Elections Division
Office of the Secretary of State

Report of the Secretary of State on the Examination of Clear Ballot Group ClearVote 1.5 Voting System

March 2019

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Overview

Application

On December 21st Clear Ballot submitted an application for Washington State Certification of ClearVote 1.5. The Voting System includes ClearDesign, ClearAccess, and ClearCount. Copies of operating and maintenance manuals, training materials, technical and operational specifications were provided as part of the Technical Data Package.

Modification of Certified Voting System

This is a modification of a currently certified voting system (ClearVote 1.4). This system is a paper based digital scan voting system with a commercial off the shelf (COTS) scanners, printers, and computers.

This system has completed testing at an Election Assistance Commission (EAC) approved Voting System Test Lab (VSTL), Pro V&V, and is currently used in New York State, Florida, Oregon and Colorado.

National Certification

After the completion of testing by a certified Voting System Test Lab (VSTL) the Election Assistance Commission (EAC) certified ClearVote 1.5 on March 19th. The following hardware and software of the system have been approved by the EAC:

Software & Hardware

The following hardware and software of the system were tested by the VSTL:

Firmware/Software	Version
ClearDesign Components, Version 1.4.3	
Windows	10 Pro 1607
Google Chrome	55.0.2883.87
Ubuntu	14.04.4 LTS
MySQL	5.5.55
Apache	2.4.7
libapache2-mod-fcgid	2.3.9
PhantomJS	1.9.0
Usbmount	0.0.22
Unzip	6.0.9
Samba	4.3.11
Python PIP	1.5.4
Zip	3.0.8
Pyinstaller	3.0
Python JSMIN	2.2.1

Python	2.7.6
Python webpy	0.38
Python MySQL DB	1.2.3
SQLAlchemy	1.0.15
Python Pillow	2.3.0
Python Flup	1.0.2
Python DBUtils	1.1
Python XLRD	0.9.4
Python FontTools library	3.0
Python RTF	0.2.1
OpenSSL FIPS Object Module	2.0.10
OpenSSL (standard)	1.0.2g
DataTable	1.10.5
DataTable-TableTools	2.2.3
DataTable-ColVis	1.1.1
DataTable-ColReorder	1.1.2
DataTablePlugins	1.10.10
bootstrap	3.0.0
jquery	1.10.2
jquery-impromptu	5.2.3
jquery-qrcode	1.0
jquery-splitter	0.14.0
jquery-ui	1.10.4
jscolor	1.4.2
tinymce	4.1.9
fastclick	1.0.4
libmp3lame	0.5.0
jszip	3.1.2
papaparse	4.1.2
jsmin	12/4/2003
ClearAccess Components, Version 1.4.1	
Windows	10 Pro 1607
Google Chrome	61.0.3163.100
nsis	3.01
PyInstaller	3.2
Python	2.7.10
webpy	0.38
Python-future	0.15.2
pefile	2016.3.28
pywin	220
jquery	1.10.5
DataTables	1.10.5
ColVis	1.1.1
ColReorder	1.1.2
jsmin	2003-12-04
Brother printer driver	1.0.1.0
Okidata printer driver	1.0.0.0
ClearCast Components, Version 1.4.2	
scanner_control	0.0.28

UPSBatteryMontior	1.0
Ubuntu	14.04.5 LTS
google_chrome	62.0.3202.75-1
zeromq	4.2.0
arduino tools	1.8.0
adafruit tools	1.4.9
pyinstaller	3.2.1
OpenSSL FIPS Object Module	2.0.10
OpenSSL (standard)	1.0.1f
libPDIScan.so	7.1.0
pdi_ps3_drv_scanner.ko	2.0.5
DataTables	1.10.5
JTSage DateBox	4.0.0
jQuery.NumPad	1.4
jQuery	1.10.2
jquery.ui	1.11.3
ClearCount Components, Version 1.4.2	
Windows	10 Pro 1607
Google Chrome	55.0.2883.87
Ubuntu	16.04.1 LTS
Apache	2.4.18
libapache2-mod-fcgid	2.3.9
Python(part of Ubuntu)	2.7.12
Pillow (part of Ubuntu)	3.1.2
MySQLdb (part of Ubuntu)	1.3.7
PyInstaller	3.2.1
PollyReports	1.7.6
OpenSSL FIPS Object Module	2.0.10
OpenSSL (standard)	1.0.2g
JavaScript Bootstrap library	2.3.2
JavaScript Chosen library	1.0.0
JavaScript jQuery library	1.10.2
J JavaScript jQuery-migrate library	1.2.1
JavaScript DataTables library	1.9.4
ColVis	1.0.8
JavaScript TableTools library	2.1.5
ZeroClipboard	1.0.4-TableTools2
JavaScript FixedHeader library	2.0.6
JavaScript hotkeys library	1.0
JavaScript tooltip library	1.3
JavaScript pep library	1.0
JavaScript LESS library	1.3.3
Fujitsu fi-6400	PaperStream 1.30.0
Fujitsu fi-6800	PaperStream 10.10.710
Fujitsu fi-7180	PaperStream 1.4.0

Component	**Model**	**Serial Number**
ClearDesign Components		

Dell Latitude Laptop	5580	7L6M3G2
Dell PowerEdge Server	T630	2K5YFK2, JLPYHK2, & JLPXWK2
Dell 24 inch Monitor	SE2416H	FVWV5G2
Dell 22 inch Monitor	E2216HV	36765D2 & 90665D2
Dell Mini Tower	T3620	IHCLXK2 & IHCKXK2
TP-LINK VPN Router	TL-R600VPN	2149342000209, 2166306000413, & 2168351001114
Lenovo USB Portable DVD Burner	LN-8A6NH11B	8SSDX0H33226L1CB7107 099
Brother Printer	HL-L2340DW	U63879A7N416353
ClearAccess Components		
Dell OptiPlex AIO	5250	6PW4GK2, BPYXCH2, HGCMGK2, & 6PWZFK2
Dell 15" Inspiron	7000 series	80S1YD2, 7TT1YD2, & 22S1YD2
Brother Laser Printer	HL-L2340DW	U63879M4N62861, U63879M4N628617, U63879A7N416353, & U63879M4N628535
Oki Data Laser Printer	B432dn	AK5B007647A0, AK76030925A0, AK76030928A0, AK62030437A0, AK62030440A0, & AK76030928A0
Storm EZ Access Keypad	EZ08-222013	15000005, 15000007, & 15020478
Origin Instruments Sip/Puff Breeze with Headset	AC-0313-H2	CBG-SP-001, CBG-SP-002, & CBG-SP-003
Hamilton Buhl Over-Ear Stereo Headphones	HA7	CBG-HP-001 & CBG-HP-002
ElectionSource Table Top Voting Booth (Privacy Screen)	VB-60B	CBG-VB-001
APC Smart-UPS	SMT2200	AS1602232215, AS1721142050, AS1638230963, AS1721132721, & AS1625141816
Ergotron Stand for Dell OptiPlex 5250 AIO (portrait mode)	Neo Flex	1274839-0061 & 1358124-0005
Wurth Ferrite (for Oki printer)	742-416-33S	742-416-33S-CBG1
Wurth Ferrite (for Brother printer)	742-416-22S	742-416-22S-CBG1
3M EMI Copper Foil	1181	1181-CBG1

Shielding Tape, , ¼ inch		
Lexan or acrylic plastic cover (8 mm)	2”x4”	Cover-CBG1
ClearCount Components		
Dell Latitude Laptop (multiple units)	5580	2F3L3G2, C9S22G2, CF3L3G2, 90356H2, BDH46H2, 8TM46H2, 4PM46H2, 4QM46H2, 3CH46H2, & FPM46H2
Dell PowerEdge Server	T330	5RRFGK2, 5712JK2, & FHV9RD2
Dell OptiPlex AIO	7440	JXDFHH2, JXDFDH2, & 64WPXG2
Dell Precision Workstation	T3620	GW6XHH2 & H0PZFK2
Fujitsu Scanner	fi-7180	A20DC10302, A20DC10378, A20D000798, & A20DC08933
Fujitsu Scanner	fi-6800	A9HCC00543, A9HCC00535, & 100295
Fujitsu Scanner	fi-6400	AKHCC00609, AKHCC00337, & AKHCC00362
Lenovo USB Portable DVD Burner	LN-8A6NH11B	8SSDX0H33226L1CB7107 099
Dell 22 inch Monitor	E2216HV	GD965D2
Dell 22 inch Monitor	P2217	7818672
Dell 22 inch Monitor	S2240M	CN-0CFGKT-64180-58B-0X3T
Dell 27 inch Monitor	P2717H	CDMS672 & HPWD072
Cisco Catalyst Switch (1 Gigabit Router or Switch)	2960-X Series	FCW2039B6QF & FCW2110A1E0
TP-LINK Easy Smart Switch (1 Gigabit Router or Switch)	TL-SG108E	216C319009010 & 216C319009012
NetGear ProSafe VPN Firewall (1 Gigabit Router or Switch)	FVS318G	40F266BA00280
APC Smart-UPS	SMT1500	3S1525X07491, 3S1525X07421, & 4B1448P39979
Western Digital External Hard Drive	WDBBGB0040HBK	WCC7K5CHA3DK
EZ Scanning Shelf (fi-6400 or fi-6800)	Model: WorkEZ	CBG-EZ-001, CBG-EZ-002, CBG-
ClearCast Components		
ClearCast	Model: 1 Version A	Cast0011, Cast0014, Cast0015, Cast0017,

		Cast0018, and Cast0020
Ballot Box	1224UBB-CB	CBG-BB-001, CBG-BB-002

The ScanServer computer hosts the primary database and the ClearCount server and client software that recognizes and analyzes ballots. It can be a desktop or laptop computer. Minimum requirements include:

- 4-core, 8-thread processor
- At least 8 GB of RAM
- At least 500–1 TB of disk space
- Gigabit LAN connection
- USB 3.0 ports for backing up databases on external hard drives

When a jurisdiction installs or updates a ClearCount product, the installer program replaces the ScanServer computer's operating system with Linux. Therefore, the operating system originally installed on the ScanServer computer is unimportant.

A desktop or laptop computer enabled with a USB 2.0 or later port that can successfully run the listed software is required for use in a ScanStation. One computer is needed for each scanner in concurrent use.

The minimum requirements for a ScanStation computer are:

- 4 core, 8-thread processor
- At least 4 GB of RAM (at least 8 GB recommended)
- At least 500 GB of disk space
- Gigabit LAN connection
- USB 2.0 or later ports

Software requirements for each ScanStation computer include:

- Operating system: Windows 10 Pro
- For Fujitsu scanners:
- Fujitsu ScandAll PRO™ 2.0.12
    - Fujitsu TWAIN driver for the connected scanner, one of:
    - fi-6400 PaperStream IP 1.30.0
    - fi-6800 10.10.710
    - fi-7180 PaperStream® IP 1.4.0
- For ibml scanners:
    - SoftTrac® Capture Suite 4.0 (for ImageTrac 6000 series)
    - SoftTrac ScanDS 4.4.0 (for ImageTracDS 1155 and 1210)
    - ibml TWAIN driver for the connected scanner, one of:
    - 03-02-01 (for ImageTracDS 1155 and 1210)
    - TWAIN Manager 6.4.0 or later (for ImageTrac 6000 series)

Testing & Inspection

Testing and evaluation of ClearVote 1.5 was conducted by Secretary of State staff at the Pierce County Elections Office in Tacoma, WA on February 28, 2019. Examining the system for the Office of the Secretary of State was Stuart Holmes, Voting Information Systems (VIS) Manager and several members of Pierce County and members of the Voting System Review Board were also present.

Due to ClearVote 1.5 receiving a successfully test at an VTSL prior to state certification testing, a two phase testing program was developed and approved by Secretary of State VIS Manager for state certification testing.

> **Delivery acceptance testing** of the equipment and software to determine if the correct model and versions of the equipment and software are delivered and that the equipment, software and system operate as documented by the vendor.
>
> **Election Results Testing** to ensure that the equipment, software and system perform each of the functions required by federal, state and local law in order to administer an election from the beginning to the end.

Ballots were manually voted using the accessible voting unit, ClearAccess, and incorporated into the results to ensure proper tabulation.

Executive Summary of Findings be Secretary of State Staff

Voting System Accuracy

ClearVote 1.5 successfully and accurate tabulated all ballots including manually voted ballots from the accessible voting units. Results were manually audited and reviewed.

Results Reporting

ClearVote 1.5 was able to produce the state required reports for election results by precinct and cumulative. Performance improvements made to this version of ClearVote allow for the generation of those reports much faster than before. That is especially important for elections with many districts and many candidates in a county the size of King County.

Presidential Primary

ClearVote 1.5 can perform all the functions necessary to comply with current state requirements for the Presidential Primary. It can detect cross-party voting in a Presidential Primary without manual intervention.

System Limits

Characteristic	Tested Limit	Characteristic	Tested Limit
Election parameters			
Precincts per election	3200	Card styles per election	3200
Splits per election	3200	Contests per ballot style	60
District categories per election	100	Card styles per precinct	50
Districts per single category	3200	Parties per election	50
Districts per election	3200	Counter groups per election	7
Contests per election	3200	"Vote for" per contest	50
Choices per election	3200	Languages per election	15
Choices per contest	300	Cards per ballot (per language)	5
Vote positions per side	420	Write-ins per contest	50
Reporting name parameters*			
Election name (characters)	60	Contest name (characters)	60
Jurisdiction name (characters)	60	Candidate name (characters)	60
Precinct name (characters)	60	Party name (characters)	60
Vote center name (characters)	60	Write-in length (characters)	60
System parameters			
Central-count scanners per network	10	Cards per central-count device	4,000,000
Cards per precinct-voting device	10,000		

*These limits are for reports only.

Ballot Scanning

ClearVote 1.5 uses Fujitsu or IBML high-speed scanners capable of scanning up to 16,000 ballots per hour using the ImageTrac Lite. Sustained scanning speeds of each of the four available scanners are:

Small scanner: Fi-7180 – 1,300 per hour
Medium scanner: fi-6400 – 2,350 per hour
Medium scanner: fi-6800 – 3,000 per hour
Medium/Large scanner: DS 1210 - 6,000 per hour
Large scanner: ImageTrac Lite – 16,000 per hour

Ballot Processing

Different from other digital scan systems, most adjudication occurs after Election Day. Prior to Election Day, ballots can be adjudicated. The software is capable of identifying light marks that may not have been detected as a vote or marks that show additional voter intent.
Enabling results is logged in the system audit log so that it can be shown that at no time were results enabled prior to Election Day.

ClearCount can be used on laptops or desktop workstations. On laptops the small screen is a drawback, however the county could use the external monitor port to use a large screen monitor. Some benefits of using laptop computers is the built in battery backup and the ability for counties to store them compactly and reuse the election space when not in 'election mode' (especially in smaller counties who could benefit from repurposing their office space when not conducting an election).

System Security

ClearDesign and ClearCount require a server that stores the election data. That connection to the server is via a HTTPS connection through a VPN router capable of IP/MAC/Domain name filtering and other high security features. This is ideal for completely locking down the internal network in large counties.

All laptops and computers will be hardened to restrict only 'approved' applications to be opened on each workstation along with securing and protecting other important areas of that workstation.

The ClearAccess devices will come with a bezel that will cover and protect the exposed ports and only expose those require for accessibility and power. Those ports can be protected via a tamper evident seal when not in use.

All software and media has an easy to view hash value that will ensure that the device's software has not changed since its last install. Additional system and election event logs can be accessed to view any activity on that device. Furthermore, users can be given roles or credentials that limit their ability to perform any action on the system.

When ClearBallot prodcuts start up, they check that the cryptographic module is operating in FIPS mode. If not, the produce displays an error message and will not proceed.

Physical Security

An excerpt from Clear Ballot's security recommendations is:

When the components of the ClearCount system are not in use, they must be stored in a locked area under the custody and control of the jurisdiction. Access to this area must be controlled by the jurisdiction so the system cannot be accessed by unauthorized individuals and so that any breaches in security can be recognized through the auditing functions of the system.

When in storage or in use, the ClearCount system must be kept within a controlled area where only individuals authorized by the jurisdiction to handle and process ballots or maintain the voting system can come into direct contact with the ballots or components of the system. Each jurisdiction must also follow all jurisdictional and state rules for the handling and processing of ballots in addition to this Clear Ballot procedure. This means that at least one security method is employed to provide deterrence and physical security:

- Receptionists or guards with a gate or other barrier to the scanning area.
- Security cameras.
- Electronic door locking mechanisms such as ID cards or key fobs that record the identity of the device used or person to unlock the door.
- A locking computer rack or other cabinet to contain components of the ClearCount system.

Write-Ins

ClearVote 1.5 allows for entering write-in candidates after results have been enabled. Write-in candidates do not have to be on a qualified or declared list prior to ballot processing. Clear Ballot representatives recommended that counties review marks in the write-in box prior to adjudicating write-in votes for any marks that are not write-ins (marked the write-in oval, however did not write-in a name).

Accessible Voting

ClearAccess has an accessible voting unit that is touchscreen, can be used with the provided accessible switches or the voter's sip-n-puff or other USB assistive device. Once the voter has completed voting, their ballot is printed onto regular ballot paper. Depending on the county's procedures and in compliance with all other state elections law, the voter could then put their ballot into a return envelope and put into a ballot drop box and processed with all other ballots returned by mail or in drop boxes. The vote is not captured electronically so this device **is not** a direct recording electronic (DRE) voting unit so this device does not need to be audited separately. The votes on ClearAccess will be a part of the post-election audit as the ballots can be mixed in with all other ballots.

Conclusion

After an evaluation of the system, Stuart Holmes, Voting Information Systems Manager, believes the system and its components meet current Washington State requirements for Presidential Primary, Special, Primary, and General Elections as well as security, accuracy, and transparency.