

PRO V&V



6705 Odyssey Dr. Suite C
Huntsville, AL 35806
Phone (256)713-1111
Fax (256)713-1112

Test Report for EAC 2005 VVSG Certification Testing Clear Ballot Group ClearVote 2.3 Voting System

EAC Project Number: CBG-CV-23

Version: 06

Date: 05/22/2025

U.S. Election Assistance Commission

VSTL

EAC Lab Code 1501



TESTING
NVLAP LAB CODE 200978-0

Disclaimer: This test report and the test results contained herein must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

TR-01-01-CBG-006-01.06

SIGNATURES

Approved by: Michael Walker 05/22/2025
Michael Walker, VSTL Program Manager Date

Approved by: Wendy Owens 05/22/2025
Wendy Owens, VSTL Program Director Date

Approved by: Stacey Glover 05/22/2025
Stacey Glover, QA Manager Date

Pro V&V attests to the following: 1) all testing prescribed by the approved and published test plan or amended test plan was performed as identified or the divergence from the test plan was properly documented in this test report, 2) all identified voting system anomalies or failures were reported and resolved, and 3) this test report is accurate and complete. There are no opinions or interpretations included in this report, except as noted under Recommendations.

REVISIONS

Revision	Description	Date
00	Initial Release	08/01/2022
01	Updates per EAC comments	08/24/2022
02	Updated ClearCount software version in Table 4-1, updated Changes in Section 2.2.1.1, TDP document versions in Table 3-1, Section 3.3 Deficiencies and Resolutions, and Appendix B. Added disclaimer on cover page, QA signature, and statement on signature page. Reformatted as needed.	09/26/2022
03	Added Tables 2-3 and 2-4 in Section 2.2.3, added Cross-party endorsements and Judge initials in Section 2.2.5, updated TDP document versions in Table 3-1. Reformatted as needed.	10/17/2022
04	Fixed typographical error in Table 1-2 for Dell Latitude Laptop (ScanStation, CountStation) serial number 5M5D1N2, fixed typographical error in Table 4-2 for Dell Latitude Laptop (ScanStation) serial number 5M5D1N2, corrected EloPOS 15" model number to "EPS15E2" in Table 1-2, corrected "EloPOS – 15" All-in-One TouchScreen Computer Datasheet" name in Table 3-1, added EloPOS All-in-one Touch Computer User Manual to Table 3-1, corrected EloPOS 15" model number to "EPS15E2" in Table 4-2, updated document version for ClearVote Approved Parts List in Table 3-1, and updated Section 1.2 reference for ClearVote 2.2 Test Report to update document number.	05/10/2024
05	Removed duplicate items (chromium-browser, libssl, openssl, libScanAPI.a, DataTables, and JTSage DateBox) from ClearCast Go component section of Table 4-1. Added Dell OptiPlex AIO, ELO 20 inch AIO, Dell Inspiron 15", Zebra Technologies Bar Code Scanner, Monoprice Over the Ear Pro Headphones, Hamilton Buhl Over-Ear Stereo Headphones, Ergotron Neo-Flex Lift Stand, and Wearson LCD Stand to ClearAccess components list in Table 4-2. Corrected Google Chrome version number for ClearAccess in Table 4-1. Added ClearAccess – LGPO item and version number to ClearAccess in Table 4-1. Corrected jquery-qrcode version number for ClearDesign in Table 4-1. Corrected Ubuntu version number for ClearCast D in Table 4-1. Corrected U-Boot version number for ClearCast Go in Table 4-1. Corrected Apache, OpenSSL, pmount, udisks, Python (part of Ubuntu), and MySQLdb (part of Ubuntu) version numbers for ClearCount in Table 4-1. Obtained corrected ClearDesign Software Design and Specification document with MySQL version corrected to 5.7.31 in Table 2-2 of document and updated document version in Table 3-1 of Test Report. Obtained corrected ClearCount Software Design and Specification document with OpenSSL FIPS Object Module version corrected to 2.0.10 in Table 3-5 of document and updated document version in Table 3-1 of Test Report. Corrected name and spelling of JavaScript splitter library for ClearCount in Table 4-1. Corrected spelling of JavaScript jQuery-migrate library for ClearCount in Table 4-1. Corrected spelling of papaparser for ClearDesign in Table 4-1 and	04/23/2025

	Table 1-1. Obtained updated ClearDesign Software Design and Specification document with Windows 10 Pro 1607 added to Table 2-2 of document and updated document version in Table 3-1 of Test Report. Obtained updated ClearDesign Software Design and Specification document with Google Chrome 87.0.4280.141 added to Table 2-2 of document and updated document version in Table 3-1 of Test Report.	
06	Corrected APC UPS Model Number to SRT1500RMXLA in section 2.2.1. Corrected APC UPS Model Number to SRT1500RMXLA in section 2.2.1.1.	5/22/2025

TABLE OF CONTENTS

1.0	INTRODUCTION.....	1
1.1	Description and Overview of EAC System Being Modified	1
1.1.1	Baseline Certified System.....	3
1.2	References.....	10
1.3	Terms and Abbreviations.....	11
2.0	CERTIFICATION TEST BACKGROUND	12
2.1	Revision History	12
2.2	Scope of Testing	12
2.2.1	Modification Overview	13
2.2.1.1	List of Changes	13
2.2.2	Block Diagram	16
2.2.3	System Limits	16
2.2.4	Supported Languages	18
2.2.5	Supported Functionality	19
2.2.6	VVSG	19
2.2.7	RFIs	19
2.2.8	NOCs	19
3.0	TEST FINDINGS AND RECOMMENDATION	20
3.1	Summary Findings and Recommendation	20
3.1.1	Source Code Review, Compliance Build, Trusted build, and Build Documentation Review	28
3.1.2	System Level Testing	28
3.1.2.1	Functional Configuration Audit (FCA)	29
3.1.2.2	Accuracy	30
3.1.2.3	System Integration	31
3.1.2.4	Volume & Stress	32
3.1.4	Hardware Testing	32
3.2	Anomalies and Resolutions	34
3.3	Deficiencies and Resolutions	34
4.0	RECOMMENDATION FOR CERTIFICATION.....	35
Appendix A – Hardware Test Reports		A-1
Appendix B – Trusted Build		B-1
Appendix C – Warrant Of Accepting Change Control Responsibility		C-1

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 2.3 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 2.3 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 2.3 Voting System. The application was accepted by the EAC and the project was assigned the unique Project Number of CBG-CV-23.

The ClearVote 2.3 EAC-approved test plan (TP-01-01-CBG-006-01.01), 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 2.2 Voting System. Detailed descriptions of the ClearVote 2.2 test campaign are contained in Pro V&V Report No. TR-01-01-CBG-005-01.02, which is available for viewing on the EAC's website at www.eac.gov.

The ClearVote 2.3 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 2.3 Voting System, as taken from the Clear Ballot Group technical documentation.

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, and ballot production. The ClearDesign system consists of the physical components listed below. All of the components and generation of voting machine election definition file packages 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 administrative rights is 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: An Ubuntu Linux 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 Windows laptop or desktop/scanner pairs used to scan and tabulate ballots.
- Network Switch: Used to connect the ScanStations to the CountServer using a wired, closed Ethernet.
- CountStation: One or more Windows laptop or desktop computers installed with browser software, linked by a wired Ethernet connection to the CountServer using the network switch. This station can serve multiple uses: user administration, election administration, adjudication, and reporting. This station is also used to consolidate the vote totals and ballot images from the ClearCast precinct tabulator. The vote totals and ballot images are consolidated by the ClearCount Software via the ClearCast USB drive.

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 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 day 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, this 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.

1.1.1 Baseline Certified System

The tables below detail the certified ClearVote 2.2 equipment and firmware versions.

Table 1-1. 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

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

Firmware/Software	Version
Zip	3.0.11
Pyinstaller	3.2.1
Python JSMIN	2.2.1
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
papaparser	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

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

Firmware/Software	Version
Python	2.7.10
webpy	0.38
Python-future	0.15.2
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

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

Firmware/Software	Version
libScanAPI.a	1.0.0.1
DataTables	1.10.16
JTSage DateBox	4.0.0
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 splitter 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

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

Firmware/Software	Version
Fujitsu fi-6400	PaperStream IP (TWAIN) 2.10.3
Fujitsu fi-6800	PaperStream IP (TWAIN) 2.10.3
Fujitsu fi-7180	PaperStream IP (TWAIN) 2.10.3
Fujitsu fi-7800	PaperStream IP (TWAIN) 2.10.3
Fujitsu fi-7900	PaperStream IP (TWAIN) 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 1-2. 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	EPS15E2	J193011873

Table 1-2. ClearVote 2.2 Voting System Equipment *(continued)*

Component	Model	Serial Number
ELO 15 inch AIO	E-Series (ESY15E2)	A18C004080
Dell OptiPlex AIO	5250	HCGMGK2
ELO 20 inch AIO	X-Series (ESY20X2)	D18Q000334
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
<i>ClearCount Components</i>		

Table 1-2. ClearVote 2.2 Voting System Equipment *(continued)*

Component	Model	Serial Number
Dell PowerEdge Server (ScanServer)	T130, T140, T330, T440, R440	5G0ZLN2, 8BFJ3W2, FHV9RD2, H6J5MN2, 55FDB03
Lenovo ThinkServer (ScanServer)	TS140	MJ0472UV
Dell Precision Tower (CountStation)	T3620	GSKQMN2
Dell OptiPlex (CountStation)	7440, XE3 SFF	JXDFHH2, 93YDB03
Dell Latitude Laptop (ScanStation, CountStation)	5580, 5590, 5500, 5511	2F3L3G2, 5M5D1N2, 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

Table 1-2. ClearVote 2.2 Voting System Equipment *(continued)*

Component	Model	Serial Number
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
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

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 Clear Ballot ClearVote 2.3 Voting System Testing Application Package” letter dated February 2, 2022
- EAC Requests for Interpretation (RFI) and Notices of Clarification (NOC) (listed on www.eac.gov)

- Pro V&V Test Report No. TR-01-01-CBG-005-01.03, “Test Report for EAC 2005 VVSG Certification Testing Clear Ballot Group ClearVote 2.2 Voting System”
- Clear Ballot Group’s Technical Data Package (*A listing of the ClearVote 2.3 documents submitted for this test campaign is listed in Section 3.1 of this Test Report*)

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 2.3 is a modification of a previously certified system (ClearVote 2.2). 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 2.3. 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 2.3 System:

Table 2-1. ClearVote 2.3 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
ClearVote 2.3	Modification	ClearVote 2.2	CBG-CV-23*

*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 I, 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 I, Section 4: Hardware Requirements
 - Environmental Requirements
 - Electrical Tests (ClearAccess)
 - Environmental Tests (ClearAccess)
 - Technical Documentation Package (TDP) Review
- EAC VVSG 1.0 Volume I, Section 5: Software Requirements

- Source Code Review, Compliance Build, Trusted Build, and Build Document Review
- Technical Documentation Package (TDP) Review
- Functional Configuration Audit (FCA)

Note: Section 6 (Telecommunications Requirements) of the VVSG 1.0 is not applicable to ClearVote 2.3, therefore, it was not included in testing. Additionally, Section 3 (Usability & Accessibility), Section 7 (Security Requirements), Section 8 (Quality Assurance Requirements), and Section 9 (Configuration Management Requirements) were reviewed in previous test campaigns and were not impacted by the submitted modifications.

2.2.1 Modification Overview

The submitted modifications to the ClearVote 2.3 System consist of both software and hardware changes. Software changes and updates were implemented to accommodate defect resolutions, enhancements, and user interface features. Hardware modifications include the addition of a Dell Latitude 5521 computer to ClearDesign as a DesignStation and to ClearCount as a CountStation and a ScanStation, and the addition of the Lexmark MS-521dn printer and the APC SRT1500RMXLA UPS to the ClearAccess eloPos box configuration.

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 changes from version 2.2 to 2.3, as taken from the *ClearVote 2.3 Change Notes*:

ClearDesign

- SW-2689: Implemented three new contest rotation methods, Grouped Precinct Rotation, Voter Count Precinct Rotation, and Balance Precinct Rotation.
- SW-9451: Added new macros for 'pageNum' and 'numPages'.
- SW-10161: Added support for more card footer placement options. For more details, refer to the ClearDesign User Guide.
- SW-10690: Updated the accessible definition file (ADF) to account for the new page number macros introduced in this release.

- SW-10932: Enabled the DesignServer to be accessed by name on the local network by allowing updating the Samba configuration.
- Added Dell Latitude 5521 computer as a DesignStation

ClearAccess

- SW-11059: Updated Zebra CoreScanner driver to version 3.07.0011.
- Added Lexmark MS-521dn printer added to eloPos box configuration
- Added APC SRT1500RMXLA uninterruptible power supply added to eloPos box configuration

ClearCount

- SW-8116: Changed the Apache configuration to set the maximum number of processes to start based on the number of CPU's installed on the server.
- SW-9151: In ClearCount when looking at Statement of Votes Cast reports, the user is now able to select the Choice Order column, to order the rows by the order of the choices how they would be on the ballot.
- SW-9437: A file ending in extension .co.csv that implements a variation on the Cast Vote Record format designed for Colorado has been added to the Cast Vote Record zip file package.
- SW-9439: In previous versions when getting the list of card images (thumbs) filtering by more than one contest the set only contained cards that had both contests on them. Now the set contains the cards that have either of the contests on them.
- SW-9553: Partitioned the results tables in the database to provide better performance on large elections (> 500,000 ballots).
- SW-9558: Updated the database index to improve speed of getting ovals to list on the oval visualization page. Performance improvement on large (>500,000 ballots) database is approximately 10x.
- SW-9604: Optimized the query used to generate the list of card images to display.
- SW-9641: Performance enhancements for the saving of ballots on the CountServer while scanning.
- SW-9648: Explicitly updated the votes and contest voted tables rather than using database triggers.

- SW-9712: The default log filter was setting an end date/time value that was preventing log messages from within the last minute from showing up. This has been fixed.
- SW-9713: The oval visualization page has been rewritten for performance reasons to support lazy loading of oval images. Oval images will be loaded as they are scrolled into view.
- SW-9795: Hourly cron job open/close log entries have been omitted to avoid filling the logs with expected messages.
- SW-9804: Table data for web statement reports is now passed as JSON to DataTables. This drastically improves client-side rendering for tables with a large amount of data (rows).
- SW-9816: The end date for logs now is unset by default, meaning that all log entries after the start date will be returned. In order for an end date/time to be persisted, it must be selected, and the "Change" button pressed.
- SW-9861: Fixed the issue in the resolver when a card's precinct or style is changed and then saved without selecting the 'vote' button.
- SW-9877: Fixed potential dead lock when error occurs during uploading of ClearCast results.
- SW-9910: Table data for the Card Resolutions page is now passed as JSON to DataTables. This drastically improves client-side rendering for tables with a large amount of data (rows).
- SW-9911: Fixed a bug in the "Show All" option under "Show / hide columns" on web reports. Previously a column that was intended to always be hidden would be displayed.
- SW-10178: Corrected the syntax for increasing the system log rate limit burst to the new configuration syntax.
- SW-10288: Fixed an issue that caused target cards to be erroneously categorized as unreadable ballots.
- SW-10517: Improved the performance for the Vote Visualization page when using large elections.
- SW-10718: Increased the number of allowable open files for MySQL to accommodate the partitioned tables.
- SW-10867: Enabled the CountServer to be accessed by name on the local network by allowing updating the Samba configuration.
- Added Dell Latitude 5521 computer as a CountStation and a ScanStation

- SW-13178: Updated the permissions that had been set on an installation directory, which prevented the system from calculating the hashes that could be used to verify the installation of the trusted build.

2.2.2 Block Diagram

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

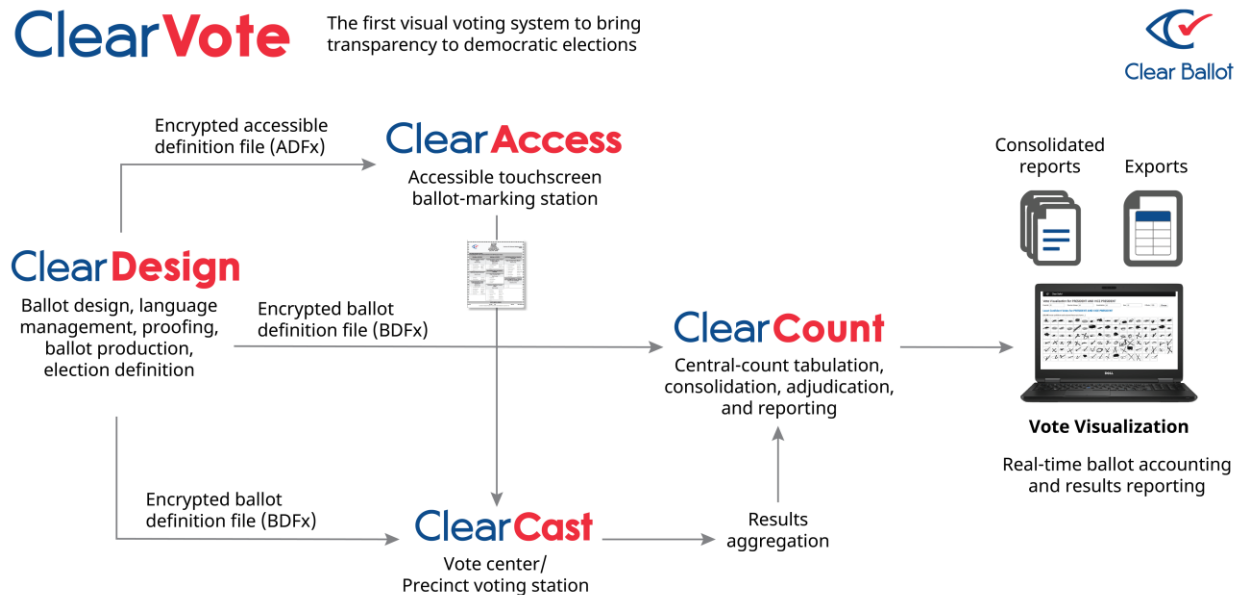


Figure 2-1. ClearVote 2.3 Product Relationship

2.2.3 System Limits

The system limits that CBG has stated to be supported by the ClearVote 2.3 Voting System are listed in the tables below.

Table 2-2. ClearVote System Limits

Characteristic	Limit
<i>Election Parameters</i>	
Precincts per election	3200
Splits per election	3200
District categories per election	100
Districts per single category	3200
Districts per election	3200
Contests per election	3200
Choices per election	3200
Choices per contest	300
Vote positions per side	420

Table 2-2 ClearVote System Limits *(continued)*

Characteristic	Limit
Card styles per election	3200
Contests per ballot style	60
Card styles per precinct	50
Parties per election	50
Counter groups per election	7
"Vote for" per contest	50
Languages per election	15
Cards per ballot (per language)	5
Write-ins per contest	50
<i>Reporting Name Parameters (Reports Only)</i>	
Election name (characters)	60
Jurisdiction name (characters)	60
Precinct name (characters)	60
Vote center name (characters)	60
Contest name (characters)	60
Candidate name (characters)	60
Party name (characters)	60
Write-in length (characters)	60
<i>System Parameters</i>	
Central-count scanners per network	10
Cards per precinct-voting device	10,000
Cards per central-count device	4,000,000

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)

Table 2-4. System Limits for ClearCount *(continued)*

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-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 2.3 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 2.3 was evaluated against the relevant requirements contained in the EAC VVSG 1.0. To evaluate the ClearVote 2.3 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 2.2) 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 2.3 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, and FCA), 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 2.3 TDP is provided in Table 3-1.

Table 3-1. ClearVote 2.3 TDP Documents

Document Number	Description	Version
<i>ClearVote Documents</i>		
100101	ClearVote 2.3 Approved Parts List	2.0.5
100067	ClearVote 2.3 Ballot Stock and Printing Specification	1.0.16
100057	ClearVote 2.3 Configuration Management Plan	1.0.20
100069	ClearVote 2.3 Glossary	1.0.13
100058	ClearVote 2.3 Personnel Deployment and Training Plan	1.0.15
100059	ClearVote 2.3 Quality Assurance Program	1.0.18
100086	ClearVote 2.3 Security Policy	1.0.18

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

Document Number	Description	Version
100071	ClearVote 2.3 System Overview	1.1.4
100073	ClearVote 2.3 Test and Verification Specification	1.0.17
100128	ClearVote 2.3 Change Notes	Final
<i>ClearDesign Documents</i>		
100011	ClearDesign 2.3 Acceptance Test Checklist	1.0.10
100062	ClearDesign 2.3 Administration Guide	1.0.16
100083	ClearDesign 2.3 Build Procedures	1.0.11
100103	ClearDesign 2.3 Database Specification	1.0.11
100046	ClearDesign 2.3 Functionality Description	1.0.16
100098	ClearDesign 2.3 Hardware Specification	1.0.14
100063	ClearDesign 2.3 Installation Guide	2.0.6
100082	ClearDesign 2.3 Maintenance Guide	1.0.15
100045	ClearDesign 2.3 Security Specification	1.0.16
100072	ClearDesign 2.3 Software Design and Specification	1.2
100043	ClearDesign 2.3 System Overview	1.0.18
100133	ClearDesign 2.3 Accessible Definition File Guide	1.0.5
100131	ClearDesign 2.3 Ballot Definition File Guide	1.0.6
100074	ClearDesign 2.3 System Identification Guide	1.5
100041	ClearDesign 2.3 User Guide	3.0.4
100121	ClearVote 2.3 ClearDesign DesignServer SCAP Checklist Ubuntu 18.04.5	2.0.4
100122	ClearVote 2.3 ClearDesign DesignStation SCAP Checklist	1.0.7
<i>ClearCount Documents</i>		
100102	ClearCount 2.3 Acceptance Test Checklist	1.0.14
100009	ClearCount 2.3 Build Procedures	1.6.8
100005	ClearCount 2.3 Database Specification	1.1.6
100004	ClearCount 2.3 Election Administration Guide	2.0.6
100006	ClearCount 2.3 Installation Guide	2.0.2
100021	ClearCount 2.3 Functionality Description	1.0.17
100022	ClearCount 2.3 Hardware Specification	1.0.17
100023	ClearCount 2.3 Maintenance Guide	1.0.17

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

Document Number	Description	Version
100070	ClearCount 2.3 Reporting Guide	1.1.5
100013	ClearCount 2.3 Scanner Operator Guide	1.2.2
100026	ClearCount 2.3 Security Specification	1.0.17
100119	ClearVote 2.3 ClearCount CountServer SCAP Checklist Ubuntu 18.04.5	2.0.5
100156	ClearVote 2.3 ClearCount ScanStation SCAP Checklist Windows 10 Pro (1607)	1.0.8
100120	ClearVote 2.3 ClearCount CountStation SCAP Checklist Windows 10 Pro (1607)	1.0.3
100019	ClearCount 2.3 Software Design and Specification	1.5
100024	ClearCount 2.3 System Operations Procedures	2.0.1
100025	ClearCount 2.3 System Overview	1.0.16
---	ClearCount 2.3 Quick Guide XML Report Conversion Tool	---
100047	ClearCount 2.3 System Identification Guide	1.5
<i>ClearCast Documents</i>		
100134	ClearCast 2.3 Hardware Acceptance Test Checklist	1.3
100135	ClearCast 2.3 Software Acceptance Test Checklist	1.1.1
100097	ClearCast 2.3 System Identification Guide	1.5
100094	ClearCast 2.3 Build Procedures	1.2.10
100079	ClearCast 2.3 Functionality Description	1.5.6
100080	ClearCast 2.3 Installation Guide	1.4.4
100081	ClearCast 2.3 Hardware Specification	1.5.4
100089	ClearCast 2.3 Maintenance Guide	2.0.3
100090	ClearCast 2.3 Poll Worker Guide	1.2
100084	ClearCast 2.3 Security Specification	1.4.6
100093	ClearCast 2.3 Software Design and Specification	1.5
100100	ClearCast 2.3 Supervisor Guide	1.8.5
100078	ClearCast 2.3 System Overview	1.4.7
100148	ClearVote 2.3 ClearCast Go System Identification Guide	1.2
100142	ClearVote 2.3 ClearCast Go Maintenance Guide	1.0.3
100143	ClearVote 2.3 ClearCast Go Poll Worker Guide	1.1
100144	ClearVote 2.3 ClearCast Go Supervisor Guide	1.0.3

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

Document Number	Description	Version
100147	ClearCast Go 2.3 Hardware Acceptance Test Checklist	1.0.1
100146	ClearVote 2.3 ClearCast Go Installation Guide	1.0.2
100145	ClearVote 2.3 ClearCast Go Build Procedures	1.0.2
100123	ClearVote 2.3 ClearCast 2.2 SCAP Checklist Ubuntu 18.04	2.1.3
100149	ClearCast Go 2.3 SCAP Checklist Ubuntu 18.04	1.0.1
<i>ClearAccess Documents</i>		
100109	ClearAccess 2.3 Acceptance Test Checklist	1.1.5
100051	ClearAccess 2.3 Build Procedures	1.1.6
100049	ClearAccess 2.3 Functionality Description	1.5.7
100085	ClearAccess 2.3 Hardware Specification	1.5.5
100053	ClearAccess 2.3 Installation Guide	1.8.6
100052	ClearAccess 2.3 Maintenance Guide	1.8.4
100054	ClearAccess 2.3 Poll Worker Guide	1.8.9
100050	ClearAccess 2.3 Security Specification	1.5.2
100099	ClearAccess 2.3 Software Design and Specification	1.5.7
100055	ClearAccess 2.3 Supervisor Guide	1.8.9
100044	ClearAccess 2.3 System Overview	1.6.8
100056	ClearAccess 2.3 Voter Guide	1.1.8
100118	ClearVote 2.3 ClearAccess SCAP Checklist Windows 10 (1607)	1.0.5
100038	ClearAccess 2.3 System Identification Guide	1.6
<i>COTS Components</i>		
EN990-5442B	APC Operation Manual Smart-UPS	---
---	APC SRT1500RMXLA UNINTERRUPTABLE POWER SUPPLY (UPS)	---
---	Brother HL-L2340DW: How to Replace the Drum Unit	C
---	Brother HL-L2340DW: Quick Setup Guide	A
---	Brother HL-L2340DW: HL-L2340DW tech specs	---
---	Brother HL-L2350DW: cv_eng_login_password_insertion	---
---	Brother HL-L2350DW: How to Replace the Drum Unit	0
---	Brother HL-L2350DW: Online User's Guide	A
---	Brother HL-L2350DW: Product Safety Guide	0

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

Document Number	Description	Version
---	Brother HL-L2350DW: Quick Setup Guide	0
---	Brother HL-L2350DW: HL-L2350DW_2PgBrochure_fin	---
---	Corsair Flash Voyager GTX USB 3.1 Premium Flash Drive CMFVYGTX3C	---
---	Corsair_cmfvygtx	---
49-001574	Corsair Flash Padlock Quick Start Guide USB 3.0	AA
49-001575	Corsair Flash Padlock USB 3.0 User Manual	AA
---	CyberPower_DS_PR1500RT2U	---
---	Inspiron 15 7000 2-in-1 Setup and Specifications	Rev. A00
---	Dell Latitude 5500 Service Manual	Rev. A04
---	Dell Latitude 5500 Setup and specifications guide	Rev. A02
---	Dell Latitude 5511 Service Manual	Rev. A00
---	Dell Latitude 5511 Setup and specifications guide	Rev. A00
---	Dell-latitude-5521-laptop_specs-setup-guide	Rev. A01
---	latitude-15-5521-laptop_owners-manual_en-us	Rev. A01
---	Dell Latitude 5580 Owner's Manual	Rev. A00
---	Dell Latitude 5580 Quick Start Guide	---
---	latitude-15-5580-laptop_white papers_en-us	1.0
ENV0023	Dell Latitude 5590 Product Compliance Datasheet	A12
---	Dell Latitude 5590 Owner's Manual	Rev. A01
---	Dell Latitude 5590 Quick Start Guide	---
---	Dell OptiPlex 5250 All-In-One Owner's Manual	Rev. A00
---	Dell OptiPlex 5250 All-In-One Quick Start Guide	---
---	Dell OptiPlex 7440 All-In-One Owner's Manual	Rev. A01
---	Dell OptiPlex 7440 All-In-One Quick Start Guide	---
---	OptiPlex_XE3_Spec_Sheet	---
---	OptiPlex XE3 Small Form Factor Setup and Specifications Guide	Rev. A00
---	Dell EMC PowerEdge R440 Installation and Service Manual	Rev. A11
---	Dell EMC PowerEdge R440 Technical Specifications	Rev. A02
---	Dell_PowerEdge_T130_SpecSheet_final	v.2
---	Dell EMC PowerEdge Servers Troubleshooting Guide	Rev. A05

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

Document Number	Description	Version
---	Dell PowerEdge T130 Owner's Manual	Rev. A04
---	Dell PowerEdge T130 Setup Guide	---
---	Dell EMC PowerEdge Servers Troubleshooting Guide	Rev. A11
---	Dell EMC PowerEdge T140 Installation and Service Manual	Rev. A00
---	Dell EMC PowerEdge T140 Technical Specifications	Rev. A00
---	Dell EMC PowerEdge T140 Setup Guide	Rev. A00
---	Dell Worldwide Regulatory Compliance Engineering and Environmental Affairs	Rev. A11
---	Dell PowerEdge T330 Spec Sheet	v4.1
---	Dell PowerEdge T330 Owner's Manual	Rev. A01
ENV0023	Product Compliance Datasheet	A12
---	Dell EMC PowerEdge Servers Troubleshooting Guide	Rev. A05
---	Dell EMC PowerEdge T440	Rev. A01
---	Dell PowerEdge Servers Troubleshooting Guide	Rev. A01
---	Dell PowerEdge T630 Owner's Manual	Rev. A04
---	Dell PowerEdge T630 Setup Guide	---
---	poweredge-t630_setup guide2_en-us	---
---	Dell Precision Tower 3620 Owner's Manual	Rev. A02
---	Dell Precision Tower 3620 Quick Start Guide	---
---	Breeze User Guide USB Sip/Puff Switch Model: BZ2	---
---	15E2 15.6-inch All-in-One Touchscreen Computer	---
---	Product Spec Sheet Request	---
SW602266	USER MANUAL Elo Touch Solutions 15.6" Widescreen E-Series Rev C/D All-in-One Touch computer	C
---	Quick Installation Guide E-Series Rev C LCD Multifunction Touch computer	---
---	Elo POS Configuration Kickstand #65121	---
---	EloPOS - 15-inch All-in-One TouchScreen Computer Datasheet	---
UM600232	EloPOS All-in-one Touch Computer User Manual	Rev. E
---	2D Barcode Scanner Peripheral User Manual	Rev. A
---	Breeze User Guide USB Sip/Puff Switch Model: BZ2	---
---	2D Barcode Scanner Peripheral User Manual	Rev. A

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

Document Number	Description	Version
---	Elo Touch Solutions User Manual	Rev. A
---	X-Series AiO Touchscreen Computers	---
SW602213	Elo Touch Solutions	B
P/N E001016	Quick Installation Guide X-Series All-in-One Touch Computer	Rev. B
---	FUJITSU Image Scanner fi-6400	---
---	Fi-6400 / Fi-6800 Image Scanner Getting Started	---
---	Fi-6400 / Fi-6800 Image Scanner Operator's Guide	---
---	Fi-6400 / Fi-6800 Image Scanner	---
---	Fi-6400 / Fi-6800 Maintenance Guide	---
---	FUJITSU Image Scanner fi-6800	---
---	Fi-6400 / Fi-6800 Image Scanner Getting Started	---
---	Fi-6400 / Fi-6800 Image Scanner Operator's Guide	---
---	Fi-6400 / Fi-6800 Image Scanner	---
---	FUJITSU Image Scanner fi-7180	---
---	Fi-7160 / Fi-7260 / Fi-7180 / Fi-7280 Image Scanner Getting Started	---
---	Fi-7160 / Fi-7260 / Fi-7180 / Fi-7280 Image Scanner Operator's Guide	---
---	Fi-7160 / Fi-7180 Image Scanner	---
---	Datasheet FUJITSU Image Scanner fi-7800	---
---	Datasheet FUJITSU Image Scanner fi-7900	---
---	Kapton Tape - 2 Mil, 3.4" x 36 yds	---
---	DataTraveler Elite G2	---
---	Laird_ferrite_28a2029-0a0-datasheet	X
---	Laird_ferrite_28a5776-0a2-datasheet	J
LP0034	Lenovo ThinkServer TS140 Product Guide	---
---	Lexmark_MS521dn_printer	---
45822052EE03	Okidata B432 User's Manual	---
MS16120-0115	B412dn/B432dn Mono Printer	---
---	Extreme Go Product Details	---
---	Ultra Flair Manufacturer's Consumer Products Limited Warranty	---

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

Document Number	Description	Version
---	Ultra Flair Product Details	---
EZK-XX-08KT	EZ ACCESS KEYPAD - Installation Instruction	1
EZK-08-28KT	Nav-Pad Tactile Interface Data Sheet	1
ECN101705	NAVPAD 8-KEY USB KEYPAD 2.5m CABLE	1
EZ08-22200	Storm ATP Nav-Pad	---
---	Takachi One-touch Partitioned Toroidal Core (TFT-152613N)	---
---	Tapes Masters	---
---	Product Description 3 inch	---
---	Digi-Key Ferrite	---
74271132	WE-STAR-TEC Snap Ferrite with safety key technology	---
74271142S	WE-STAR-TEC Snap Ferrite with safety key technology	---
74271222	WE-STAR-TEC Snap Ferrite with safety key technology	---
---	WE-STAR-FIX Snap Ferrite with flexible cable fixing	---
---	Star-Bueno Snap Ferrite	---
72-E 14436	DS457 FIXED MOUNT IMAGER INTEGRATION GUIDE	A
---	PRODUCT SPEC SHEET ZEBRA DS457 SERIES	---
---	Scanners At-A-Glance	---

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 2.3 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 2.2 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 I, 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 2.2) remained unchanged for the submitted modifications. The ClearVote 2.3 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 2.3 EMS applications are as follows:

- ClearDesign
- ClearCount

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

Summary Findings

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:

- 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.
- Voting System Capabilities: These functional capabilities include all operations conducted at the polling place by voters and officials including the generation of status messages.
- 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 2.3 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.

The functional configuration audit also included Regression Testing. ClearVote 2.3 is a modified voting system configuration that includes functional upgrades and modifications to the baseline system. Modified system testing is an abbreviated testing campaign built upon a regression review of the modifications against the baseline system and requirements. Modifications, alone and collectively, are reviewed (tested) to see if they fall under any requirement(s), or functionally impact the ability of the modified system to continue to meet requirements. Regression reviews consist of targeted investigations to determine if further testing is necessary based on the nature and scope of the communicated modifications (whether activated or deactivated), and any other submitted information. The objective of regression testing was to establish assurance that the modifications have no adverse impact on the compliance, integrity, or performance of the system. All functional regression tests were successfully completed.

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 accuracy requirements for ClearCount were met by the execution of the standard accuracy test utilizing pre-marked and hand-marked paper ballots of each ballot length supported by the system, and BMD ballots produced by the ClearAccess. ClearCount was tested by utilizing a combination of hand marked (70%) and pre-marked (30%) ballots. The ClearCast Accuracy test was reused from the ClearVote 2.2 EAC Campaign.

The ClearVote 2.3 System successfully passed the Accuracy Test. Any 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 2.3 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, two General Elections and two Primary Elections were exercised on the voting system, as described below:

Two general elections with the following breakdowns:

- General Election GEN-01: A General Election with Straight Party 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-03: A General 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.

Two primary elections with the following breakdowns:

- Primary Election PRIM-01: This election is designed to functionally test a Closed Primary Election with multiple ballots and support for common voting variations. This election contains thirty-one contests and six parties compiled into eighteen ballot styles, each ballot containing six contests.
- Primary Election PRIM-03: A Closed Primary 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 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 2.3 System successfully passed the System Integration Test. Any deficiencies encountered during the System Integration test are detailed in Section 3.3. All issues noted were successfully resolved. During execution of the test procedure, it was verified that the ClearVote 2.3 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 which was subjected to focused testing. The ClearVote 2.3 System successfully passed Volume and Stress Testing. Any deficiencies encountered during the Volume and Stress testing are detailed in Section 3.3. Any issues noted 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 certified versions of the baseline system (ClearVote 2.2). The updates to the modified system (ClearVote 2.3) required the tests listed below to be performed:

Electrical Tests:

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

Environmental Tests:

- Temperature Power Variation - 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 Pro V&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 2.3 components listed above. The procedures and results for this testing are included in the following NTS Test reports:

- ITR-PR150950, Revision 0, presented in Appendix B-1
- ETR-PR150950, Revision 0, 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

* The test items exceeded the Class B limits. Ferrites were added to the UPS ELO and Printer Cables and a retest was performed. No further anomalies were encountered. The test items met the specified requirements.

Environmental Testing was performed on the ClearVote 2.3 components listed above. The procedures and results for this testing are included in the following NTS Test reports:

- TR-PR150950, Revision 0, presented in Appendix B-1

The test results from this testing are summarized in Table 3-3:

Table 3-3. Environmental Hardware Test Results

Standard/Method	Description	Criteria	Result
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

The Temperature/Power Variation Test was 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
537	Hardware Testing	ClearAccess eloPos Box Configuration with Lexmark Printer and APC UPS failed Radiated Emissions Testing	Ferrites were placed on the UPS input cable, printer power cable, Elo power cable, and printer data cable. Cable management best practices were implemented within the ClearAccess Case, and the APC UPS power setting was changed to bypass mode. The Radiated Emissions test was then performed and successfully completed without issue.

Table 3-4. Noted Deficiencies (continued)

ID#	Test Category	Deficiency	Resolution
538	Volume and Stress	ClearAccess eloPos Box Configuration with Lexmark Printer consistently jammed when attempting to duplex print on 65# Lynx Cover Ultra 11" paper	The ClearVote 2.3 Ballot Stock and Printing Specification was updated to Version 1.0.16 and states that for ClearAccess units using the Lexmark printer, 60# cover stock is required.
539	--	Permissions on an installation directory for the ClearVote 2.3.0k application were not set correctly, which prevented the system from calculating the hashes of the installed ClearVote 2.3.0k software components.	A new Trusted Build was performed of ClearCount with the resulting Version 2.3.1. This release corrected the permissions on the installation directory allowing the software to properly calculate the hashes of the installed ClearVote 2.3.1 software components.

4.0 RECOMMENDATION FOR CERTIFICATION

The ClearVote 2.3 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 2.3 system, as identified in Tables 4-1 and 4-2, certification to the EAC 2005 VVSG.

Table 4-1. ClearVote 2.3 Voting System Software

Firmware/Software	Version
<i>ClearDesign Components, Version 2.3.0</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

Table 4-1. ClearVote 2.3 Voting System Software *(continued)*

Firmware/Software	Version
Python PIP	9.0.1
Zip	3.0.11
Pyinstaller	3.2.1
Python JSMIN	2.2.1
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
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
papaparser	4.6.0
jsmin	4.6
<i>ClearAccess Components, Version 2.3.0</i>	
Windows	10 Pro 1607
Google Chrome	87.0.4280.141
nsis	3.01

Table 4-1. ClearVote 2.3 Voting System Software *(continued)*

Firmware/Software	Version
PyInstaller	3.2
Python	2.7.10
webpy	0.38
Python-future	0.15.2
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
ClearAccess - LGPO	3
<i>ClearCast Components, Version 2.2.9</i>	
Ubuntu	18.04.5
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	2020.1
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

Table 4-1. ClearVote 2.3 Voting System Software *(continued)*

Firmware/Software	Version
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
jQuery.NumPad	1.4
jQuery	1.12.4
jquery.ui	1.11.3
<i>ClearCount Components, Version 2.3.1</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	2.4.29-1
libapache2-mod-fcgid	2.3.9-1
Python (part of Ubuntu)	2.7.17-1
MySQLdb (part of Ubuntu)	5.7.39-0
PyInstaller	3.2.1
PollyReports	1.7.6
OpenSSL	1.1.1-1
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
JavaScript jQuery-migrate library	1.2.1
JavaScript jQuery hotkeys library	0.8
JavaScript jQuery tooltip library	1.3
JavaScript splitter 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

Table 4-1. ClearVote 2.3 Voting System Software *(continued)*

Firmware/Software	Version
JavaScript bootstrap-vue library	2.0.2
Fujitsu fi-6400	PaperStream IP (TWAIN) 2.10.3
Fujitsu fi-6800	PaperStream IP (TWAIN) 2.10.3
Fujitsu fi-7180	PaperStream IP (TWAIN) 2.10.3
Fujitsu fi-7800	PaperStream IP (TWAIN) 2.10.3
Fujitsu fi-7900	PaperStream IP (TWAIN) 2.10.3
auditd	2.8.2-1
debconf	1.5.66
pmount	0.9.23-3
Samba	4.7.6
udisks	2.7.6-3

Table 4-2. ClearVote 2.3 Voting System Equipment

Component	Model	Serial Number
<i>ClearDesign Components</i>		
Dell Latitude Laptop (client)	5580, 5590, 5500, 5511, 5521	2F3L3G2, 9W5DIN2, JV3WXY2, 13KWY33, JM3WSG3
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

Table 4-2. ClearVote 2.3 Voting System Equipment *(continued)*

Component	Model	Serial Number
<i>ClearAccess Components</i>		
ELO 15 inch EloPOS	EPS15E2	J193011873, K193008678
ELO 15 inch AIO	E-Series (ESY15E2)	K17C012858
Oki Data Laser Printer	B432dn	AK8C17022C0 & BW0107753CD
Lexmark Laser Printer	MS521dn	4600952318T35
CyberPower Smart App UPS	PR1500RT2U	PY3JT2000004
APC Smart UPS	SRT1500RMXLA	AS2155292757
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	CBG-SP-001, 002, 003
Samson Over-Ear Stereo Headphones	SASR350	SR350J8G390 & SR350J8G396
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
ClearAccess Setup Case	ClearAccess Setup Case 2.3	6231202005
Dell OptiPlex AIO	5250	HCGMGK2
ELO 20 inch AIO	X-Series (ESY20X2)	D18Q000334
Dell Inspiron 15"	7573	80S1YD2
Zebra Technologies Bar Code Scanner	DS457-SR	18059000501984
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

Table 4-2. ClearVote 2.3 Voting System Equipment *(continued)*

Component	Model	Serial Number
<i>ClearCount Components</i>		
Dell PowerEdge Server (CountServer)	T130, T140, T330, T440, R440	5G0ZLN2, 8BFJ3W2, FHV9RD2, H6J5MN2, 55FDB03
Lenovo ThinkServer (CountServer)	TS140	MJ0472UV
Dell Precision Tower (CountStation)	T3620	GSKQMN2
Dell OptiPlex (CountStation)	7440, XE3 SFF	JXDFHH2, 93YDB03
Dell Latitude Laptop (CountStation)	5521	8LB8HG3, JM3WSG3
Dell Latitude Laptop (ScanStation)	5580, 5590, 5500, 5511, 5521	2F3L3G2, 5M5D1N2, DP5D1N2 9S3WXY2, 13KWY33, 8LB8HG3, JM3WSG3
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
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
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
APC Smart-UPS	SMT-1500C	3S1831X12280

Table 4-2. ClearVote 2.3 Voting System Equipment *(continued)*

Component	Model	Serial Number
<i>ClearCast Components</i>		
ClearCast	Model D Revision 4	CCD041904024
ClearCast Go	Model E Revision 5	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
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

Hardware Test Reports

(Provided Separately)

Electrical Test Reports

ITR-PR150950, Revision 0

ETR-PR150950, Revision 0

Environmental Test Report

TR-PR150950, Revision 0

APPENDIX B

Trusted Builds

Trusted Builds

The ClearVote 2.3 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 2.3.0 – The ClearAccess trusted build was performed using the “ClearAccess 2.3 Build Procedures” document Version 1.1.6, dated 08/12/2021, provided by Clear Ballot Group. The trusted build yielded the following output file and the associated Hash Value:

- ClearAccess-2.3.0 Installer.exe
SHA256: fe1cf53405c9b159f7f4c5fcadbf7e78ce676687a4260b5a47089afce7d2874c

ClearCount Version 2.3.1 – The ClearCount trusted build was performed using the “ClearCount 2.3 Build Procedures” document Version 1.6.8, dated 09/27/2021, provided by Clear Ballot Group. The trusted build yielded the following output file and the associated Hash Value:

- clearcount-2.3.1-20220921-200410.iso
SHA256: 6cc3ee0120597ff345b73e030c4ed2ea8e3c6c47d24b3e03d6d349dbb205ed95

ClearDesign Version 2.3.0n – The ClearDesign trusted build was performed using the “ClearDesign 2.3 Build Procedures” document Version 1.0.11, dated 08/12/2021, provided by Clear Ballot Group. The trusted build yielded the following output files and their associated Hash Values:

- clearDesign-2.3.0n.zip
SHA256: 7bd505758a64be055565c3c38f89b4edd8c8f01919da5732b854d05cc6b3599d
- install-setup.zip
SHA256: 4c553e95cebb87a4c7994af5a3be6f8dea31157cb4619a1bbe960019a43b8b97

APPENDIX C

Warrant of Accepting Change Control Responsibility



January 3, 2022

Mr. Michael Walker
Pro V&V
Huntsville AL 35802

****transmitted via email****

Re: Voting System Durability Attestation

Dear Mr. Walker:

This document addresses EAC 2005 VVSG Volume I, Section 4.3.2 and more specifically EAC RFI 2008-05.

Clear Ballot attests that the ClearVote 2.3 paper-based optical scan voting system is engineered to withstand normal use without deterioration and without excessive maintenance costs for a period of (10) years.

Sincerely,

Russ Dawson
Federal Certification Program Manager
russ.dawson@clearballot.com
512.350.5720

clearballot.com | 857-250-4961

2 Oliver Street | Second Floor | Boston, MA 02109