



**Elections Division
Office of the Secretary of State**

**Report of the Secretary of State on the Examination of Clear
Ballot Group ClearVote 1.4.2 Voting System**

March 2018

Table of Contents

Application	3
New Voting System	3
National Certification.....	3
Software & Hardward	3
Testing & Inspection	7
Voting System Accuracy	8
Results Reporting	8
Presidential Primary	9
System Limits.....	9
Ballot Scanning.....	9
Ballot Processing	10
System Security.....	10
Physical Security.....	10
Write-Ins	11
Accessible Voting	11
Conclusion	11

Overview

Application

On February 21st Clear Ballot submitted an application for Washington State Certification of ClearVote 1.4.2 (also known as 1.4.VBM2). 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 1.3.3). 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

ClearVote 1.4.2 has not received EAC certification, however the only changed component between 1.4 and 1.4.2 is ClearCount. The modifications made to ClearCount are to accommodate the load for large counties, like King Count.

Software & Hardware

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

Firmware/Software	Version
<i>ClearDesign Components, Version 1.4.3</i>	
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

ClearCount Components, Version 1.4.3

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
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	10.10.710
Fujitsu fi-7180	PaperStream 1.4.0

ClearVote 1.4.2 VBM2 Software/Firmware Versions

ClearCount	1.4.3
ClearDesign	1.4.3
ClearAccess	1.4.1

ibml Software/Firmware Versions

ImageTrac Lite Scanner 6000 series

Image Trac Manager	6.7.1.159
SoftTrac capture suite	4.2.1.532
IT base	6.7.159
Firmware Build	6.00 build 56
DocNetics	5.6.0.131

ImageTrac DS series Scanner 1210

SoftTrac version	4.7.0
ImageTracDs 1210 firmware	3.04.00
SoftTrac capture suite	4.2.1.532
Twain Manager	6.8.0.104
DocNetics	5.6.0.131

Component	Serial Number(s)
<i>ClearDesign Components</i>	
Dell PowerEdge Server T630	2K5YFK2
Dell 24 inch Monitor SE2416H	FVWV5G2
Dell Latitude Laptop E5580	7L6M3G2
TRENDnet Switch TEG-S80g	CA11238032857
<i>ClearAccess Components</i>	
Dell OptiPlex 5250 All In One	BPYXCH2
Dell Inspiron 15 5000 Series 2 in 1	29XF1C2

Oki Data Laser Printer Model: B432dn	SAK5B007647A0
Brother Laser Printer	U63879M4N628612,
Model: HL-L2340DW	U63879M4N628617, &
	U63879M4N628535
APC Smart-UPS 2200 (for the Laser Printers)	AS1603160039
Model: SMT2200	
Origin Instruments Sip/Puff Breeze with Headset	AC-0313-H2
Model: BZ2	
Storm EZ Access Keypad Model: BZ2	1500005
Hamilton Buhl Over-Ear Stereo Headphones Model:HA-7	CLR-002-20-HP
ElectionSource Table Top Voting Booth (Privacy Screen) Model: VB-60B	CLR-002-21-VB
Hamilton Buhl Sanitary Headphone Covers	Model: HYGENX45
Security Seals Model: MRS2-12030	CLR-002-22-Seal
ClearCount Components	
Fujitsu fi-6800 Scanner	A9HCA00737
Fujitsu fi-6670 Scanner	AAADC00936
Fujitsu fi-7180 Scanner	A20D000798
ibml ImageTrac Lite Scanner 6000 series	A-1090514000007
ibml ImageTrac DS series Scanner 1210	763 SHT-4165-68M1 00050005
Dell Latitude Laptop E5580	2F3L3G2, C9S22G2, CF3L3G2
Dell OptiPlex 7440 AIO	64WPXG2
Dell Precision Workstation T3620	GW6XHH2
Dell PowerEdge Server T330	FHV9RD2
Dell Precision 7910	BPH0TD2 & CL9RGK2
Dell 22 inch Monitor Model: S2240M	CN-0CFGKT-64180-58B-0X3T
Dell 27 inch Monitor Model: P2717H	CDMS672
APC Smart-UPS 1500 (for Fujitsu scanners)	3S1525X07491
Model: SMT1500	
APC Smart-UPS 2200 (for ibml scanners)	AS1603160039
Model: SMT2200	
Cisco Catalyst Switch Model: 2960-X Series	S/N: FCW2039B6QF
Lenovo USB Portable DVD Writer Model: GP60NB50	411HV005130 & 411HR027583
EZ Scanning Shelf (fi-6400 or fi-6800)	Model: WorkeEZ

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

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 1.4.2 was conducted by Secretary of State staff at the King County Elections Office in Renton, WA on March 6, 2018. Examining the system for the Office of

the Secretary of State was Stuart Holmes, Voting Information Systems (VIS) Manager and several members of the King County Elections Department. Attendees from Pierce County and members of the Voting System Review Board were also present.

Due to ClearVote 1.4.2 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 1.4.2 successfully and accurate tabulated all ballots including manually voted ballots from the accessible voting units. Results were manually audited and reviewed.

Additionally, each county who chooses to install ClearVote 1.4.2 must complete an acceptance test prior to use. During acceptance testing of ClearVote 1.4, a previous version of this system, King County found that the system was not capable of handling the system connection load. That issue has been resolved and ClearVote has provided sufficient documentation of the issue and the steps taken to resolve the issue. During the inspection and testing of the system, we did not attempt to find the max load of the system.

Additionally, a Cisco 3850 network switch was used during the test. That component is unique to King County and, although it is not part of the TDP, it was tested and inspected successfully.

Results Reporting

ClearVote 1.4.2 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 1.4.2 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	5000	Choices per contest	200
Splits per precinct	50	Contests per ballot style	125
District categories per election	5000	Ballot styles per precinct	50
Districts per single category	5000	Parties per election	50
Districts per election	5000	Counter groups per election	7
Contests per election	5000	"Vote for" descriptors per contest	50
Choices per election	5000	Languages per election	15
Ballot styles per election	5000	Write-ins per contest	30
Ballot parameters			
Election name (characters)	128	Contest name (characters)	4096
Jurisdiction name (characters)	128	Candidate length (characters)	128
Precinct name (characters)	128	Party name (characters)	128
Vote center name (characters)	128	Write-in length (characters)	128
System parameters			
Cards per ballot	5	Cards per precinct-voting device	10,000-plus
Central-count scanners per network	20	Cards per central-count device	4,000,000

Ballot Scanning

ClearVote 1.4.2 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 products 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 1.4.2 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.