System that is the baseline for the submitted modification is described in the following subsections. All information presented was derived from the previous Certification Test Report, the EAC Certificate of Conformance and/or the System Overview.

The baseline system for this modification is the ClearVote 2.0 System. Detailed descriptions of the ClearVote 2.0 test campaign are contained in Pro V&V Report No. TR-01-01-CBG-004-01.03, which is available for viewing on the EAC's website at www.eac.gov.

The ClearVote 2.0 Voting System is a paper-based optical scan voting system consisting of the following major components: ClearDesign (ballot design and EMS), ClearCount (central count, tabulation, and election reporting), ClearCast (precinct count and tabulation), and ClearAccess (accessible voting and ballot marking device).

The following sections contain a product description and an overview of the design methodology of the ClearVote 2.0 Voting System, as taken from the Clear Ballot Group technical documentation.

1.1.1 Baseline Certified System

A product description and an overview of the design methodology of the ClearVote 2.0 Voting System, as taken from the Clear Ballot Group technical documentation, is provided in the following paragraphs.

ClearDesign

ClearDesign is an Election Management System consisting of an interactive set of applications which are responsible for all pre-voting activities necessary for defining and managing elections.

This includes ballot design, ballot proofing, ballot layout, ballot production, and generation of voting machine election definition file packages. The ClearDesign system consists of the physical components listed below. All of the components are unmodified COTS that are connected via a wired, closed, and isolated network not connected to any other systems or the Internet.

- DesignServer: A laptop or desktop computer running Ubuntu with the ClearDesign software and hosting the election database.
- DesignStation(s): One or more laptops or desktops running Windows used to connect to the DesignServer. A browser is used to perform the necessary tasks. A user with administration privileges will be able to define users and manage the elections.
- Network Switch: Used to connect the DesignStations to the DesignServer using a wired, closed Ethernet-based network.

ClearCount

ClearCount is a central, high-speed, optical scan ballot tabulator coupled with ballot processing applications. The ClearCount software runs on unmodified COTS laptop or desktop computers running the Windows operating system and supports specific models of scanners. The ClearCount central-count system running on an Ubuntu Linux operating system, with Ethernet connections to workstations running the Windows operating system consists of the physical components listed below. All of the components are unmodified COTS that are connected via a wired, closed, and isolated network not connected to any other systems or the Internet.

- CountServer (formerly known as ScanServer): A laptop or desktop computer running the ClearCount software and hosting its election database and the web server that serves its election reports.
- ScanStation(s): One or more laptop or desktop/scanner pairs used to scan and tabulate ballots.
- Network Switch: Used to connect the ScanStations and CountStations to the CountServer using a wired, closed Ethernet-based network.
- CountStation (formerly known as Election Administration Station): One or more Microsoft Windows computers installed with browser software. Election officials use this computer to manage elections and users, to monitor and interact with election reports, and to adjudicate unreadable cards. System administrators use it to monitor the ClearCount system.

All files that make up the ClearCount software reside on a single CountServer that is shared by all client ScanStations. The Tabulator software is executed by the ScanStations at run-time from files that reside on the CountServer. The only software programs that have to be installed on ScanStations, apart from the Windows operating system, are the Fujitsu PaperStream Capture (formerly known as ScandAll Pro) software and drivers required by the scanner hardware. The ClearCount software consists of the following components:

- Tabulator: The Tabulator application handles ballot tabulation. The Tabulator software is stored on the CountServer and an instance of Tabulator runs on each ScanStation. The Tabulator counts the ballots and adjudicates the vote for the ballots scanned on that ScanStation. Upon completion of a batch of ballots, the Tabulator application sends its results and the associated card images to the central election database on the CountServer.

- Election Database: A centralized election database that resides on the CountServer and collects the output of each Tabulator.
- Election Reports: A suite of reports that provides election results and analysis and allows election officials to review individual ballot images.
- Card Resolutions tool: A web application that allows election officials to review and appropriately resolve unreadable voted ballots. It also allows manual adjudication of automatically adjudicated ballots where officials determine changes need to be made to reflect voter intent.
- User and Election Database Management through web applications: On the User Administration dashboard, the administrator can add, rename, or delete users, assign permissions, and change user passwords.
- On the Election Administration dashboard, the administrator can create or delete an election, set an election as active, merge ClearCast election results, and backup or restore an election.

ClearCast

The ClearCast tabulator is a precinct count ballot scanning solution suitable for early and election in-person voting, including processing ballots printed by the ClearAccess accessible ballot marking device. The ClearCast application runs on the precinct count-based tabulator, and is used to scan, count and tally marked ballots. Its functionality is divided into three essential modes: Election Mode (Early Voting and/or Election Day), which is used to process voter cast ballots; Pre-Election Mode, which occurs prior to Election Mode, and is used to test all system functionality prior to the start of the election; and Post-Election Mode, which is used to perform administrative functions following the close of the election.

ClearAccess

ClearAccess is an accessible touchscreen ballot marking device (BMD) used for the creation of paper ballots that can be scanned and tabulated by ClearCast or ClearCount. The ClearAccess components of the ClearVote voting system consist of computers combined with personal assistive devices, printers, and uninterruptible power supplies to form a ballot-marking device.

1.2 References

- Election Assistance Commission 2005 Voluntary Voting System Guidelines (VVSG) Version 1.0, Volume I, “Voting System Performance Guidelines”, and Volume II, “National Certification Testing Guidelines”
- Election Assistance Commission Testing and Certification Program Manual, Version 2.0
- Election Assistance Commission Voting System Test Laboratory Program Manual, Version 2.0
- National Voluntary Laboratory Accreditation Program NIST Handbook 150, 2020 Edition, “NVLAP Procedures and General Requirements (NIST Handbook 150)”, dated July 2020

- National Voluntary Laboratory Accreditation Program NIST Handbook 150-22, 2017 Edition, “Voting System Testing (NIST Handbook 150-22)”, dated July 2017
- United States 107th Congress Help America Vote Act (HAVA) of 2002 (Public Law 107-252), dated October 2002
- Pro V&V, Inc. Quality Assurance Manual, Revision 7.0
- Election Assistance Commission “Approval of Voting System Testing Application Package” letter dated July 12, 2018
- EAC Requests for Interpretation (RFI) (listed on www.eac.gov)
- EAC Notices of Clarification (NOC) (listed on www.eac.gov)
- Pro V&V Test Report No. TR-01-01-CBG-004-01.03, “Test Report for EAC 2005 VVSG Certification Testing Clear Ballot Group ClearVote 2.0 Voting System”, dated 09/30/2019
- Clear Ballot Group’s Technical Data Package (*A listing of the ClearVote 2.2 documents submitted for this test campaign is listed in Section 3.1 of this Test Report*)
- CIS Ubuntu Linux 18.04 LTS Benchmark v2.0.1 - 01-03-2020
- CIS Microsoft Windows 10 Enterprise (Release 1607) Benchmark v1.2.0 - 06-28-2017

1.3 Terms and Abbreviations

This subsection lists terms and abbreviations relevant to the hardware, the software, or this Test Plan.

“ADA” – Americans with Disabilities Act 1990

“BMD” – Ballot Marking Device

“CM” – Configuration Management

“COTS” – Commercial Off-The-Shelf

“EAC” – United States Election Assistance Commission

“EMS” – Election Management System

“FCA” – Functional Configuration Audit

“HAVA” – Help America Vote Act

“ISO” – International Organization for Standardization

“NOC” – Notice of Clarification

“PC” – Personal Computer

- “PCA” – Physical Configuration Audit
- “QA” – Quality Assurance
- “RAM” – Random Access Memory
- “RFI” – Request for Interpretation
- “SCAP” – Security Content Automation Protocol
- “TDP” – Technical Data Package
- “UPS” – Uninterruptible Power Supply
- “VSTL” – Voting System Test Laboratory
- “VVSG” – Voluntary Voting System Guidelines

2.0 CERTIFICATION TEST BACKGROUND

The ClearVote 2.2 is a modification of a previously certified system (ClearVote 2.0). Pro V&V performed an evaluation of results from the previous test campaign to determine the scope of testing required for certification of the ClearVote 2.2. Based on this evaluation, Pro V&V determined that testing from the previous test campaign would establish the baseline and that the focus of this test campaign would be on the documented system updates.

2.1 Revision History

The table below details the version history of the ClearVote 2.2 System:

Table 2-1. ClearVote 2.2 System Revision History

System Version	Certification Type	Baseline System	Certification Number
ClearVote 1.4	New System	--- (Original System)---	CBG-CV-14
ClearVote 1.5	Modification	ClearVote 1.4	CBG-CV-15
ClearVote 2.0	Modification	ClearVote 1.5	CBG-CV-20
ClearVote 2.2	Modification	ClearVote 2.0	CBG-CV-22*

*Upon grant of certification by the EAC

2.2 Scope of Testing

The scope of testing focused on evaluating the modifications detailed in Section 2.2.1 of this Test Report. To determine the ClearVote 2.2 test requirements, the submitted modifications were evaluated against each section of the EAC VVSG 1.0 to determine the applicable tests to be performed. Based on this assessment, it was determined that multiple areas within the EAC VVSG 1.0 would be evaluated to encompass the required tests. Additionally, it was determined that Regression Testing would consist of executing the System Integration Test and the Accuracy Test.

A breakdown of the areas and associated tests is listed below:

- EAC VVSG 1.0 Volume 1, Section 2: Functional Requirements
 - System Integration Testing

- Functional Configuration Audit (FCA)
- Physical Configuration Audit (PCA), including System Loads & Hardening
- Technical Documentation Package (TDP) Review
- Accuracy Testing
- Volume and Stress
- EAC VVSG 1.0 Volume 1, Section 3: Usability and Accessibility Requirements
 - Usability and Accessibility Testing
 - Technical Documentation Package (TDP) Review
- EAC VVSG 1.0 Volume 1, Section 4: Hardware Requirements
 - Environmental Requirements
 - Electrical Tests (ClearCast and ClearAccess)
 - Environmental Tests (ClearCast and ClearAccess)
 - Technical Documentation Package (TDP) Review
- EAC VVSG 1.0 Volume 1, Section 5: Software Requirements
 - Source Code Review, Compliance Build, Trusted Build, and Build Document Review
 - Technical Documentation Package (TDP) Review
 - Functional Configuration Audit (FCA)
- EAC VVSG 1.0 Volume 1, Section 7: Security Requirements
 - Security Testing
 - Technical Documentation Package (TDP) Review
 - Functional Configuration Audit (FCA)
- EAC VVSG 1.0 Volume 1, Section 8: Quality Assurance Requirements
 - Technical Documentation Package (TDP) Review
- EAC VVSG 1.0 Volume 1, Section 9: Configuration Management Requirements
 - Technical Documentation Package (TDP) Review

Note: Section 6 (Telecommunications Requirements) of the VVSG 1.0 is not applicable to ClearVote 2.2. and was therefore not included in testing. Additionally, Sections 8 (Quality Assurance Requirements) and 9 (Configuration Management Requirements) were reviewed in a previous test campaign and are not impacted by the submitted modifications.

2.2.1 Modification Overview

The submitted modifications consisted primarily of software changes to accommodate defect resolutions, enhancements, and improved security and user interface features. Hardware modifications to ClearCast and ClearAccess were also submitted for this evaluation.

To verify the modifications were successfully addressed throughout the test campaign, each modification was tracked and verified to be addressed during the execution of the relevant test area. For example, source code changes were verified during the source code review. Modifications requiring functional test verification were evaluated by executing the standard Accuracy Test, the System Integration Test, or during performance of the FCA. Modifications that were not adequately evaluated during the performance of these tests were subjected to specifically designed test cases.

Additionally, Pro V&V functionally verified that any corrected issues from the baseline system were not present in the modified system and that all enhancements implemented did not adversely impact system performance.

2.2.1.1 List of Changes

The submitted modifications include the following summarized changes from version 2.0 to 2.2:

ClearDesign

- Enhancements to ballot design and application performance
- Fixed defects

ClearAccess

- New COTS hardware
- Optional storage, transport, and setup case
- Fixed defects

ClearCount

- Enhancements to reporting and results aggregation
- Fixed defects

ClearCast

- New model of precinct tabulator hardware (ClearCast Go)
- Enhancements to tabulation performance and functionality
- Fixed defects

Note: For a more detailed listing of the changes, please refer to Appendix A of this Test Report and/or the ClearVote 2.2 Change Notes, Clear Ballot Part Number: 100128-10018.

2.2.2 Block Diagram

The system overview of the submitted voting system is depicted in Figure 2-1.

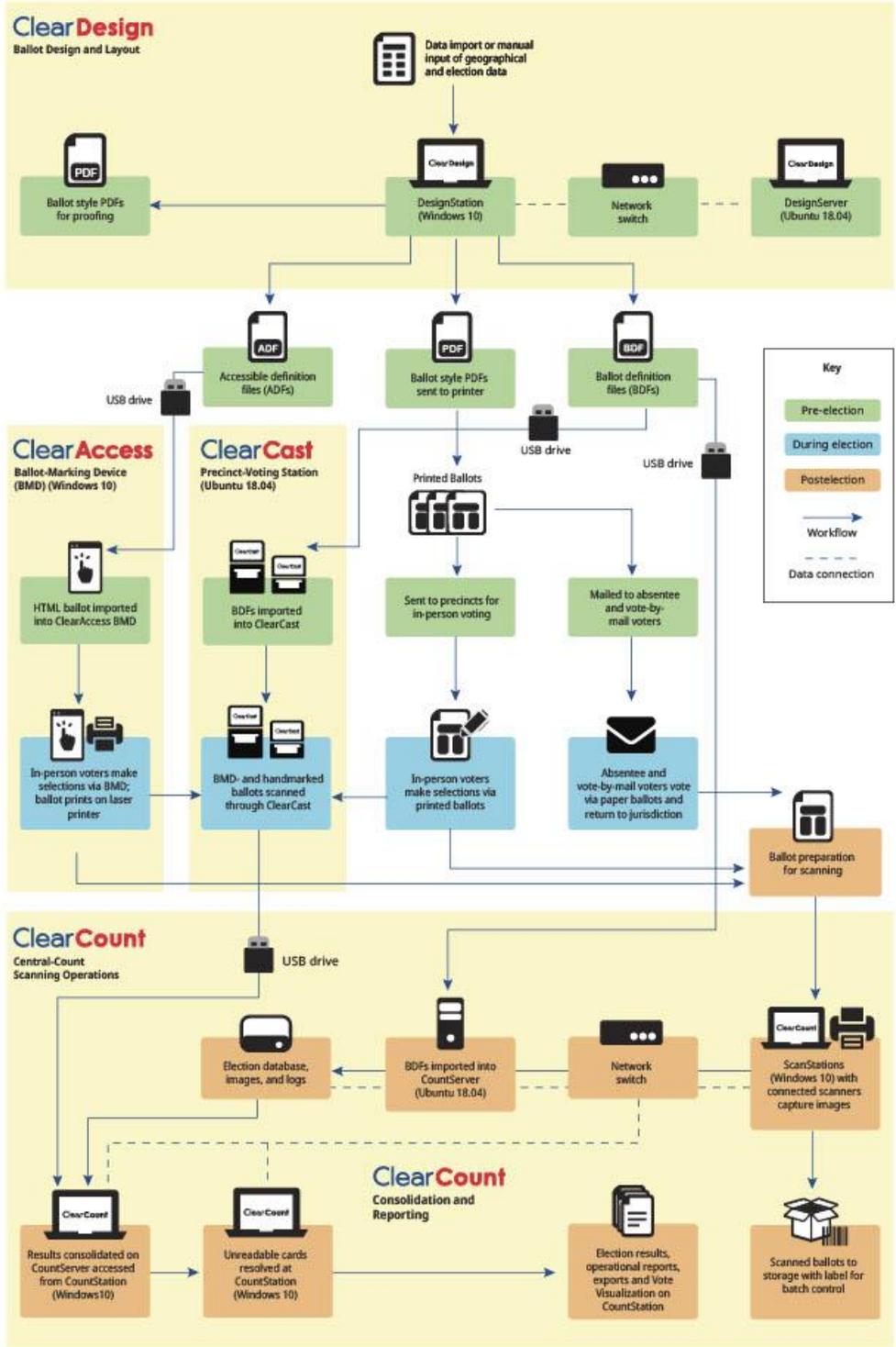


Figure 2-1. ClearVote 2.2 System Overview

2.2.3 System Limits

The system limits that CBG has stated to be supported by the ClearVote 2.2 Voting System are listed in the tables below.

Table 2-2. System Limits for ClearDesign

Characteristic	Limit
Precincts in an election	3200
Contests in an election	3200
Candidates/Counters in an election	3200
Ballot Styles in an election	3200
Contests in a ballot style	60
Candidates in a contest	300
Ballot styles in a precinct	50
Number of political parties	50
“vote for” in a contest	50
Supported languages in an election	15
Number of write-ins	50

The maximum ballot positions for the ClearVote 2.2 Voting System were verified to be as follows:

Table 2-3. Maximum Oval Positions for ClearDesign

Ballot Size	Oval positions per side
5 inch	60
11 inch	180
14 inch	240
17 inch	300
19 inch	360
22 inch	420

Table 2-4. System Limits for ClearCount

Scanner Model	Sustained (not burst speed) ballots per hour						Typical county size (central count)
	8.5x5	8.5x11	8.5x14	8.5x17	8.5x19	8.5x22	
fi-6400	5592	3624	2928	2448	2350	2236	Large (>100k voters)
fi-6800	7822	5508	4155	3352	3000	2800	Large (>100k voters)
fi-7180	3396	2040	1692	1400	1300	1200	Small (<25k voters)
fi-7800	5364	5028	3842	3556	3136	1566	Large (>100k voters)
fi-7900	6746	5635	4129	3926	3175	3108	Large (>100k voters)
ClearCount can have a maximum of 10 ScanStation/Scanner pairs							

2.2.4 Supported Languages

The submitted voting system supports:

- English
- Spanish
- Chinese
- Korean
- Vietnamese
- Danish
- Dutch
- Flemish
- French
- German
- Italian
- Japanese
- Norwegian
- Portuguese
- Swedish

Due to the limited scope of testing, only English and Spanish language ballots were cast during the performance of functional testing. Additionally, one character-based language (Chinese) was tested during System Integration Testing.

For the character-based language, the ballot was created by Pro V&V and voted utilizing both paper ballots and ADA voting devices along with all applicable peripherals. The Chinese language for the ballot was created using a readily available online translation tool. The translated language text was entered into the ClearDesign Application. A ballot preview was generated in the ClearDesign application. The Chinese characters displayed in the ballot preview were compared to the characters generated by the online translation tool, to ensure that the characters matched. The ballots were then generated and printed, and the election loaded onto the tabulators and the BMD units. The Chinese characters displayed on both the printed ballots and displayed on the BMD units were compared to the original Chinese characters generated by the online translation tool to verify that the characters matched.

2.2.5 Supported Functionality

The ClearVote 2.2 was verified to support the following voting variations:

- General Election
- Primary Election (Open and Closed)
- Early Voting
- Partisan/Non-Partisan Offices

- Write-In Voting
- Primary Presidential Delegation Nominations
- Straight Party Voting
- Split Precincts
- Vote for N of M
- Ballot Rotation
- Provisional or Challenged Ballots
- Cross-party endorsement
- Judge initials

2.2.6 VVSG

The ClearVote 2.0 was evaluated against the relevant requirements contained in the EAC VVSG 1.0. To evaluate the ClearVote 2.2 test requirements, the submitted modifications were evaluated against each section of the EAC VVSG 1.0 to determine the applicable tests to be performed. Additionally, all requirements that were excluded from the previous test campaign (ClearVote 2.0) were also deemed not applicable to this test campaign. The submitted modifications did not require the evaluation of any requirements that were not included in the baseline system.

2.2.7 RFIs

There are no RFIs released by the EAC as of the date of this Test Report that pertain to this test campaign that were not in effect at the time of the baseline system certification.

2.2.8 NOCs

There are no NOCs released by the EAC as of the date of this Test Report that pertain to this test campaign that were not in effect at the time of the baseline system certification.

3.0 TEST FINDINGS AND RECOMMENDATION

The ClearVote 2.2 Voting System was evaluated against the relevant requirements contained in the EAC 2005 VVSG, Volumes I and II. The focus of this test campaign was on the modifications made to the baseline certified system. The summary findings and recommendations for each area of testing are provided in the following sections.

3.1 Summary Findings and Recommendation

Summary findings for the System Level Testing (System Integration, Accuracy, Volume and Stress, FCA, and Security Review), Hardware Testing, and Source Code Review are detailed in the relevant sections of this report. In addition to these areas of testing, a PCA and a limited TDP Review were performed, as described below.

TDP Review

In order to determine compliance of the modified TDP documents with the EAC 2005 VVSG, a limited TDP review was conducted. This review focused on TDP documents that have been modified since the certification of the baseline system. The review consisted of a compliance review to determine if each regulatory, state, or manufacturer-stated requirement had been met based on the context of each requirement. Results of the review of each document were entered into the TDP Review Checklist and reported to the manufacturer for resolution of any anomalies. This process continued until all anomalies were addressed. Any revised documents during the TDP review process were compared with the previous document revision to determine changes made, and the document was re-reviewed to determine whether subject requirements had been met.

Summary Findings

The submitted TDP was determined to be in compliance with the requirements set forth in the EAC 2005 VVSG. A listing of all documents contained in the ClearVote 2.2 TDP is provided in Table 3-1.

Table 3-1. ClearVote 2.2 TDP Documents

Document Number	Description	Version
<i>ClearVote Documents</i>		
100128	ClearVote 2.2 Denali Change Notes	2.0
100101	ClearVote 2.2 ClearVote Approved Parts List	1.2.6
100067	ClearVote 2.2 ClearVote Ballot Stock and Printing Specification	1.0.14
100057	ClearVote 2.2 ClearVote Configuration Management Plan	1.0.20
100069	ClearVote 2.2 ClearVote Glossary	1.0.13
100058	ClearVote 2.2 ClearVote Personnel Deployment and Training Plan	1.0.14
100059	ClearVote 2.2 ClearVote Quality Assurance Program	1.0.17
100086	ClearVote 2.2 ClearVote Security Policy	1.0.17
100071	ClearVote 2.2 ClearVote System Overview	1.1.3
100073	ClearVote 2.2 ClearVote Test and Verification Specification	1.0.16
<i>ClearDesign Documents</i>		
100011	ClearVote 2.2 ClearDesign Acceptance Test Checklist	1.0.9
100133	ClearVote 2.2 ClearDesign Accessible Definition File Guide	1.0.4
100062	ClearVote 2.2 ClearDesign Administration Guide	1.0.15
100131	ClearVote 2.2 ClearDesign Ballot Definition File Guide	1.0.5
100083	ClearVote 2.2 ClearDesign Build Procedures	1.0.10
100103	ClearVote 2.2 ClearDesign Database Specification	1.0.10

Table 3-1. ClearVote 2.2 TDP Documents *(continued)*

Document Number	Description	Version
100046	ClearVote 2.2 ClearDesign Functionality Description	1.0.15
100098	ClearVote 2.2 ClearDesign Hardware Specification	1.0.13
100063	ClearVote 2.2 ClearDesign Installation Guide	2.0.3
100082	ClearVote 2.2 ClearDesign Maintenance Guide	1.0.13
100045	ClearVote 2.2 ClearDesign Security Specification	1.0.15
100072	ClearVote 2.2 ClearDesign Software and Design Specification	1.0.22
100043	ClearVote 2.2 ClearDesign System Overview	1.0.17
100074	ClearVote 2.2 ClearDesign System Identification Guide	1.3.1
100041	ClearVote 2.2 ClearDesign User Guide	3.0.2
<i>ClearCount Documents</i>		
100102	ClearVote 2.2 ClearCount Acceptance Test Checklist	1.0.13
100009	ClearVote 2.2 ClearCount Build Procedures	1.6.7
100005	ClearVote 2.2 ClearCount Database Specification	1.1.5
100004	ClearVote 2.2 ClearCount Election Administration Guide	2.0.5
100006	ClearVote 2.2 ClearCount Election Preparation and Installation Guide	1.2.17
100021	ClearVote 2.2 ClearCount Functionality Description	1.0.16
100022	ClearVote 2.2 ClearCount Hardware Specification	1.0.16
100023	ClearVote 2.2 ClearCount Maintenance Guide	1.0.16
100070	ClearVote 2.2 ClearCount Reporting Guide	1.1.4
100013	ClearVote 2.2 ClearCount Scanner Operator Guide	1.2.1
100026	ClearVote 2.2 ClearCount Security Specification	1.0.16
100019	ClearVote 2.2 ClearCount Software Design and Specification	1.0.17
100024	ClearVote 2.2 ClearCount System Operations Procedures	2.0
100025	ClearVote 2.2 ClearCount System Overview	1.0.15
100130	ClearCount Quick Guide XML Report Conversion Tool	n/a
100047	ClearVote 2.2 ClearCount System Identification Guide	1.3.3
<i>ClearCast Documents</i>		
100094	ClearVote 2.2 ClearCast Build Procedures	1.2.9
100079	ClearVote 2.2 ClearCast Functionality Description	1.5.5
100134	ClearCast 2.2 Hardware Acceptance Test Checklist	1.2
100081	ClearVote 2.2 ClearCast Hardware Specification	1.5.4

Table 3-1. ClearVote 2.2 TDP Documents *(continued)*

Document Number	Description	Version
100080	ClearVote 2.2 ClearCast Installation Guide	1.4.4
100089	ClearVote 2.2 ClearCast Maintenance Guide	2.0.2
100090	ClearVote 2.2 ClearCast Poll Worker Guide	1.7.2
100084	ClearVote 2.2 ClearCast Security Specification	1.4.5
100135	ClearVote 2.2 ClearCast Software Acceptance Test Checklist	1.1.0
100093	ClearVote 2.2 ClearCast Software Design and Specification	1.4.5
100097	ClearVote 2.2 ClearCast System Identification Guide	1.3.3
100100	ClearVote 2.2 ClearCast Supervisor Guide	1.8.3
100078	ClearVote 2.2 ClearCast System Overview	1.4.6
100145	ClearVote 2.2 ClearCast Go Build Procedures	1.0.1
100147	ClearVote 2.2 ClearCast Go Hardware Acceptance Test Checklist	1.0.1
100146	ClearVote 2.2 ClearCast Go Installation Guide	1.0.2
100142	ClearVote 2.2 ClearCast Go Maintenance Guide	1.0.2
100143	ClearVote 2.2 ClearCast Go Poll Worker Guide	1.0
100144	ClearVote 2.2 ClearCast Go Supervisor Guide	1.0.2
100148	ClearVote 2.2 ClearCast Go System Identification Guide	1.0.1
<i>ClearAccess Documents</i>		
100109	ClearVote 2.2 ClearAccess Acceptance Test Checklist	1.1.4
100051	ClearVote 2.2 ClearAccess Build Procedures	1.1.5
100049	ClearVote 2.2 ClearAccess Functionality Description	1.5.6
100085	ClearVote 2.2 ClearAccess Hardware Specification	1.5.4
100053	ClearVote 2.2 ClearAccess Installation Guide	1.8.4
100052	ClearVote 2.2 ClearAccess Maintenance Guide	1.8.4
100054	ClearVote 2.2 ClearAccess Poll Worker Guide	1.8.6
100050	ClearVote 2.2 ClearAccess Security Specification	1.5.2
100099	ClearVote 2.2 ClearAccess Software and Design Specification	1.5.6
100055	ClearVote 2.2 ClearAccess Supervisor Guide	1.8.7
100044	ClearVote 2.2 ClearAccess System Overview	1.6.7
100056	ClearVote 2.2 ClearAccess Voter Guide	1.1.7
100038	ClearVote 2.2 ClearAccess System Identification Guide	1.4.2

Physical Configuration Audit (PCA)

The physical configuration audit compares the voting system components submitted for qualification to the manufacturer's technical documentation, and shall include the following activities:

- Establish a configuration baseline of software and hardware to be tested; confirm whether manufacturer's documentation is sufficient for the user to install, validate, operate, and maintain the voting system
- Verify software conforms to the manufacturer's specifications; inspect all records of manufacturer's release control system; if changes have been made to the baseline version, verify manufacturer's engineering and test data are for the software version submitted for certification
- If the hardware is non-COTS, review drawings, specifications, technical data, and test data associated with system hardware to establish system hardware baseline associated with software baseline
- Review manufacturer's documents of user acceptance test procedures and data against system's functional specifications; resolve any discrepancy or inadequacy in manufacturer's plan or data prior to beginning system integration functional and performance tests
- Subsequent changes to baseline software configuration made during testing, as well as system hardware changes that may produce a change in software operation are subject to re-examination

Summary Findings

During execution of the PCA, the components of the ClearVote 2.2 were documented by component name, model, serial number, major component, and any other relevant information needed to identify the component. For COTS equipment, every effort was made to verify that the COTS equipment had not been modified for use. Additionally, each technical document submitted in the TDP was recorded by document name, description, document number, revision number, and date of release. At the conclusion of the test campaign, test personnel verified that any changes made to the software, hardware, or documentation during the test process were fully and properly documented.

3.1.1 Source Code Review, Compliance Build, Trusted build, and Build Documentation Review

Pro V&V evaluated the submitted source code against the EAC 2005 VVSG and the manufacturer-submitted coding standards using both Automated Source Code Review and Manual Review methods. Prior to initiating the software review, Pro V&V verified that the submitted documentation was sufficient to enable Pro V&V to: (1) a review of the source code and (2) Pro V&V to design and conduct tests at every level of the software structure to verify that design specifications and performance guidelines are met.

Summary Findings

- Automated Source Code Review: The Automated Source Code Review was performed to review the changes in the source code from the previously certified ClearVote 2.0 voting system. No source code issues were found during the Automated Source Code review.
- Manual Source Code Review: The Manual Source Code review was performed on 10% of the comments for compliance to VVSG Volume Section 5.2.7. No source code issues were found during the Manual Source Code review.

- Compliance Build: The compliance build was performed following the compliance review. Once the compliance review was performed and the source was deemed stable enough to proceed with testing, the source code and all additional packages were compiled into a Compliance Build.
- Trusted Build: The Trusted Build consisted of inspecting proprietary source code, COTS software, and third-party software products and combining them to create the executable code. This inspection followed the documented process from the “United States Election Assistance Commission Voting System Test Laboratory Program Manual” Section 5.5 – 5.7. Completion of the trusted build included the build documentation review. The Trusted Build was performed following the completion of the Functional Configuration Audit.

3.1.2 System Level Testing

System Level testing was implemented to evaluate the complete system. This testing included all proprietary components and COTS components (software, hardware, and peripherals) in a configuration of the system’s intended use. For software system tests, the tests were designed according to the stated design objective without consideration of its functional specification. The system level hardware and software test cases were prepared independently to assess the response of the hardware and software to a range of conditions.

Pro V&V reviewed the manufacturer’s program analysis, documentation, and module test case design and evaluated the test cases for each module with respect to flow control parameters and entry/exit data.

The software system functions for the previously certified voting system (ClearVote 2.0) remained unchanged for the submitted modifications. The ClearVote 2.2 Election Management System (EMS) consists of a set of applications responsible for all pre-voting and post-voting activities used in election definition and management process. The ClearVote 2.2 EMS applications are as follows:

- ClearDesign
- ClearCount

System Level Testing included the evaluations of the following test areas: FCA, Accuracy Testing, Volume and Stress, System Integration Testing, and the Security Review. Each of these areas is reported in detail in the subsections that follow.

Component Level Testing was implemented during the FCA for each component and subcomponent. During the source code review, compliance builds, and security testing, Pro V&V utilized limited structural-based techniques (white-box testing). Additionally, specification-based techniques (black-box testing) were utilized for the individual software components.

Pro V&V defined the expected result for each test and the ACCEPT/REJECT criteria for certification. If the system performed as expected, the results were accepted. If the system did not perform as expected, an analysis was performed to determine the cause. If needed, the test was repeated in an attempt to reproduce the results. If the failure could be reproduced and the expected results were not met, the system was determined to have failed the test. If the results could not be reproduced, the test continued. Any errors encountered were documented and tracked through resolution.

To verify the modifications were successfully addressed throughout the test campaign, each modification was tracked and verified to be addressed during the execution of the relevant test area. For example, source code changes were verified during the source code review. Modifications requiring functional test verification were evaluated by executing the standard

Accuracy Test, the System Integration Test, or during performance of the FCA. Modifications that were not adequately evaluated during the performance of these tests were subjected to specifically designed test cases.

3.1.2.1 Functional Configuration Audit (FCA)

The functional configuration audit encompasses an examination of manufacturer's tests, and the conduct of additional tests, to verify that the system hardware and software perform all the functions described in the manufacturer's documentation submitted in the TDP.

In addition to functioning according to the manufacturer's documentation, tests are conducted to ensure all applicable EAC 2005 VVSG requirements are met.

For this campaign FCA testing included several exhaustive paths applied in concert:

- **FCA-VVSG Testing:** Each component of the system was evaluated against a standardized test-case suite centered upon requirements stated in the VVSG and administered through a test-management software tool. All applicable test-cases were performed while any non-applicable test-cases were logged as "n/a" for substantiation. The system operations and functional capabilities were categorized in the tool as follows by the phase of election activity in which they are required:
 - o **Pre-voting Capabilities:** These functional capabilities are used to prepare the voting system for voting. They include ballot preparation, the preparation of election-specific software (including firmware), the production of ballots, the installation of ballots and ballot counting software (including firmware), and system and equipment tests.
 - o **Voting System Capabilities:** These functional capabilities include all operations conducted at the polling place by voters and officials including the generation of status messages.
 - o **Post-voting Capabilities:** These functional capabilities apply after all votes have been cast. They include closing the polling place; obtaining reports by voting machine, polling place, and precinct; obtaining consolidated reports; and obtaining reports of audit trails.
- **FCA-Claims Testing:** System user instructions and procedures found in the TDP were followed to verify their accuracy and completeness. In addition any functional claims discovered in the TDP that were not specifically examined in other areas or that were items of interest were also tested.
- **FCA-Mapping:** Any modified functional paths (buttons, dropdowns, etc.) were mapped by qualified VSTL personnel, to help ensure all functional options had been noted and exercised. Any items of interest were examined and/or tested.

All issues (if any) found during these efforts are detailed in Section 3.3. Any issues noted were tracked using an issue tracking software program and issue tracking spreadsheets.

Summary Findings

All functional tests were successfully executed. During execution of the test procedure, it was verified that the ClearVote 2.2 System successfully completed the system level integration tests with all actual results obtained during test execution matching the expected results. At the conclusion of the test campaign, it was determined that all issues communicated to Clear Ballot Group had been successfully reconciled except for deficiency #507 referenced in Table 3.4.

3.1.2.2 Accuracy

The Accuracy Test ensures that each component of the voting system can each process at least 1,549,703 consecutive ballot positions correctly within the allowable target error rate. The Accuracy Test is designed to test the ability of the system to “capture, record, store, consolidate and report” specific selections and absences of a selection. The required accuracy is defined as an error rate. This rate is the maximum number of errors allowed while processing a specified volume of data. For paper-based voting systems the ballot positions on a paper ballot must be scanned to detect selections for individual candidates and contests, and those selections converted into digital data.

Summary Findings

The ClearVote system was tested by utilizing a combination of hand marked (70%) and pre-marked (30%) ballots to achieve an accuracy rate greater than 1,549,703 correct ballot positions. The ClearVote system was tested by using all of the available ballot sizes to cast a sufficient number of ballots to achieve an accuracy rate greater than 1,549,703 correct ballot positions.

The ClearVote 2.2 System successfully passed the Accuracy Test. All deficiencies encountered during the Accuracy Test are detailed in Section 3.3. Any issues noted were successfully resolved. During execution of the test procedure, it was verified that the ClearVote 2.2 System successfully completed the test with all actual results obtained during test execution matching the expected results.

3.1.2.3 System Integration

System Integration is a system level test for the integrated operation of both hardware and software. System Integration evaluates the compatibility of the voting system software components or subsystems with one another, and with other components of the voting system environment. This compatibility was determined through functional tests integrating the voting system software with the remainder of the system. During test performance, the system was configured exactly as it would be for normal field use. This included connecting all supporting equipment and peripherals including ballot boxes, voting booths (regular and accessible), and any physical security equipment such as locks and ties.

Summary Findings

During System Integration testing, three General Elections and three Primary Elections were successfully exercised on the voting system, as described below:

Three general elections with the following breakdowns:

- General Election GEN-01: A basic election held in four precincts, one of which is a split precinct. This election contains nineteen contests compiled into four ballot styles. Five of the contests are in all four ballot styles. The other fourteen contests are split between at least two of the precincts with a maximum of four different contest spread across the four precincts.
- General Election GEN-02: A basic election held in three precincts. This election contains fifteen contests compiled into three ballot styles. Ten of the contests are in all three ballot styles with the other five split across the three precincts.
- General Election GEN-03: A basic election held in two precincts. This election contains eight contests compiled into two ballot styles. Four of the contests are in both ballot styles. The other four contests are split between the two precincts. This election is designed to functionally test the handling of multiple ballot styles, support for at least three languages

including a character-based language, support for common voting variations, and audio support for at least three languages and an ADA binary input device.

Three primary elections with the following breakdowns:

- Primary Election PRIM-01: Open Primary Election in two precincts. This election contained thirty contests compiled into five ballot styles. Each ballot style contains six contests.
- Primary Election PRIM-02: Open Primary Election held in two precincts. This election contained thirteen contests compiled into three ballot styles. One contest is in all three ballot styles; all other contests are independent.
- Primary Election PRIM-03: A basic election held in two precincts. This election contains ten contests and is compiled into two ballot styles. Two of the contests are in both ballot styles. The other eight contests are split between the two parties' ballots. This Primary Election is designed to functionally test the handling of multiple ballot styles, support for at least three languages including a character-based language, support for common voting variations, and audio support for at least three languages and an ADA binary input device.

The ClearVote 2.2 System successfully passed the System Integration Test. All deficiencies encountered during the System Integration test are detailed in Section 3.3. Any issues noted were successfully resolved. During execution of the test procedure, it was verified that the ClearVote 2.2 System successfully completed the system level integration tests with all actual results obtained during test execution matching the expected results.

3.1.2.4 Volume & Stress

The Volume & Stress test investigates the system's response to conditions that tend to overload the system's capacity to process, store, and report data. The test parameters will focus on the system's stated limits and the ballot logic for areas such as the maximum number of active voting positions, maximum number of ballot styles, maximum candidates, maximum contests, and stated limits within the EMS. This test was utilized to ensure the system can achieve the manufacturer's TDP claims of what the system can support. Testing was performed by exercising an election definition and test cases developed specifically to test for volume and stress conditions of the system being tested.

Summary Findings

Previous test results were utilized for all components with the exception of the ClearAccess and ClearCast Go units which were subjected to full testing. The ClearVote 2.2 System successfully passed Volume and Stress Testing. All deficiencies encountered during the Volume and Stress testing are detailed in Section 3.3. Any issues noted were successfully resolved.

3.1.2.5 Security Review

A complete security evaluation was performed on the baseline system. The evaluation of the baseline system was accomplished by utilizing a combination of documentation review, functional testing, source code review, automated network and vulnerability scanners, as well as manual inspection. Test cases were developed in an attempt to defeat the access controls and security measures documented in the system TDP. During the execution of these test procedures, the physical, technical, and administrative security controls were evaluated to determine if the security posture of the system components meet the objectives of the security standards which include: protection of the critical elements of the voting system; establishing and maintaining controls to minimize errors; protection from intentional manipulation, fraud and malicious mischief; identifying fraudulent or erroneous changes to the voting system; and protecting the secrecy in the voting process. Tests conducted verified that the security mechanisms specified in

the TDP Security Specification were implemented and adequately protect the system. Administrative Security was tested by examining the system's documented security instructions and procedures for effectiveness and breadth. Logical Security was tested as part of FCA by conducting the following tests on system components: Vulnerability Scans, SCAP Scans, and Physical Bypass Attempts.

To meet the objectives of this test campaign, the modified components were evaluated to determine the effectiveness of their physical security measures and to determine if the modification adversely impacted results from the baseline test campaign.

Summary Findings

The SCAP checklists used for the review were CIS Ubuntu Linux 18.04 LTS Benchmark v2.0.1 - 01-03-2020 for CountServer & DesignServer and CIS Microsoft Windows 10 Enterprise (Release 1607) Benchmark v1.2.0 - 06-28-2017 for CountStation, ScanStation, & DesignStation. During the review, these checklists were utilized to compare the operating system settings of the ClearVote 2.2 to the benchmark. As a result of the Security Review, it was determined that the ClearVote 2.2 met the VVSG 1.0 security requirements. Any deviations encountered during testing were successfully resolved and are detailed in Section 3.3.

3.1.3 Usability and Accessibility Testing

Usability & Accessibility Testing was performed to evaluate the ClearVote 2.2 voting system against the applicable requirements. Testing specifically focused on the ClearAccess and ClearCast units and the modifications implemented since the certification of the baseline system.

Usability was defined generally as a measure of the effectiveness, efficiency, and satisfaction achieved by a specified set of users with a given product in the performance of specified tasks. The Accessibility portion of testing evaluated the requirements for accessibility. These requirements are intended to address HAVA 301 (a) (3) (B).

During test performance, the ClearVote 2.2 voting system was configured as per the Clear Ballot TDP. The configured system was tested to the VVSG 1.0 requirements utilizing TestLink which maintains all applicable test cases. Test Cases requiring both negative and positive inputs were entered into the system and documented in TestLink to allow for traceability and reproducibility. All components were evaluated against applicable requirements and all deficiencies were documented within TestLink and Mantis for tracking purposes. Regression testing was performed on all identified issues to ensure resolution and compliance to the requirements.

Summary Findings

The ClearCast and ClearAccess components successfully met the requirements of the Usability and Accessibility evaluation. Any deficiencies encountered during testing were successfully resolved.

3.1.4 Hardware Testing

The ClearVote 2.2 Voting System consists of the following major components: ClearDesign, ClearAccess, ClearCast, ClearCast Go, and ClearCount. ClearVote is comprised of two proprietary hardware components (ClearCast and ClearCast Go) and two COTS hardware components (ClearCount) and (ClearAccess). All ClearDesign functions are managed by proprietary software running on COTS PCs/laptops/servers, which is excluded from Hardware Testing.

Previous hardware examinations were performed on the certified baseline system (ClearVote 2.0). The hardware modifications submitted in ClearVote 2.2 required the following hardware and electrical testing to be performed:

Electrical Tests:

- Electrical Power Disturbance – ClearCast Go, ClearAccess
- Electromagnetic Radiation – ClearCast Go, ClearAccess
- Electrostatic Disruption – ClearCast Go, ClearAccess
- Electromagnetic Susceptibility – ClearCast Go, ClearAccess
- Electrical Fast Transient – ClearCast Go, ClearAccess
- Lightning Surge – ClearCast Go, ClearAccess
- Conducted RF Immunity – ClearCast Go, ClearAccess
- Magnetic Fields Immunity – ClearCast Go, ClearAccess
- Electrical Supply – ClearCast Go, ClearAccess

Environmental Tests:

- Bench Handling – ClearCast Go, ClearAccess
- Vibration – ClearCast Go, ClearAccess
- Temperature Power Variation - ClearCast Go, ClearAccess
- Acoustic – ClearAccess

Pro V&V utilized third party testing during the performance of hardware testing. All hardware testing was performed at the NTS Longmont facility located in Longmont, Colorado with the exception of the Acoustic Test in which ProV&V qualified staff executed at the Pro V&V facility. All testing at the NTS Longmont facility was witnessed on-site by Pro V&V personnel, with the exception of Temperature Power Variation Test in which Pro V&V qualified staff executed all testing.

Summary Findings

Electrical Testing was performed on the ClearVote 2.2 components listed above. The procedures and results for this testing are included in the following NTS Test reports:

- ITR-PR127745, presented in Appendix B-1
- ITR-PR128128, presented in Appendix B-1
- ETR-PR127745, presented in Appendix B-1
- ETR-PR128128, presented in Appendix B-1

The test results from this testing are summarized below:

Table 3-2. Electrical Hardware Test Results

Standard/Method	Description	Criteria	Class/Level	Result
FCC 15.107 ICES-003 VVSG Vol. 1 4.1.2.9	Power Line Conducted Emissions	Normal Operation & No Data Loss	Class B	Pass
FCC 15.109 ICES-003 VVSG Vol. 1 4.1.2.9	Radiated Emissions	Normal Operation & No Data Loss	Class B	Pass *
EN61000-4-11 VVSG Vol. 1 4.1.2.5	Electrical Power Disturbance	Normal Operation & No Data Loss	Various	Pass
EN61000-4-4 VVSG Vol. 1 4.1.2.6	Electrical Fast Transient	Normal Operation & No Data Loss	±2kV - Mains	Pass
EN61000-4-5 VVSG Vol. 1 4.1.2.7	Lightning Surge	Normal Operation & No Data Loss	±2kV Line - Line ±2kV Line - Ground	Pass
EN61000-4-2 VVSG Vol. 1 4.1.2.8	Electrostatic Disruption	Normal Operation & No Data Loss	±8kV Contact ±15kV Air	Pass
EN61000-4-3 VVSG Vol. 1 4.1.2.10	Electromagnetic Susceptibility	Normal Operation & No Data Loss	10 V/m, 80 MHz – 1 GHz	Pass **
EN61000-4-6 VVSG Vol. 1 4.1.2.11	Conducted RF Immunity	Normal Operation & No Data Loss	10 Vrms, 150 kHz – 80 MHz	Pass
EN61000-4-8 VVSG Vol. 1 4.1.2.12	Magnetic Immunity	Normal Operation & No Data Loss	30 A/m	Pass

* During test performance, an issue was detected with the ClearAccess Configuration. The configuration was outside of the allowable range during the emissions test. Clear Ballot was notified of the issue and performed an analysis of the occurrence and implemented a corrective action by adding a ferrite core to the printer data cable and updating the power supply manufacturing SOP. For a detailed description of the corrective actions please refer to the document Clear Ballot Group ClearAccess RCA 210525_final. This configuration was successfully tested and regression testing was performed on the system to verify that the change did not adversely impact previous test results.

** During test performance, an issue was detected with the ClearCast unit. Specific frequencies caused the unit to exhibit an operational interruption when exposed to the electromagnetic field strength of 10V/m at recorded frequencies. Clear Ballot was notified of the issue and performed an analysis of the occurrence and implemented a corrective action by adding ferrites to the USB extension cables of the unit. For a detailed description of the corrective actions please refer to the document ClearCast Go RCA CV2.2 210420 FINAL. This configuration was successfully tested and regression testing was performed on the system to verify that the change did not adversely impact previous test results.

Environmental Testing was performed on the ClearVote 2.2 components listed above. The procedures and results for this testing are included in the following NTS Test reports:

- TR-PR127745-00 Rev. 0, presented in Appendix B-1
- TR-PR128128-1 Rev. 0, presented in Appendix B-1

The test results from this testing are summarized below:

Table 3-3. Environmental Hardware Test Results

Standard/Method	Description	Criteria	Result
MIL-STD-810D, 516.3, I-3.8 VVSG Vol. 1 4.1.2.14, VVSG Vol. 2 4.6.2	Shock – Bench Handling	Normal Operation & No Data Loss	Pass
MIL-STD-810D, 514.3, I-3.2.1 VVSG Vol. 1 4.1.2.14, VVSG Vol 2 4.6.3	Vibration - Basic Transportation	Normal Operation & No Data Loss	Pass
MIL-STD-810D, 501.2/502.2 VVSG Vol 1 4.1.2.13, 4.3.3, VVSG Vol 2 4.7.1	Reliability, Temperature-Power Variation Testing	Normal Operation & No Data Loss	Pass
VVSG Vol. 1 3.1.7.1, 3.2.2.2 (c)	Acoustic Noise Level Test	Normal Operation & No Data Loss	Pass *

* The Acoustic Noise Level Test was performed by ProV&V qualified staff at the Pro V&V facility in Huntsville, Alabama. Test cases were developed and tested to the standards set forth in VVSG Volume 1 3.1.7.1 & 3.2.2.2 (c).

All tests were completed successfully without issue.

3.2 Anomalies and Resolutions

When a result is encountered during test performance that deviates from what is standard or expected, a root cause analysis is performed. Pro V&V considers it an anomaly if no root cause can be determined. In instances in which a root cause is established, the results are then considered deficiencies.

Summary Findings

There were no anomalies encountered during this test campaign.

3.3 Deficiencies and Resolutions

Any violation of the specified requirement or a result encountered during test performance that deviates from what is standard or expected in which a root cause is established was considered to be a deficiency. When a root cause can be determined, instances of nonstandard or unexpected results are considered deficiencies, rather than anomalies. Throughout the test campaign, any deficiencies encountered were logged in the Pro V&V tracking system (Mantis) for disposition and resolution. In each instance, if applicable, the resolution was verified to be resolved through all required means of testing (regression testing, source code review, and TDP update) as needed. The noted deficiencies are listed in Table 3-4.

Table 3-4. Noted Deficiencies

ID#	Test Category	Deficiency	Resolution
506	FCA	ClearCast Go graphic on the Election Management page to indicate USB physical drive location wrong.	The USB port recognition error was corrected by swapping connection positions of cables connected to the USB ports. The ClearCast Go Manufacturing Guide was revised to reflect the precise process required for properly connecting the USB cables to the CPU. For a detailed description of the corrective actions please refer to the document ClearCast Go USB Recognition Error.
507	FCA	Graphic accompanying the error message on the ClearCast disappeared when changing languages.	This issue was chosen not to be addressed in this version by ClearBallot due to the operational performance of the ClearCast nor the messaging to voters and poll workers is compromised by the deficiency. The device messaging conveyed to the voter/poll worker regardless of the language displayed remains concise and unambiguous when the graphic is not present. It may be addressed in a future version of the voting system.
511	FCA	Election was accepted and tabulated from another election.	A new election ballot code has been added to the election metadata. This code enables ClearVote to detect ballots that do not belong to the current election. Functional regression testing was performed to verify that the issue was resolved. For a detailed description of the corrective actions please refer to the document Clear Ballot Group Ballot Identification RCA 0411221_EAC.
520	FCA	Ballot scanned, accepted and counted from different election. All components effected.	A new election ballot code has been added to the election metadata. This code enables ClearVote to detect ballots that do not belong to the current election. Functional regression testing was performed to verify that the issue was resolved. For a detailed description of the corrective actions please refer to the document Clear Ballot Group Ballot Identification RCA 0411221_EAC.
532	Accuracy	Ballot hangs in ClearCast D during testing and “Scanner is Busy” is displayed with no timeout.	A source code update was required so the ClearCast application software properly logged and recovered from a detected error in the scanner driver. Functional regression testing was performed to verify that the issue was resolved. For a detailed description of the corrective actions please refer to the document Clear Ballot ClearCast D Unresponsive Scanner RCA 09072021 FINAL.

Table 3-4. Noted Deficiencies (continued)

ID#	Test Category	Deficiency	Resolution
535	Hardware	ClearCast Go failed Electromagnetic Susceptibility Testing.	Implemented a corrective action by adding ferrites to the USB extension cables of the unit. For a detailed description of the corrective actions please refer to the document ClearCast Go RCA CV2.2 210420 FINAL.
536	Hardware	ClearAccess failed Radiated Emission Testing	Implemented a corrective action by adding a ferrite core to the printer data cable and updating the power supply manufacturing SOP. For a detailed description of the corrective actions please refer to the document Clear Ballot Group ClearAccess RCA 210525_final.
N/A	TDP	Minor edits and revisions needed during review.	All issues were corrected with new submissions of the affected documents.

4.0 RECOMMENDATION FOR CERTIFICATION

The ClearVote 2.2 Voting System, as presented for testing, successfully met the requirements set forth for voting systems in the U.S. Election Assistance Commission (EAC) 2005 Voluntary Voting System Guidelines (VVSG), Version 1.0. Additionally, Pro V&V, Inc. has determined that the ClearVote 2.2 functioned as a complete system during System Integration Testing. Based on the test findings, Pro V&V recommends the EAC grant the ClearVote 2.2 system, as identified in Tables 4-1 and 4-2, certification to the EAC 2005 VVSG.

Table 4-1. ClearVote 2.2 Voting System Software

Firmware/Software	Version
<i>ClearDesign Components, Version 2.2.4</i>	
Windows	10 Pro 1607
Google Chrome	87.0.4280.141
Ubuntu	18.04.5
MySQL	5.7.31
Apache	2.4.29
libapache2-mod-fcgid	2.3.9-1
PhantomJS	1.9.8
Unzip	6.0.21
Samba	4.7.6
Python PIP	9.0.1
Zip	3.0.11
Pyinstaller	3.2.1
Python JSMIN	2.2.1

Table 4-1. ClearVote 2.2 Voting System Software (continued)

Firmware/Software	Version
Python	2.7.15
Python webpy	0.38
Python MySQL DB	1.3.10
SQLAlchemy	1.3.3
Python Pillow	5.1.0
Python Flup	1.0.2
Python DBUtils	1.3
Python XLRD	1.2.0
Python FontTools library	3.4.1
Python RTF	0.2.1
OpenSSL (FIPS)	2.0.10
OpenSSL	1.1.1
DataTable	1.10.16
DataTable-Buttons	1.4.2
DataTable-Buttons-JSZip	2.5.0
DataTable-Buttons-Pdfmake	0.1.32
DataTablePlugins	1.10.16
bootstrap	3.0.0
jquery	2.2.4
jquery-impromptu	6.2.3
jquery-qrcode	1.0
jquery-splitter	0.27.1
jquery-ui	1.12.1
jscolor	1.4.2
tinymce	4.1.9
jslibmp3lame	0.5.0
jszip	3.2.0
paparser	4.6.0
jsmin	4.6
<i>ClearAccess Components, Version 2.2.2</i>	
Windows	10 Pro 1607
Google Chrome	93.0.4577.63
nsis	3.01
PyInstaller	3.2
Python	2.7.10
webpy	0.38
Python-future	0.15.2

Table 4-1. ClearVote 2.2 Voting System Software (continued)

Firmware/Software	Version
pefile	2018.8.8
pywin	223
jquery	1.10.2
DataTables	1.10.16
jsmin	2019-10-30
Zebra scanner driver	3.07.0004
EloPOS driver pack	12/5/2019
pyserial	3.2.1
<i>ClearCast Components, Version 2.2.9</i>	
Ubuntu	18.04.5 LTS
chromium-browser	92.0.4515.159
pyinstaller	3.2.1
openssl-fips	2.0.10
openssl	1.0.2g
libScanAPI.a	2.0.0.0
DataTables	1.10.16
JTSage DateBox	4.0.0
jQuery.NumPad	1.4
jQuery	1.12.4
jquery.ui	1.11.3
<i>ClearCast Go Components, Version 2.2.a</i>	
Ubuntu	18.04.6 LTS
Linux kernel	5.4.52
U-boot	2020.10
rk3399_loader	1.24.126
rk3399_bl31	1.35
trust_merger	1.0 (2015-06-15)
boot_merger	1.31
Rk3399_ddr-800MHz	1.25
Rk3399_miniloader	1.26
rkdeveloptool	1.2
chromium-browser	92.0.4515.159
libssl	1.0_1.0.2n
openssl	1.0.0_1.0.2n
libScanAPI.a	1.0.0.1
DataTables	1.10.16
JTSage DateBox	4.0.0

Table 4-1. ClearVote 2.2 Voting System Software (continued)

Firmware/Software	Version
jQuery.NumPad	1.4
jQuery	1.12.4
jquery.ui	1.11.3
<i>ClearCount Components, Version 2.2.4</i>	
Windows	10 Pro 1607
Google Chrome	87.0.4280.141
Ubuntu	18.04.5 LTS
sqlalchemy	1.3.4
six	1.15.0
Python-dateutil	2.8.1
Apache	2.4.29
libapache2-mod-fcgid	2.3.9-1
Python(part of Ubuntu)	2.7.15~rcl-1
MySQLdb (part of Ubuntu)	5.7.31
PyInstaller	3.2.1
PollyReports	1.7.6
OpenSSL	1.1.1
OpenSSL FIPS Object Module	2.0.10
JavaScript Bootstrap library	2.3.2, & 4.3.1
JavaScript Chosen library	1.8.7
JavaScript jQuery library	1.10.2J
J JavaScript jQuery-migrate library	1.2.1
JavaScript jQuery hotkeys library	0.8
JavaScript jQuery tooltip library	1.3
JavaScript jQuery spllter library	0.28.3
JavaScript DataTables library	1.10.18
JavaScript DataTables Buttons	1.5.6
JavaScript DataTables Buttons ColVis Library	1.0.8
JavaScript DataTables Buttons html5 library	1.3.3
JavaScript DataTables FixedHeader library	3.1.4
JavaScript DataTables pdfmaker library	0.1.36
JavaScript vue library	2.6.10
JavaScript bootstrap-vue library	2.0.2
Fujitsu fi-6400	PaperStream IP (TWIN) 2.10.3
Fujitsu fi-6800	PaperStream IP (TWIN) 2.10.3
Fujitsu fi-7180	PaperStream IP (TWIN) 2.10.3
Fujitsu fi-7800	PaperStream IP (TWIN) 2.10.3

Table 4-1. ClearVote 2.2 Voting System Software (continued)

Firmware/Software	Version
Fujitsu fi-7900	PaperStream IP (TWIN) 2.10.3
auditd	2.8.2-1
debconf	1.5.66
pmount	0.9.23
Samba	4.7.6
udisks	2.7.6

Table 4-2. ClearVote 2.2 Voting System Equipment

Component	Model	Serial Number
<i>ClearDesign Components</i>		
Dell Latitude Laptop (client)	5580, 5590, 5500, 5511	2F3L3G2, 9W5DIN2, JV3WXY2, 13KWY33
Dell OptiPlex (client)	7440	JXDFHH2, 93VDB03
Dell Precision Tower (client)	T3620	GSKRMV2
Dell PowerEdge Server (server)	T130, T140, T440, R440, T630	5G0YLN2, 8BFH3W2, H6JZLN2, 55BGB03, GCHLHL2
Cisco 8-Port Switch	SG250-08	PSZ21451MLJ
Cisco Catalyst 8-Port Switch	C1000-8T-2G-L	PSZ240319T3
NetGear 8-Port Switch	FVS318G	40F266BA00280
TP-LINK 4-Port Switch	TL-R600VPN	2157090000334
TRENDNet 8-Port Switch	TEG-S80G	C217Z28001195
Corsair Flash Padlock 3 32 GB	Secure USB 3.0 Flash Drive	CMFPLA3B-32GB
Corsair Flash Voyager GTX	3.1 USB Drive	CMFVYGTX3C-128GB
Kingston Data Traveler Elite G2	3.0 USB Drive	DTEG2/64GB
SanDisk Extreme Go 64 GB USB	3.0 USB Drive	SDCZ800-064G-G46
SanDisk Extreme Pro 64 GB USB	3.0 USB Drive	SDCZ880-128G-G46
SanDisk Ultra Flair 32 GB USB	3.0 USB Drive	SDCZ73-032G-A46, SDCZ73-032G-G46
<i>ClearAccess Components</i>		
ELO 15 inch EloPOS	EPS15E3	J193011873
ELO 15 inch AIO	E-Series (ESY15E2)	A18C004080
Dell OptiPlex AIO	5250	HCGMGK2
ELO 20 inch AIO	X-Series (ESY20X2)	D18Q000334

Table 4-2. ClearVote 2.2 Voting System Equipment (continued)

Component	Model	Serial Number
Dell Inspiron 15”	7573	80S1YD2
Oki Data Laser Printer	B432dn	AK5B007647A0 & AK91021454C0
Zebra Technologies Bar Code Scanner	DS457-SR	18059000501984
Storm EZ Access Keypad	EZ08-22201	15000005, 15000007, 15020478
Storm EZ Access Keypad	EZ08-22000	20010073
Origin Instruments Sip/Puff Breeze with Headset	AC-0313-MUV, AC-0300-MU	CBG-SP-001, 002, 003
Samson Over-Ear Stereo Headphones	SASR350	SR350J8G390 & SR350J8G396
Monoprice Over the Ear Pro Headphones	8323	CBG-mono-001, 002, 003
Hamilton Buhl Over-Ear Stereo Headphones	HA7	CBG-HP-001 & CBG-HP-002
Ergotron Neo-Flex	Widescreen Lift Stand	33-329-085
Wearson LCD Stand	Adjustable LCD Monitor Stand	WS-03A
Corsair Flash Padlock 3 32 GB	Secure USB 3.0 Flash Drive	CMFPLA3B-32GB
Corsair Flash Voyager GTX	3.1 USB Drive	CMFVYGTX3C-128GB
Kingston Data Traveler Elite G2	3.0 USB Drive	DTEG2/64GB
SanDisk Extreme Go 64 GB USB	3.0 USB Drive	SDCZ800-064G-G46
SanDisk Extreme Pro 64 GB USB	3.0 USB Drive	SDCZ880-128G-G46
SanDisk Ultra Flair 32 GB USB	3.0 USB Drive	SDCZ73-032G-A46, SDCZ73-032G-G46
CyberPower Smart App UPS	PR1500RT2U	PY3HZ2002933, PY3HZ2003000
APC Smart-UPS	SMT2200	AS1602232215
ClearCount Components		
Dell PowerEdge Server (ScanServer)	T130, T140, T330, T440, R440	5G0ZLN2, 8BFJ3W2, FHV9RD2, H6J5MN2, 55FDB03
Lenovo ThinkServer (ScanServer)	TS140	MJ0472UV
Dell Precision Tower (Election Administration)	T3620	GSKQMN2
Dell OptiPlex (Election Administration)	7440, XE3 SFF	JXDFHH2, 93YDB03

Table 4-2. ClearVote 2.2 Voting System Equipment (continued)

Component	Model	Serial Number
Dell Latitude Laptop (ScanStation)	5580, 5590, 5500, 5511	2F3L3G2, 5M5DIN2, 35YL9Y2, 13KWY33
Fujitsu Scanner	fi-7180	A20DC10302 & A20D000798
Fujitsu Scanner	fi-6800	A9HCA00737 & A9HCC00543
Fujitsu Scanner	fi-6400	AKHCC00362 & AKHCC00609
Fujitsu Scanner	fi-7800	C39C000034
Fujitsu Scanner	fi-7900	C30C000270
SanDisk Extreme Go 64 GB USB	3.0 USB Drive	SDCZ800-064G-G46
SanDisk Extreme Pro 64 GB USB	3.0 USB Drive	SDCZ880-128G-G46
SanDisk Ultra Flair 32 GB USB	3.0 USB Drive	SDCZ73-032G-A46, SDCZ73-032G-G46
CyberPower Smart App UPS	PR1500RT2U	PY3HZ2002933, PY3HZ2003000
Cisco 8-Port Switch	SG250-08	PSZ21451MYX
Cisco Catalyst 8-Port Switch	C1000-8T-2G-L	PSZ240319T3
Cisco 24-Port Switch	C1000-24T-4X-L	FCW2417A0E6
NetGear 8-Port Switch	FVS318G	40F266BA00280
TP-LINK 4-Port Switch	TL-R600VPN	2157090000334
Cisco 26-Port Switch	SG250-26	DNI203400A6 & DNI203400AW
TRENDNet 8-Port Switch	TEG-S80G	C217Z28001195
Corsair Flash Padlock 3 32 GB	Secure USB 3.0 Flash Drive	CMFPLA3B-32GB
Corsair Flash Voyager GTX	3.1 USB Drive	CMFVYGTX3C-128GB
Kingston Data Traveler Elite G2	3.0 USB Drive	DTEG2/64GB
APC Smart-UPS	SMT-1500C	3S1831X12280
ClearCast Components		
ClearCast	Model D Revision 4	CCD041903778, CCD041904024
ClearCast Go	Model E Revision 5	CCER0401004, CCER0401006
Corsair Flash Padlock 3 32 GB	Secure USB 3.0 Flash Drive	CMFPLA3B-32GB
Corsair Flash Voyager GTX	3.1 USB Drive	CMFVYGTX3C-128GB
Kingston Data Traveler Elite G2	3.0 USB Drive	DTEG2/64GB
SanDisk Extreme Go 64 GB USB	3.0 USB Drive	SDCZ800-064G-G46

Table 4-2. ClearVote 2.2 Voting System Equipment *(continued)*

Component	Model	Serial Number
SanDisk Extreme Pro 64 GB USB	3.0 USB Drive	SDCZ880-128G-G46
SanDisk Ultra Flair 32 GB USB	3.0 USB Drive	SDCZ73-032G-A46, SDCZ73-032G-G46
Ballot Bag	CV-1032-1.5, CV-1032-2.0	bag001, bag002
Ballot Box	CV-1033-1.5, CV-1033-2.0	box001, box002

**APPENDIX A
MODIFICATION TABLE**

Table A-1. System Modifications

Issue key	Component	Change Note Description
<i>ClearAccess</i>		
SW-8995	ClearAccess	ClearAccess' barcode scanner now recovers more gracefully if disabled due to an electro-static discharge.
SW-8973	ClearAccess	Fixed a bug that caused the Sound/Screen options to not be properly focused when selected via the touchscreen.
SW-8513	ClearAccess	The ClearAccess installation media have been updated to include additional files from the graphics driver pack that are needed for successful installation of the graphics driver.
SW-8451	ClearAccess	When on the main page, the user can now only click on any of the buttons once. After clicked once and while the data is loading, the links are disabled and buttons are darkened.
SW-8394	ClearAccess	All instances of How to Vote are now How to vote. Mainly this is on the help screen in ClearAccess. This is changed in the default languages on ClearDesign
SW-8369	ClearAccess	Previously the documentation said that the default text-to-speech (TTS) voice was set to the female voice during installation but it was not. The default TTS voice will now actually be set to the female during installation.
SW-8341	ClearAccess	Disables startup programs as a part of ClearAccess installation.
SW-8273	ClearAccess	Ensure all cryptographic functions use the FIPS certified library in FIPS mode.
SW-8155	ClearAccess	A new model of the ClearAccess touchscreen, the Elo POS, has been added to the APL.
SW-7726	ClearAccess	The ClearAccess installation documentation has been updated with details on BIOS settings that reduce the likelihood of the touchscreen becoming unresponsive, which has been seen intermittently in earlier releases.
SW-7529	ClearAccess	The ClearAccess installer no longer hangs when a password contains more than 14 characters.
SW-7363	ClearAccess	ClearAccess now preserves the initial font size ratio as seen on the ballot when displaying contest description information.
SW-7326	ClearAccess	ClearAccess ballot style list loading speed has been improved and stabilized.
SW-6227	ClearAccess	The upper limit for a stub size has increased to five inches.
SW-8303	ClearAccess	Since loading a large ADF can be slow, the OK and Back buttons have been disabled during the loading process to prevent the election loading and validation from being initiated multiple times.
SW-7178	ClearAccess	The exact font size is scaled relative to the Zoom option (Small, Default, Large, Extra Large) on the Settings screen of ClearAccess.
SW-8232	ClearAccess	Previously the logs would occasionally be corrupted when shutting down the system, this issue has been corrected in this release.

Table A-1. System Modifications *(continued)*

Issue key	Component	Change Note Description
SW-7844	ClearAccess	This allows ClearAccess to accept the new ADF version updated to support multi-language ballots
SW-7901	ClearAccess	The release has added support for the Elo barcode scanner that attaches directly to the Elo POS system.
SW-7292	ClearAccess	The various forms of the word "logout" have been changed to "log out" in the ClearAccess user interface.
SW-8055	ClearAccess	ClearAccess now supports multiple languages on the same ballot printing. The voting experience remains the same as before whereby the voter only navigates through their chosen language. The printed ballot will be multi-language however.
SW-8111	ClearAccess	Because the ADF now contains a field for "PDFNamingConvention", the ClearAccess schema has been updated to verify this field. This value is used when determining how to name ballot PDF files generated in ClearDesign.
SW-7386	ClearAccess, ClearCast	The Erase key has been renamed Delete. The "Quote" key has been fixed.
SW-6291	ClearAccess	Conditional straight-party voting—only parties that have a candidate represented on a given ballot style are represented in the straight-party contest.
SW-6749	ClearAccess	The Back button now works correctly on the Select Vote Center screen.
SW-6112	ClearAccess	Previously, when you were logged in as an Election Administrator, a Change Vote Center button appeared on the No Election Loaded screen. Clicking this button did not accomplish anything. This button no longer appears.
SW-6483	ClearAccess	<p>In the System Log for ClearAccess, the header cell Valid has changed to Validated. This column describes the validation status of the transaction, which is one of the following:</p> <ul style="list-style-type: none"> • Validated • Validated HMAC • Error: text describing the error.
SW-7096	ClearAccess	Previously, ClearAccess read write-in names with no space between the write-in and the colon. This release has fixed this issue.
<i>ClearCast</i>		
SW-8982	ClearCast	There is a new entry in the About ClearCast Dialogue that states the ClearCast Model. It has possible values of: 'ClearCast Model D' or 'ClearCast Go' depending on what hardware the cast is on.
SW-8775	ClearCast	The version of Ubuntu has been upgraded to 18.04.5.
SW-8656	ClearCast	Scanner calibration no longer causes a shutdown screen to appear. Scanner calibration is also done asynchronously to prevent the python global interpreter thread from locking up.

Table A-1. System Modifications *(continued)*

Issue key	Component	Change Note Description
SW-8556	ClearCast	Fixed an issue where misleading error messages would be written to the logs about not being able to reach the USB drives when the drives had been unmounted before shutdown.
SW-8558	ClearCast	A log entry is now added on successful and unsuccessful validation of the data on the USB drives. This occurs when a user logs in to ClearCast.
SW-8434	ClearCast	New graphics have been added to the Election Management page to indicate which physical drive location corresponds to USB 1 and USB 2.
SW-8260	ClearCast	Ensure all cryptographic functions are used in FIPS mode.
SW-8169	ClearCast	The USB drives used in ClearCast are no longer mounted with the "sync" option in order to increase the performance of writing results to the drives. To maintain data integrity, explicit sync operations have been added to code when writing to the drives.
SW-7983	ClearCast	Fixed error logging so that each instance of a ballot jam is logged only one time rather than repeatedly until the jam is cleared.
SW-7972	ClearCast	Election data is now synced to the USB drives and validated after every successfully accepted card. This ensures that all data has been written successfully to the system of record before the next voter casts their ballot.
SW-7830	ClearCast	Fixed an issue in which a ClearCast station which had polls opened and closed without any ballots being cast would raise an error message when trying to merge the results into ClearCount.
SW-7750	ClearCast	The election_state.txt file on the USB drives are now moved into the current election folder when the election is closed on the ClearCast station, rather than deleted.
SW-7730	ClearCast	ClearCast election logs that are written in plain text on the USB drives are hashed to secure them against tampering.
SW-7681	ClearCast	New values have been added to the election-state.txt file due to the new results aggregation workflow. These are: scan_computer_name, scanner_model, and scanner_serial.
SW-7660	ClearCast	The workflow for aggregating ClearCast results has changed in this release. When merging results, you now insert the USB drives from ClearCast into a CountStation laptop rather than a CountServer and use the Results Uploader application to merge the results into ClearCount. For further details, refer to the ClearCount Election Administration Guide.
SW-7531	ClearCast	Fixed an issue where changing the language while an error is displayed on the UI can cause a different error to display in the chosen language.

Table A-1. System Modifications *(continued)*

Issue key	Component	Change Note Description
SW-7420	ClearCast	The election-sigs.txt file has been restructured so there is only one file with this name for each election, and it does not include either the poll worker or election code. The election-sigs.txt file in the election directory should have an "election" key with a hash value (this is the hash of the election.log file). The voting-sigs.txt file in the voting directory should have an "archive.tar" key with a hash if ballots have been scanned.
SW-6687	ClearCast	The ClearCast functionality that recovers from an election in progress on a USB drive has changed so that it reads the encrypted Cast Vote Records on the USB drive instead of retabulating the ballot images. The images and CVRs are validated to ensure that they have not been tampered with.
SW-8251	ClearCast	During log in and after removable drives have been reinserted, ClearCast now validates all data on each affected drive before allowing the user to proceed.
SW-8252	ClearCast	Validation can now be done between each of the data sources used in the election any time after the polls have been opened.
SW-8266	ClearCast	The Election Management page which offers the option to recover from a USB drive has a new design that features a table that displays details about the data on each drive that enable the user to make a decision about what drive to recover from. Action buttons are available to select a USB drive to recover from or the user may select the internal drive if they want to clear the election instead of recovering.
SW-7969	ClearCast	<p>Added buttons to lower right menu that say mount/unmount for all of the 'main' screens. Tapping unmount is recommended to ensure that the data on the USB drives is saved properly before removing the drives from the voting station.</p> <p>Added buttons to polls closed screen that prompts the user to unmount the USB drives.</p> <p>Added a screen after unmounting is done prompting the user to shut down.</p>
SW-7973	ClearCast	An explicit "Unmount" option has been added to the ClearCast UI which enables a user to safely remove the USB drives from the voting station. As a result, USB drives that have been unmounted are no longer automatically mounted when they are detected to be present, but are mounted after a successful login.
SW-8517	ClearCast	ClearCast no longer loads elections with BDFs from older versions of ClearVote (that is, BDFs with a BDF version older than the version that is output by ClearDesign in the current release).
SW-8109	ClearCast	ClearCast reports now include breakdowns by ballot and card (for multi-card ballot elections) and breakdown by party (for closed primary elections).

Table A-1. System Modifications (continued)

Issue key	Component	Change Note Description
SW-6548	ClearCast	During Vote Center and Counter Group selection, ClearCast now allows the user to filter by Vote Center Category.
SW-8377	ClearCast	Unencrypted BDF files are no longer supported in ClearCast. The ballot definition file must be exported from ClearDesign as an encrypted BDFx.
SW-8673	ClearCast	The image displayed during ballot scanning is now static/non-animated.
SW-8094	ClearCast	The verbiage on the ClearCast UI related to battery charging state has been updated.
SW-8108	ClearCast	<p>ClearCast now tracks and displays information about ballots cast as well as cards cast. Previously, it was stated the number of cards cast or cards accepted in the UI. A new number is now displayed with the label “ballots cast” which indicates the number of ballots accepted by the voting station. The number of ballots corresponds to the number of “Card 1”s accepted by the voting station. This also has a change for ClearDesign. ClearDesign had in it a languages option for Cards Cast that was called BallotsAccepted.</p> <p>A new device message was introduced called CardsAccepted</p> <p>The new verbiage for each is:</p> <p>CardsAccepted: Cards Accepted:</p> <p>BallotsAccepted: Ballots Accepted:</p>
SW-7981	ClearCast	The “Save System Information” option available to the maintenance user now saves OS level logs useful for debugging in addition to the ClearCast System Log.
SW-8768	ClearCast	Recovering in the middle of L & A testing without ending the test allows you to enter the same session for L & A testing.
SW-8292	ClearCast	The printed ClearCast election log now includes a column indicating whether the entry was validated or not with each entry printed.
SW-7005	ClearCast	The color of the "Submit" and "Return" buttons when giving voters a choice for a ballot that has tabulated with a warning (for example, if the voter has submitted an overvote) are now both the same neutral color rather than green and red.
SW-9103	ClearCast	There is a new loading bar that appears when the user clicks save system info if saving the system info process takes more than a couple seconds to do.
SW-9231	ClearCast	Recovering L&A Results now leaves the results zeroed out with a blank database, but it still reloads and recovers the election (bdf) itself.
SW-7419	ClearCast	The election-state.txt file that is written on the removable USB drives of ClearCast no longer contains the pollworker_code or election_code.
SW-6676	ClearCast	The Precinct Card Counts report was previously limited to 100 precincts. This limit has been removed, so this report can be printed for elections and vote centers with large numbers of precincts.

Table A-1. System Modifications *(continued)*

Issue key	Component	Change Note Description
SW-7536	ClearCast	Graphics depicting hardware are automatically chosen upon install to accurately reflect the version onto which the software is installed.
SW-9195	ClearCast	The label for displaying the summary report during logic and accuracy testing changes to "Display Zero Report" depending on whether cards have been cast.
SW-9488	ClearCast	Fixed an issue where the user would see an error suggesting that a box had already been tabulated after restoring an election that had a large number of ballots scanned.
SW-9515	ClearCast	Fixed a validation issue that can appear when a large number of ballots have been scanned, causing the user to reach an unrecoverable error.
SW-9596	ClearCast	Fixed a case where election data validation would find inconsistent data between the ClearCast internal storage and the removable USB drives.
SW-9348	ClearCast	Optimized the number of python processes that are active during tabulation.
SW-9529	ClearCast	Fixed an issue where the "Thank You for Voting" screen appeared briefly when initially entering a voting session.
SW-9516	ClearCast	Addressed an issue where several ballots can be scanned without the public counter incrementing (the UI is slow to catch up and eventually reports the right number of ballots).
SW-9511	ClearCast	Fixed an issue where the Polls Open report could print with an incorrect public counter if the election is being restored in a "Polls Open" state on a different voting station.
SW-9471	ClearCast	Upgraded the Linux kernel version to fix a display issue on booting up the ClearCast unit.
SW-9467	ClearCast	Fixed an issue where the battery charge percentage was not being accurately reported in the UI.
SW-9452	ClearCast	Fixed an issue where the low battery warning appeared prematurely - it now appears when the battery reaches 10% charge.
SW-9090	ClearCast	Fixed an issue where the "Unmount" button on the UI does not appear when both USB drives are removed and only one of them reinserted.
SW-9442	ClearCast	Improved handling of database exceptions.
SW-9539	ClearCast	Updated the validation logic so that it does not invalidate a USB drive that has invalid log entries, but highlights the validation errors on the Election Management screen so the user has the proper information to select the drive to restore the election from.
SW-7988	ClearCast	Improved handling of removable USB drives so that they will not cause warnings when inserted into the CountStation for uploading as long as they were unmounted properly from ClearCast.
SW-7943	ClearCast	Improved handling of the system log when it contains null bytes so that the user does not reach an unrecoverable exception.
SW-9480	ClearCast	Updated the permissions on log files on the ClearCast Go so that they can be saved to USB drives as part of the "Save System Information" option.
SW-9209	ClearCast	Handled an error condition in the case where a user attempted to start Repeat Scan when only one USB drive was present.
SW-9609	ClearCast	The Ubuntu sudo library has been upgraded to pick up security fix.

Table A-1. System Modifications *(continued)*

Issue key	Component	Change Note Description
SW-9409	ClearCast	Updated the ClearCast scanner firmware to V1.031/21/03/03.
SW-9956	ClearCast	ClearCast now rejects ballots that are not for the current election based on the ElectionBallotCode or the ElectionDate.
SW-10180	ClearCast	Addressed an issue where restoring an election on ClearCast when certain validation errors occur could leave the system in an inconsistent state.
<i>ClearCount</i>		
SW-8923	ClearCount	Fix potential 'deadlock' error that could happen if a delete box was run at the same time as a manually adjudicated ballot was being saved. This could lead to 'box already copied' errors when re-scanning the deleted box.
SW-8730	ClearCount	There is no longer an option to disable TLS when installing ClearCount.
SW-8625	ClearCount	Fixed an issue that prevented the concurrent upload of multiple sets of results to ClearCount from multiple CountStations. This was accomplished by building apache2 from source and inserting a third party patch that addresses an apache issue.
SW-8581	ClearCount	The Results Uploader application communicates with ClearCount using ECC keys for TLS.
SW-8550	ClearCount	Updated the digital certificate algorithm from the RSA to ECC.
SW-8548	ClearCount	This release validates that all cryptographic functions use the FIPS certified cryptographic library.
SW-8329	ClearCount	This version of ClearCount has been enhanced so that the registration counts on the PDF reports for an election, precinct, or district now include the counts for parties that do not have their own ballot, and include the counts for contests that were not on the first card of the ballot.
SW-8287	ClearCount	We now support Bitlocker being enabled during installation.
SW-8272	ClearCount	Ensure all cryptographic functions, including simple hashes, use the FIPS validated library.
SW-8145	ClearCount	Disable super user (su) access to the mysql server unless the mysql user password is entered.
SW-7932	ClearCount	A new column, Validated, was added to the table for viewing ClearCount logs which show whether logs merged from ClearCast results are valid or not. Invalid logs will have a value of "Invalid HMAC".
SW-7818	ClearCount	Status messages display in the Results Uploader application to inform the user of the status of an upload and provide troubleshooting information. For further details, refer to the ClearCount Election Administration Guide.
SW-7732	ClearCount	ClearCast election logs are now merged into ClearCount based on the text files that are continuously written to the USB drives during operation, rather than from a database backup taken at polls close. The logs are hashed to secure them against tampering, and these hashes are verified before merging the logs into ClearCount.

Table A-1. System Modifications (continued)

Issue key	Component	Change Note Description
SW-7616	ClearCount	Previously, using the Back button in Google Chrome on the PDF Reporting page resulted in some user selections getting ignored. This issue no longer occurs.
SW-7559	ClearCount	Previously, the ClearCount install displayed the following message: "error: attempt to read or write outside of disk 'hd0'. Entering rescue mode...grub rescue>." This error no longer occurs.
SW-7543	ClearCount	ClearCount no longer fills in password on non-login screens.
SW-7465	ClearCount	The ballot definition file (BDF) now contains the table ballotgroupmap.csv. This table maps a VoterGroupID to a VoterCenterID.
SW-7449	ClearCount	ClearCount validates that data that is uploaded from USB drives using the Results Uploader application is valid, well-formed, and has not been tampered with before it merges the results into the database.
SW-7439	ClearCount	The Results Uploader application checks that the contents of the USB drives contain valid election results for the current election that is active in ClearCount and for which results uploads have been enabled before attempting to upload them to the CountServer.
SW-7368	ClearCount	The election administrator is able to toggle on the uploading of ClearCast results for the active election. If this option is not enabled, results cannot be uploaded from CountStations.
SW-7316	ClearCount	Additional log entries have been added to ClearCount logs for events that occur while merging results using the Results Uploader application.
SW-7276	ClearCount	A new command-line option enables administrators to regenerate a new digital certificate for the ClearCount servers without reinstalling the software.
SW-7275	ClearCount	Previously the digital certificate generated on installation had a lifetime of 7305 days. It now has a lifetime of 365 days and there is an additional script to allow users to re-generate the digital certificate without re-installation.
SW-8350	ClearCount	This replaces the usage of aptitude to get third party dependencies for the About Page with dpkg-query.
SW-7188	ClearCount	This release has added the Election Date element to the XML file format.
SW-6694	ClearCount	ClearCast results can be uploaded and merged from USB drives based on files that are continuously written to the drives during the voting session rather than based on a database backup taken when closing polls. This results in a faster poll-closing process as well as eliminating errors when results are uploaded to ClearCount without polls having been first been closed in ClearCast.
SW-4432	ClearCount	The hover found on the vote visualization screen now correctly shows angle brackets ("<" ">") in any strings.
SW-8376	ClearCount	Previously, the certain fields in the metadata.csv file were not required to create an election in ClearCount. Now, if JurisdictionName, ElectionName, ElectionDate, or Parser are left empty, the election will not be created and an error is thrown.

Table A-1. System Modifications *(continued)*

Issue key	Component	Change Note Description
SW-8285	ClearCount	To be consistent with ClearCount, ClearDesign now enforces that Counter Group abbreviations consist of only uppercase letters (A-Z) and numbers (0-9).
SW-8491	ClearCount	On the ClearCount Election Administration page, it is possible to show the Election Key Id included in an encrypted BDFx. This can be used to compare with the version in the BDFx loaded into ClearCast.
SW-1900	ClearCount	Previously election- and web-log pages had date filters that defaulted to the current day. They are now date-time filters that default to the last 2 hours. Filters for Severity, Source, and Machine were also added.
SW-8147	ClearCount	The PDF "Ballots by Geography" report now has options to get totals by "Party" and by "Card Sequence", where "Card Sequence" is the 1st, 2nd, 3rd, etc. card of a ballot.
SW-8298	ClearCount	The ClearCount Election Results XML file now contains a breakdown of ballots cast in each precinct per party.
SW-8449	ClearCount	The APL now includes the 5511 Dell Latitude.
SW-7552	ClearCount	This moves the fields PollOpenReportCopies and PollCloseReportCopies from the metadata table to the vote centers table to support the corresponding changes in the BDF format
SW-8772	ClearCount	The version of Ubuntu has been upgraded to 18.04.5.
SW-6777	ClearCount	The less CSS library has been removed from ClearCount.
SW-7880	ClearCount	The election password is always required for merging ClearCast results into ClearCount. BDFs used in ClearCount must always be encrypted. As a result, error messages for the case where ClearCast results were merged without entering a password are no longer applicable and have been removed.
SW-8792	ClearCount	When doing "Safely merge updatable BDF content" into an existing election, all election metadata fields except Parser and StraightPartyType from the BDF are now merged into the existing election.
SW-8831	ClearCount	On the Election Administration page, for elections that are not already upgraded to the current database version of ClearCount, an "Upgrade Election" action will be present on the action menu in place of actions that modify the election database.
SW-8635	ClearCount	The term "ScanServer" has been changed to "CountServer" consistently throughout the product, including the server default host name, and in user interface strings.
SW-9276	ClearCount	This fixes a bug where the "Redact Small Vote Subtotals" and "Encryption Key Id" columns were shown by default in the Election Administration web page. It was intended that these columns be hidden by default, but available to be toggled on via Show/hide columns.
SW-8056	ClearCount	When the ClearCount digital certificate will expire within 60 days, a warning is displayed on the ClearCount login screen.

Table A-1. System Modifications *(continued)*

Issue key	Component	Change Note Description
SW-9001	ClearCount	The election administrator has the option to merge election results (Cast Vote Records) from ClearCast voting stations without uploading the images at the same time in order to expedite the results aggregation and reporting process. Selecting this option displays a confirmation dialogue with information about which features of ClearCount will not be usable without ballot images.
SW-7851	ClearCount	Tabulation of ballots between 8 and 9 inches in length failed due to a missing library, resulting in an exception.
SW-8340	ClearCount	The hardening script has been updated to disable the "Windows Defender notification icon" startup application, which is not a whitelisted application.
SW-7629	ClearCount	Improve the performance for searching for backup files.
SW-8218	ClearCount	Updates copyright on election dashboard
SW-6607	ClearCount	You can now manually set a Precinct to be "Reported" on the Precincts Web Report. This is useful when no ballots have been cast in a precinct, as automatic tracking of precincts reported depends on ballots cast in Counter Groups that are marked as Reporting.
SW-6134	ClearCount	When using Fujitsu scanners, you will now use PaperStream Capture to scan ballots instead of ScandAll Pro. ClearCount scripts have been updated for this change, and a PaperStream Capture profile has replaced the ScandAll Pro profiles.
SW-7814	ClearCount	Previously, when creating a PDF report, selecting "Hide Counter Group subtotals" would remove information about counter group filters from the header of the generated PDF. Information about counter group filters will now continue to be shown when "Hide Counter Group subtotals" has been selected.
SW-7138	ClearCount	ClearCount PDF reports now show the number of precincts reporting at the contest level.
SW-6133	ClearCount	The new PaperStream Capture profile contains a scanner driver profile that allows you to use imprinting and endorsing, if your scanner has that functionality.
SW-7834	ClearCount	The BDF now has a field for "WriteInReportFormat" within the vote centers table, which may be used by ClearCast in the future to decide if Write-ins with text but no marked oval are included in the Write-in report. This field will also display in ClearDesign VoteCenterCategory Reports, as generated from the election home page.
SW-7608	ClearCount	Improve the performance of checking backup drives for existing election backup.
SW-7591	ClearCount	The Counter Group report now indicates which precincts show as reporting.
SW-7553	ClearCount	This release makes vote center data available to ClearCast.

Table A-1. System Modifications *(continued)*

Issue key	Component	Change Note Description
SW-8902	ClearCount	For closed primary elections that may have some splits that do not have a ballot for a specific party, provide the option to allow the reporting of those numbers in the SOCC report. Also include those counts in the XML export.
SW-8623	ClearCount	This version has added the "Party Name" field to the Card Style report that shows the party associated with the ballot.
SW-6706	ClearCount	When a user saves a card in the Card Resolutions tool and no ovals have changed, ClearCount displays a message. This message has changed.
SW-6292	ClearCount	<p>For straight-party contests, the user can set the Straight Party Voting contest to show ovals for ONLY those parties for which there are candidates on that ballot. This feature is called conditional straight party voting (SPV).</p> <ul style="list-style-type: none"> • Reports correctly list the vote totals by style for straight-party contests. <p>Reports indicate that a party does not have an oval by showing 0 votes for that party.</p> <ul style="list-style-type: none"> • The Card Resolutions tool no longer allows users to show parties that do not have party ovals on a particular ballot style. • The XML output reflects these changes. If a style or geography does not have a vote oval for a party, the XML indicates 0 votes for that party.
SW-6716	ClearCount	Allow manually resolved ovals to show on the Vote Visualization page. Users can now toggle between showing automatically adjudicated ovals, manually adjudicated ovals, or both.
SW-6717	ClearCount	Allow manually resolved ovals to show on the Vote Visualization page. A border with a dashed line indicates a manually resolved oval.
SW-6359 SW-3663	ClearCount	In the Cards Resolutions tool, visual indicators enable users to differentiate between implicit and explicit votes in the Card Resolutions tool and Vote Visualization tool. This change affects both primary preference and straight-party contests.
SW-3250	ClearCount	When a user reopens a card in the Card Resolutions tool that was visually resolved as Multiple, the Card Resolutions tool shows how the card was resolved.
SW-6639	ClearCount	In the Cards Resolution tool, users can deselect an implicitly overridden choice.
SW-6372, SW-6373	ClearCount	For write-in name assignment, a new database table was added to support write-in names
SW-6956	ClearCount	For write-in name assignment, all contests with write-ins have a default 'Invalid' write-in name.

Table A-1. System Modifications *(continued)*

Issue key	Component	Change Note Description
SW-6478	ClearCount	For write-in name assignment, this release implements a back end for the contests with write-ins filter.
SW-6370, SW-6374	ClearCount	For write-in name assignment, there is a new Contests with Write-ins report that lists all contests that have write-in candidates and the total number of write-ins, assigned write-ins, and unassigned write-ins. Users access this page from the report menu.
SW-6886	ClearCount	For write-name assignment, there is a new Write-in Candidates by Contest report that lists all the write-in candidates, their number of assignments, and total votes.
SW-6935	ClearCount	The Election Log records when Write-in Tool candidate names are added, changed, deleted and when assignments are made.
SW-6907, SW-6973, SW-6957	ClearCount	There is a new Write-in Assignments tool that displays the write-ins and allows the user to assign the write-in to a write-in name. Users access this page by using the hyperlink values on the Contests with Write-ins report.
SW-2349	ClearCount	ClearCount no longer uses Flash. Menus that previously used Flash look different, but retain all previous options.
SW-6576	ClearCount	ClearCount switched from the 'c' compile twain library to the pytwain library.
SW-6300	ClearCount	ClearCount no longer supports Firefox.
SW-6914	ClearCount	Unused precinct variables have been removed from the XML generation code.
SW-7437	ClearCount	This release has moved the option for exporting an XML file from the election dashboard page to the Election Administration page.
SW-7426	ClearCount	In the Election Administration area, this release now offers the option for customers to upload their own XSLT file and use that file to export custom results based on that XSLT format.
SW-7510	ClearCount	If you try to import an XSLT file without specifying a filename on the Election Administration area, ClearCount displays the following message: ERROR. No XSLT supplied.
SW-5420	ClearCount	Cast Vote Record (CVR) now uses the ChoiceName and no longer uses the ChoiceShortName.
SW-6121)	ClearCount	The browser versions shipped with ClearCount have been updated.

Table A-1. System Modifications *(continued)*

Issue key	Component	Change Note Description
SW-3026	ClearCount	In Google Chrome, Print Table for long reports is now larger to improve readability.
SW-6137	ClearCount	In Google Chrome, the bottom line of a drop-down list was previously missing in the Allow Display of Vote Totals dialog. This issue is fixed.
SW-6148	ClearCount	With single-row cross-endorsement, when the bottom choice in the Card Resolutions tool wrapped, the height of Contest Editor previously did not adjust correctly. This issue is fixed.
SW-9607	ClearCount	The Ubuntu sudo library has been upgraded to pick up a security fix.
SW-9475	ClearCount	No code changes for this, it just updated the calls and history comments in the module headers
SW-9418	ClearCount	Update system configuration for changes in SCAP checklist from CIS Ubuntu 18.04 Version 1.0.0 to Version 2.0.1
<i>ClearDesign</i>		
SW-8810	ClearDesign	If a split has multiple districts within the same district category, a more informative error message will be displayed when exporting the BDF. It will cite which district category has the issue with which split so that it can be fixed by the user.
SW-8789	ClearDesign	This fixes a layout bug that caused the oval box to sometimes obscure the contest border below the oval.
SW-8776	ClearDesign	This fixes a bug where Write-in choice styles set at the general layout level were not respected.
SW-8711	ClearDesign	This fixes a bug where sometimes the border around candidate names would have breaks caused by the overlay of the oval vote box.
SW-8619	ClearDesign	In previous versions if all the contests endorsed by one party were also the same set of contests that were endorsed by other parties, ballots were generated only for the first party. This did not cause any issue with tabulating ballots but the voter registration counts were only included for the first party.
SW-8538	ClearDesign	Ensure FIPS mode is always on for OpenSSL.
SW-8535	ClearDesign	Set Apache2 web server to run in FIPS mode.
SW-8456	ClearDesign	This fixes a bug with the VoterGroups with VoteCounts ClearDesign report, where the total sum of VoterCounts always displayed as 0.
SW-8454	ClearDesign	This fixes a bug impacting the vertical spacing of VoterGroup (Party) names in the case of the VoterGroup placement being below the Choice (Candidate) name.
SW-8392	ClearDesign	This replaces the usage of aptitude to get third party dependencies for the About Page with dpkg-query.

Table A-1. System Modifications *(continued)*

Issue key	Component	Change Note Description
SW-8344	ClearDesign	In previous releases the search function in the list views incorrectly included the first column 'Action' in the searched columns. This resulted in all rows being included when searching (filtering) for 'delete', or 'primary'. This has been corrected in this release.
SW-8342	ClearDesign	In previous releases, the tooltip for the disabled "Delete" buttons in the list views only displayed the word "Election" when the election state was set to disable the button, e.g. the election state was set to Media Created.
SW-8274	ClearDesign	Ensure all cryptographic functions are using the FIPS compliant libraries.
SW-8034	ClearDesign	Fix issue with some CSV reports not formatting correctly.
SW-7893	ClearDesign	Increase the encryption key, used to encrypt the election data, size from 128 bits to 256 bits
SW-7569	ClearDesign	Errors no longer occur when you generate or reset ballots within a vote center category.
SW-7565	ClearDesign	When the precinct name and the split name are the same, only the precinct name displays on the ballot. An empty set of brackets no longer appears.
SW-7542	ClearDesign	ClearDesign no longer fills in the passwords on non-login screens.
SW-7376	ClearDesign	ClearDesign has improved the restore time and logging for election backups where ballots have been laid out several times.
SW-7348	ClearDesign	Previously, contests failed to spill over to the next column if their specified columns ran out of room.
SW-7341	ClearDesign	Previously, the layout functionality timed out without a warning message when a contest could not fit on the ballot. ClearDesign version 2.2 has resolved this issue. When the layout functionality cannot fit a contest on a ballot, ClearDesign now issues a warning message similar to the following example: "Error: Failed to layout card -Failed to fit contest Question 26-125 on card seq 2 side 1. The card is not long enough."
SW-7312	ClearDesign	Previously, a ClearDesign user could not delete a split if track voter registration was selected for voter groups. This issue no longer occurs.
SW-7273	ClearDesign	A command-line option allows you to regenerate the digital certificate for the ClearDesign server without reinstalling the software.
SW-7274	ClearDesign	Browsers are starting to enforce a maximum valid time for digital certificates to be less than 825 days (27 months). We have shortened the validity time of our certificates to meet this requirement.
SW-7210	ClearDesign	Previously, the record count appeared as 0 when you cleared the election logs in ClearDesign. ClearDesign now displays the correct record count.
SW-8587	ClearDesign	The regvoters.csv file in the BDF has been modified to include the BallotSetID field.
SW-8547	ClearDesign	Update the build procedures to include building of OpenSSL version 1.0.2n, rather than 1.0.2g, in FIPS mode.

Table A-1. System Modifications *(continued)*

Issue key	Component	Change Note Description
SW-8660	ClearDesign	The default value of "Combine Similar Ballots" in BallotSet has been changed from True to False.
SW-6544	ClearDesign	The ballot definition file contains a new table called votecentermap.csv. This table associates vote centers with counter groups.
SW-8291	ClearDesign	Previously, the Straight Party Contest name in the Localizations tab was abbreviated to Spty or Sprty. Anywhere this abbreviation existed now spells out Straight Party fully.
SW-8409	ClearDesign	Ensure Apache2 web server is compiled and running in FIPS mode.
SW-7362	ClearDesign	Add support for Colored Backgrounds in Card Headers based on a Conditional Value.
SW-8440	ClearDesign	In the configuration files for BDFx and ADFx, a truncated hash, in hex, of the election key that is used for authentication (HMACS) is included so that users can determine if the key matches between ClearCast and ClearCount.
SW-7533	ClearDesign	The ClearCast automatic printing of reports at the opening of polls can now be set in ClearDesign by vote center by editing the specific vote center. The option is no longer available by device type as was previously available.
SW-8636	ClearDesign	Previously, a user could add a backup and export an ADFx/BDFx with an empty jurisdiction_name field. Now, if any of these actions are attempted with the empty field, it will error and the action will not be completed.
SW-8053	ClearDesign	There is now a "Choice: Label" entity style in the layout styles dialog.
SW-8773	ClearDesign	Upgrade from Ubuntu 18.04.1 to 18.04.5
SW-8005	ClearDesign	This fixes the issue where the system would stop responding when backing up an election that had large tables and insufficient memory.
SW-7397	ClearDesign	Adds a script that allows a user to easily generate a digital certificate.
SW-7742	ClearDesign	Correct the issue with all bottom card stubs being reduced in height to account for the printer margin rather than just the last bottom margin. This only happens when there is more than one bottom margin.
SW-8532	ClearDesign	In previous releases we used a 16 byte encryption key. This updates the key for older elections to 32 bytes when exporting the BDF.
SW-8217	ClearDesign	Updates copyright dates on the about page, the page footer, and the javascript files.
SW-7737	ClearDesign	Allow the request for /favicon.ico, the url requested by browsers for the site icon, to be handled without the need to have logged in.
SW-7845	ClearDesign	Add support to the system to allow the text for all of the languages to be placed on one ballot rather than on separate ballots.
SW-8021	ClearDesign	When the ClearDesign digital certificate will expire within 60 days, a warning is displayed on the ClearDesign login screen.
SW-7842	ClearDesign	Update the database and UI to support the option to place the text for all the languages on one ballot.

Table A-1. System Modifications *(continued)*

Issue key	Component	Change Note Description
SW-7954	ClearDesign	When creating a new election, you can import data in the DIMS format used in Ohio.
SW-8062	ClearDesign	When printing ballot sets, you can choose to have the filenames start with the precinct name instead of the card style name.
SW-8041	ClearDesign	Update OpenSSL from version 1.0.2g to version 1.0.2u.
SW-7843	ClearDesign	Update the ADF file format to support text for all languages on ballot option.
SW-7854	ClearDesign	To support reporting of voter counts for parties that do not have a specific card in a precinct, have added the PartyID to the regvoters.csv file in the BDF and the included the counts for those parties.
SW-6553	ClearDesign	The string "::Preview::" has changed to "Report" in the margin headers when printing reports.
SW-6797	ClearDesign	ClearDesign now invalidates card layouts when the controlling Straight Party contest changes.
SW-6210	ClearDesign	The controlling contest for straight-party voting now displays only the parties of candidates which appear on that individual ballot.
SW-6439	ClearDesign	This release introduces a function that backs up and then clears the election logs.
SW-7115	ClearDesign	ClearDesign truncates all empty tables when importing data to reset the IDs.
SW-6515	ClearDesign	Update jszip from version 3.1.2 to version 3.2.1 or higher.
SW-6516	ClearDesign	Update papaparse from version 4.1.2 to version 4.6 or higher.
SW-6510	ClearDesign	Update jquery from version 1.10 to version 2.2.4.
SW-6511	ClearDesign	Update jquery-impromptu from version 5.2.3 to version 6.2.3 or higher.
SW-6509	ClearDesign	Update fonttools from version 3.00 to version 3.41.0 or higher.
SW-6512	ClearDesign	Update jquery-splitter from version 0.14.0 to version 0.27.1 or higher.
SW-6513	ClearDesign	Update jquery-ui from version 1.10.4 to version 1.12.1 or higher.
SW-6507	ClearDesign	Update SQLAlchemy from version 1.0.15 to version 1.3.3 or higher.
SW-6509	ClearDesign	Update xlrd from version 0.9.4 to version 1.2.0 or higher.
SW-6506	ClearDesign	Update DBUtils from version 1.1 to version 1.3 or higher.
SW-6980	ClearDesign	Add 'sqlalchemy.ext.baked' to the hidden imports of the Pyinstaller config file.

Table A-1. System Modifications *(continued)*

Issue key	Component	Change Note Description
SW-6855	ClearDesign	You can now directly change the value of the Straight Party Type field from Exclusive to One Touch. Previously, if the value of the Straight Party field was Exclusive, you had to change it to another value before changing it to One Touch.
SW-6794	ClearDesign	Bulleted and numbered lists in ballot elements, such as headers and contests, now appear the same on the screen and in print. Previously, lists appeared differently on the screen and in print.
SW-6440	ClearDesign	The entity styles for Choice: Candidates no longer override the entity styles for Voter Groups.
SW-6011	ClearDesign	The PrecinctReportingName and PrecinctName fields now export in the appropriate order in the ballot definition file (BDF).
SW-7034	ClearDesign	Cards now filter correctly by ballot set for vote centers when you create a BDF.
SW-7285	ClearDesign	ClearDesign has fixed the issue that prevented a user from changing a header type when the header was assigned to a specific ballot set.
SW-9608	ClearDesign	The Ubuntu sudo library has been upgraded to pick up a security fix.
SW-9581	ClearDesign	The copyright date in the ClearDesign footer was updated to include 2021
SW-9474	ClearDesign	No code changes for this, it just updated the calls and history comments in the module headers
SW-9417	ClearDesign	Update system configuration for changes in SCAP checklist from CIS Ubuntu 18.04 Version 1.0.0 to Version 2.0.1
<i>ClearVote</i>		
SW-8417	ClearVote	The Windows ED 20-02 security patch is included in Denali installation directions.

APPENDIX B

Hardware Test Reports

(Provided Separately)

Electrical Test Reports

NTS - ITR-PR127745-REV0 ClearAccess Immunity

NTS - ITR-PR128128-REV0 ClearCast Immunity

NTS - ETR-PR128128 Rev. 0 ClearAccess Emissions

NTS - ETR-PR127745-REV0 ClearCast Emissions

Environmental Test Report

NTS - TR-PR127745-00-REV0 ClearCast Environmental

NTS - TR-PR128128-1-REV0 ClearAccess Environmental

APPENDIX C

Trusted Builds

Trusted Builds

The ClearVote 2.2 Voting System Trusted Build was performed using the steps described in section 5.5 of the EAC Voting System Testing and Certification Program Manual, Version 2.0. The Trusted Build yielded the following software outputs which are described below along with their associated Filenames and Hash Values in SHA 256 format:

ClearAccess Version 2.2.2 – The ClearAccess trusted build was performed using the “ClearAccess 2.2 Build Procedures” document Version 1.1.5, dated 01/11/2021, provided by Clear Ballot Group. The trusted build yielded the following output file and the associated Hash Value:

- ClearAccess-2.2.2 Installer.exe
SHA256: 0ac7ea0d39437cc56f807f5a26069c8a00357481797ea0bd518167d2402ee13e

ClearCast Version 2.2.9 – The ClearCast trusted build was performed using the “ClearCast 2.2 Build Procedures” document Version 1.2.9, dated 01/13/2021, provided by Clear Ballot Group. The trusted build yielded the following output file and the associated Hash Value:

- ClearCastImage_20210805_229172b991.iso
SHA256: 148dd0a5a7d3192b6c81da12e4bcc3df6e71752ee3f6ab422f308f90613adfd4

ClearCast Go Version 2.2.a – The ClearCast Go trusted build was performed using the “ClearCast 2.2 Build Procedures” document Version 1.0.1, dated 12/31/2020, provided by Clear Ballot Group. The trusted build yielded the following output file and the associated Hash Value:

- ClearCastImage_20210901_22a40de19a.tar
SHA256: 2bc7844f2c6d83aa2d6456d01f98c4279b19a63a9ce14e3776c28ef8ad255689

ClearCount Version 2.2.4 – The ClearCount trusted build was performed using the “ClearCount 2.2 Build Procedures” document Version 1.6.7, dated 04/27/2021, provided by Clear Ballot Group. The trusted build yielded the following output file and the associated Hash Value:

- clearcount-2.2.4-2021-09-01.iso
SHA256: 6729ba246993f7f8232b83b964f2e6fc61a134f942600376e92b302673e23159

ClearDesign Version 2.2.4 – The ClearDesign trusted build was performed using the “ClearDesign 2.2 Build Procedures” document Version 1.0.10, dated 11/18/2020, provided by Clear Ballot Group. The trusted build yielded the following output files and their associated Hash Values:

- clearDesign-2.2.4.zip
SHA256: a0d036fd4684d4c7b9b44338ed62b856294d181f5aebc3af5f1001a62bab7a64
- install-setup.zip
SHA256: 8f2fa8868d6dd60a886450a315f0fc45d43892ea02b63064a1cd5995eee3cf7a

APPENDIX D

Warrant of Accepting Change Control Responsibility



10/1/2021

Mr. Michael Walker
VSTL Project Manager
Pro V&V
Huntsville AL 35802

**** sent vial email ****

Re: Clear Ballot Group Warrant of Accepting Change Control Responsibility per
Appendix B of the EAC VSTL Program Manual and associated NOC 09-004

Dear Mr. Walker:

In agreement with and concerning the requirement referenced above, Clear Ballot Group, Inc. warrants to incorporate changes made to the ClearVote 2.2 voting system during its test campaign to any deployed voting system (and its components) before a Mark of EAC Certification is applied to the system and/or its components.

Best regards,

A handwritten signature in black ink that reads "Russ Dawson".

Russ Dawson
Federal Certification Program Manager
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512.350.5720

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