Minutes
State Election Commission Meeting
July 12, 2021

The State Election Commission meeting was called to order by Chairman Judy Blackburn at 12:07 p.m., Central Daylight Time, July 12, 2021.

The following members and staff were present: Commissioners Barrett, Blackburn, Duckett, Eldridge, McDonald, Wheeler and Younce; Coordinator of Elections Mark Goins, and Kathy Summers, Elections Specialist.

Commissioner Barrett made a motion to adopt the below listed minutes, seconded by Commissioner Eldridge.

- June 14, 2021 – Meeting and Show Cause Hearing
- June 23, 2021 – Telephonic Meeting

(Aye votes: Barrett, Blackburn, Duckett, Eldridge, McDonald, Wheeler and Younce; No votes: None; Abstention: None.)

Commissioner McDonald made a motion pursuant to TCA. § § 2-12-101 and 2-12-106 to approve any nomination(s) for county election commission appointments submitted, and to leave the nomination process open until 4:30 p.m. Central Daylight Time, Monday, July 12, 2021, seconded by Commissioner Eldridge. (Aye votes: Barrett, Blackburn, Duckett, Eldridge, McDonald, Wheeler and Younce; No votes: None; Abstention: None.) **(See attached county election commission appointments made.)**

Old Business

- **Discuss Voting Machine Recertification Process**

Chairman Blackburn discussed recertification of voting machines and the desire for the full commission to view the voting systems at several meetings by mid-November.

Coordinator Goins stated the reason for an earlier recertification process was due to correspondence from Williamson County voters asking the for a review of their voting system. The last time the commission recertified voting systems was December 2015, and the next review was due in December 2023.

Coordinator Goins discussed the process under TCA§ 2-9-117, which requires the State Election Commission and the Coordinator of Election to reexamine all voting machines at least every eight (8) years to ensure voting machines still meet the minimum criteria for certification. Coordinator Goins advised if a particular machine is not recertified, the affected county election commission would have two (2) years to purchase and implement a new certified machine within their county.

Commissioner Younce asked what the concerns were from the Williamson County voters.

Chairman Blackburn stated Dominion will be viewed on October 11, 2021 and gave the Williamson County voters a chance to speak about their concerns.

Mr. Frank Limpus spoke on behalf of his group. Mr. Limpus has a variety of reports and a presentation he would like to present before the commission when Dominion is reviewed.

Commissioner Duckett requested Dominion be provided the information/questions from the Williamson County group prior to Dominion's review.

Chairman Blackburn requested Mr. Limpus to provide the groups presentation and information to the Elections Division prior to the review of voting systems.

Elections staff will work with State Election Commissioners and vendors to set up a schedule and meeting information will be posted on the Elections Division website.

New Business

- **Hart InterCivic - Verity Voting 2.5 Voting Machine Presentation and request for approval – Ray Wittlinger, Certification Project Manager**

Ray Wittlinger, Certification Project Manager for Hart InterCivic gave the demonstration before the commission. **(See attached presentation provided by Hart InterCivic.)**

Bob Heisner, Director of Sales for Hart InterCivic, spoke before the commission. Mr. Heisner stated Verity Touch 2.4 will no longer be marketed but will still be supported in Tennessee. Any county using Verity Touch 2.4 may request an upgrade to Verity Voting 2.5.

State Election Commission members went into recess to view the Verity Voting 2.5 voting system in demonstration.

Chairman Blackburn requested Hart InterCivic provide letters of support from jurisdictions who are using Verity Voting 2.5 for the commission to review at their next meeting.

- **ES&S – EVS 6.1.1.0 – Presentation and request for approval – Ben Swartz, Senior Certification Manager**

Ben Swartz, Senior Certification Manager for ES&S, gave the demonstration before the commission. Mr. Swartz also provide letters of recommendation for EVS 6.1.1.0. **(See attached presentation and letters of recommendation provided by ES&S.)**

State Election Commission members went into recess to view the ES&S - EVS 6.1.1.0 voting system in demonstration.

Commissioner Younce made a motion to certify ES&S - EVS 6.1.1.0, seconded by Commissioner McDonald. (Aye votes: Barrett, Blackburn, Duckett, Eldridge, McDonald, Wheeler and Younce; No votes: None; Abstention: None.)

Coordinator Update

- Legislation was filed earlier this year and is being discussed to enhance the audit process in Tennessee.

Commissioner Younce made a motion to have Coordinator Goins to seek an Attorney General's opinion regarding the revision of TCA§2-1-112, seconded by Commissioner McDonald. (Aye votes: Barrett, Blackburn, Duckett, Eldridge, McDonald, Wheeler and Younce; No votes: None; Abstention: None.)

Commissioner Duckett expressed concern regarding counties having Gmail email or any other similar accounts other than a county or state government email account. Specifically, in Benton County, the county has a Gmail account and since the termination of the AOE no one has been able to access the county Gmail email account. Commissioner Duckett would like for Coordinator Goins to work with all counties, to ensure their email is either on a county or state email system so that if there is a change in staff the office is still able to access their emails.

Coordinator Goins advised commission members Benton County has two (2) email accounts, one (1) issued by the state and one (1) used through Gmail. All counties have been encouraged to have either a county email or a state email account. Many counties have taken the state up on the offer for a state email account. Coordinator Goins also advised the Division of Elections has offered grant money for standalone servers to county election commissions if they do not have access to one on the county level.

The meeting was adjourned at 2:32 p.m. Central Time.

The next scheduled meeting is set for October 11, 2021 and will be held in the William R. Snodgrass – Tennessee Tower, Nashville Room - 3rd floor at 12:00 Noon, Central Standard Time.

Respectfully submitted,

Tom Wheeler - Secretary
State Election Commission

State of Tennessee

State Election Commission
312 Rosa L. Parks Avenue, 7th Floor
Nashville, Tennessee 37243-1102

Vacant Status

July 12, 2021

Benton R Donna Barrett / D Greg Duckett

D

R

Carroll R Jimmy Eldridge / D Greg Duckett

R

Morgan R Kent Younce / D Tom Wheeler

D

Rhea R Kent Younce / D Tom Wheeler

R

Total Vacancies: 5

State of Tennessee

State Election Commission
312 Rosa L. Parks Avenue, 7th Floor
Nashville, Tennessee 37243-1102

Holdover Status

July 12, 2021

		Appointment	Reappointment
Carroll	R Jimmy Eldridge / D Greg Duckett		
	R Julia A. Blanks	5/31/2016	4/1/2019
	R Ronald R. Reiter	5/4/2015	4/1/2019
Stewart	R Jimmy Eldridge / D Greg Duckett		
	D Nellie F. Settle	4/3/1995	4/1/2019

Total Holdovers: 3

State of Tennessee

State Election Commission
312 Rosa L. Parks Avenue, 7th Floor
Nashville, Tennessee 37243-1102

New Appointment Status

July 12, 2021

	Appointment
#Type!	

Total New Commissioners: 0

Current List
SEC
Approved
Voting Systems
as of January 11, 2021

State of Tennessee

Department of State

Division of Elections

Approved Voting Machines – January 11, 2021

Machine	EAC Certification Number	Date Certified by SEC	Notes
Diebold/Premier/ES&S Gems 1-18-22	N-1-06-12-12-003	February 15, 2005	This version includes both a DRE and Precinct Optical Scan solution. (Balotar – Ballot on Demand – Certified 10/12/2015) **Note:** The State Election Commission met on December 1, 2015, and recertified this machine for use in TN. The next review will be required no later than December 1, 2023.
Diebold/Premier/ES&S Gems 1-18-24	N-1-06-22-22-003	June 8, 2006	**Note:** The State Election Commission met on December 1, 2015, and recertified this machine for use in TN. The next review will be required no later than December 1, 2023.
Dominion Voting Democracy Suite 4.0	EAC Certification Number DVS-40-G-10	August 13, 2012	**Note:** The State Election Commission met on December 1, 2015, and recertified this machine for use in TN. The next review will be required no later than December 1, 2023.
Dominion Voting Democracy Suite 4.14	EAC Certification Number DemSuite4-14	January 13, 2014	**Note:** The State Election Commission met on December 1, 2015, and recertified this machine for use in TN. The next review will be required no later than December 1, 2023.
Dominion Voting Democracy Suite 4.14-A Democracy Suite 4.14B Democracy Suite 4.14-D	EAC Certification Number DemSuite-4.14-A DVS-DemSuite-4.14B DVS-DemSuite-4.14-D	January 11, 2016	**Note:** The next review will be required no later than December 1, 2023.
Dominion Voting Democracy Suite 5.0	EAC Certification Number DVS - DemSuite-5.0	October 8, 2018	**Note:** Requires the use of ballot tote bins to be used with optical scanners and Tennessee law requires the use of ballots with serially-numbered stubs.
Dominion Voting Democracy Suite 5.5	EAC Certification Number DVS - DemSuite-5.5	July 22, 2019	**Note:** Requires the use of ballot tote bins to be used with optical scanners and Tennessee law requires the use of ballots with serially-numbered stubs.

Machine	EAC Certification Number	Date Certified by SEC	Notes
Dominion Voting Democracy Suite 5.5-B	EAC Certification Number DVS - DemSuite-5.5-B	January 13, 2020	**Note**: Request for De Minimis changes to D-Suite 5.5 - ECO 100653 Dell Optiplex 5270 AIO Computer and approval of D-Suite 5.5 Mobile Ballot Product Solution.
ES& S Unity 2.5	N-1-02-22-22-003	October 11, 2005	This version includes both a DRE and Precinct Optical Scan solution. (Balotar – Ballot on Demand – Certified 10/12/2015) **Note:** The State Election Commission met on December 1, 2015, and recertified this machine for use in TN. The next review will be required no later than December 1, 2023.
ES&S 3.0.1.1	N-2-02-22-22-006	August 21, 2007	(Balotar – Ballot on Demand – Certified 10/12/2015 **Note:** The State Election Commission met on December 1, 2015, and recertified this machine for use in TN. The next review will be required no later than December 1, 2023.
ES&S EVS 5.2.0.0	ESSEVS5200	October 12, 2015	**EVS 5.2.0.0** - counties are required to use the DS200 ballot tote bins and ballots must be serially-numbered with a ballot stub. **Express Vote Ballot on Demand** – approval requires ballots must be serially-numbered with a ballot stub. Note: The State Election Commission met on December 1, 2015, and recertified this machine for use in TN. The next review will be required no later than December 1, 2023.
ES&S EVS 5.2.1.0	ESSEVS5210	January 9, 2017	**EVS 5.2.1.0** - counties are required to use the DS200 ballot tote bins and ballots must be serially-numbered with a ballot stub. **Express Vote Ballot on Demand** – approval requires ballots must be serially-numbered with a ballot stub.
ES&S EVS 5.2.2.0	ESSEVS5220	January 8, 2018	**EVS 5.2.1.0** - counties are required to use the DS200 ballot tote bins and ballots must be serially-numbered with a ballot stub. **Express Vote Ballot on Demand** – approval requires ballots must be serially-numbered with a ballot stub.
ES&S EVS 5.2.4.0	ESSEVS5240	January 14, 2019	**Note:** Requires the use of ballot tote bins to be used with optical scanners and Tennessee law requires the use of ballots with serially-numbered stubs.
ES&S EVS 6.0.2.0	ESSEVS6020	July 22, 2019	**Note:** Requires the use of ballot tote bins to be used with optical scanners and Tennessee law requires the use of ballots with serially-numbered stubs.

Machine	EAC Certification Number	Date Certified by SEC	Notes
Hart InterCivic eSlate System Version 5.0	N-1-04-22-22-003	November 15, 2005	**Note:** The State Election Commission met on December 1, 2015, and recertified this machine for use in TN. The next review will be required no later than December 1, 2023.
Hart InterCivic eSlate System Version 6.1	N-1-04-22-22-005	September 19, 2006	
Hart InterCivic eSlate System Version 6.2.1	N-1-04-22-22-006	July 17, 2007	**Note:** The State Election Commission met on December 1, 2015, and recertified this machine for use in TN. The next review will be required no later than December 1, 2023.
Hart InterCivic Verity 1.0	HRT-Verity-1.0	December 1, 2015	The next review will be required no later than December 1, 2023.
Hart InterCivic Verity 2.0	HRTVerity2.0	January 8, 2018	
Hart InterCivic Verity 2.3	HRT-Verity-2.3	December 3, 2019	
Hart InterCivic Verity 2.4	HRT-Verity-2.4	April 13, 2020	
MicroVote Infinity EMS 3.1.0.0	N-1-09-22-22-001	January 17, 2006	**Note:** The State Election Commission met on December 1, 2015, and recertified this machine for use in TN. The next review will be required no later than December 1, 2023.
MicroVote Infinity EMS 4.0B (Modification)	EAC Certification Number MVTEMS40B	October 8, 2012	**Note:** The State Election Commission met on December 1, 2015, and recertified this machine for use in TN. The next review will be required no later than December 1, 2023.
MicroVote Infinity 4.1 (Modification)	EAC Certification Number MVTEMS41	July 10, 2017	**Infinity 4.1 – Software Upgrade** - SEC approved the 4.1 software for existing voting machines. **Note:** The next review will be required no later than December 1, 2023.
MicroVote Infinity EMS 4.41 And Firmware Software Upgrade 4.3A	EAC Certification Number MVTEMS441 And MVTEMS43A	January 11, 2021	The following are required for certification: • Two keys for internal access • If/When tape changed, tamper tape should be applied • Limit the access to adjust assigned programmed machines during election • Ensure all machines assigned are calibrated and then tallied out **Note:** The next review will be required no later than December 1, 2023.
Unisyn OpenElect 1.0.1	EAC Certification Number: UNS10121966-OE-WI	April 9, 2012	

Machine	EAC Certification Number	Date Certified by SEC	Notes
Unisyn OpenElect 1.1	EAC Certification Number: UNS10121966-OE-1.1	June 18, 2012 April 14, 2012	April 14, 2014 – de minmis change **Note:** The State Election Commission met on December 1, 2015, and recertified this machine for use in TN. The next review will be required no later than December 1, 2023.
Unisyn OpenElect 1.2	EAC Certification Number: UNS10121966-OE-1.2	April 14, 2014	(Ballot on Demand – Certified 7/13/2015) **Note:** The State Election Commission met on December 1, 2015, and recertified this machine for use in TN. The next review will be required no later than December 1, 2023.
Unisyn OpenElect 1.3	EAC Certification Number: 04211950-1.3	July 13, 2015	**Note:** The State Election Commission met on December 1, 2015, and recertified this machine for use in TN. The next review will be required no later than December 1, 2023.
Unisyn OpenElect 2.0	EAC Certification Number: UNS10121966-2.0	January 14, 2019	**Note:** Requires the use of ballot tote bins to be used with optical scanners and Tennessee law requires the use of ballots with serially-numbered stubs.
Unisyn OpenElect 2.0.A	EAC Certification Number: UNS10121966-2.0.A	January 14, 2019	**Note:** Requires the use of ballot tote bins to be used with optical scanners and Tennessee law requires the use of ballots with serially-numbered stubs.

Approved Voting Machines Currently in Use or Marketed in Tennessee as of July 7, 2021

Machine	EAC Certification Number	Date Certified by SEC
Diebold/Premier/ES&S Gems 1-18-24	N-1-06-22-22-003	June 8, 2006
Dominion Voting Democracy Suite 5.5-B	EAC Certification Number DVS - DemSuite-5.5-B	January 13, 2020
ES&S 3.0.1.1	N-2-02-22-22-006	August 21, 2007
ES&S EVS 5.2.2.0	ESSEVS5220	January 8, 2018
ES&S EVS 5.2.4.0	ESSEVS5240	January 14, 2019
ES&S EVS 6.0.2.0	ESSEVS6020	July 22, 2019
Hart InterCivic eSlate System Version 6.2.1	N-1-04-22-22-006	July 17, 2007
Hart InterCivic Verity 2.4	HRT-Verity-2.4	April 13, 2020
MicroVote Infinity 4.1 (Modification)	EAC Certification Number MVTEMS41	July 10, 2017
MicroVote Infinity EMS 4.41 And Firmware Software Upgrade 4.3A	EAC Certification Number MVTEMS441 And MVTEMS43A	January 11, 2021
Unisyn OpenElect 2.0.A	EAC Certification Number: UNS10121966-2.0.A	January 14, 2019

PROCEDURES FOR CERTIFYING VOTING MACHINES BY THE TENNESSEE STATE ELECTION COMMISSION

All voting machines/vendors must receive certification from the state election commission and the coordinator of elections before any voting machines or systems may be sold in the State of Tennessee.

First Step:

Any interested vendor should submit a written request to the coordinator of elections and the state election commission requesting certification of your company together with the EAC certification number, a financial report and a list of all states that have already bought your voting machines or systems. If you would like to demonstrate your product at a meeting of the state election commission, please make that request in your letter. You will be notified of the date, time, and place of the meeting where you may make your presentation.

Second Step:

A. Voting Machine Procedure

Following verification of EAC certification and an initial presentation of your product and/or services, you would need to arrange for at least two (2) State Election Commissioners (of opposite parties) and the coordinator of elections (or designee) to view your machines or system in use in an election of a substantial size in another state. An election of a substantial size involves at the minimum the following characteristics:

- The jurisdiction has a population of at least 10,000 persons;
- The jurisdiction has at least two (2) or more district races on the ballots; and
- There are at least two (2) contested races involving both at large and district races on the ballot.

B. Voting Machine Software or Hardware Upgrade

- EAC Certification;
- Presentation of upgrade before State Election Commission at a meeting; and
- Viewing of upgrade in another state (In lieu of viewing machine in another state, at the discretion of the State Election Commission, letters of recommendation from users in other jurisdiction may be used as support for approval.)

C. De Minimis Voting System Changes

- Any De Minimis change to an EAC certified voting system shall be submitted to the state election commission and coordinator of elections to be approved. For purposes of approval of the de minimis change to the voting system, all that will be required is a letter from the EAC stating the change is de minimis, unless further information is requested by the state election commission or coordinator of elections.

Third Step:

The State Election Commission must vote to certify the machine in order for the machines to be used in an election in Tennessee.

You may send any correspondence for both the state election commission and the coordinator of elections to the following address:

312 Rosa L.Parks Avenue, 7th Floor
William R. Snodgrass Tower
Nashville, Tennessee 37243
(615) 741-7956

If you have any further questions regarding certification of your company, please feel free to contact the office of the state election coordinator at the phone number listed above.

Hart InterCivic

Voting System

Presentation

Verity 2.5

July 12, 2021

- Ray Wittlinger, Certification Project Manager

Kathy Summers

From: Ray Wittlinger <rwittlinger@hartic.com>
Sent: Tuesday, April 6, 2021 1:49 PM
To: Kathy Summers
Subject: [EXTERNAL] Request for Hart InterCivic Certification of Verity 2.5 in Tennessee
Attachments: Verity Voting 2.5 Change Notes 4005669 A02.pdf

Importance: High

***** This is an EXTERNAL email. Please exercise caution. DO NOT open attachments or click links from unknown senders or unexpected email - STS-Security. *****

Hi Kathy,

Thank you so much for taking the time to speak with me earlier today. It was great to finally get in touch and I am looking forward to working with you through the certification process in Tennessee. I have attached the notes regarding the Verity 2.5 upgrade from Verity 2.4. I have also included the link from the EAC's website regarding the certification of Verity 2.5 and other items therein. After you have had the chance to review this, please let me know if you all will require an observation election for the certification of Verity 2.5 in Tennessee. At any time, let me know if I may provide you with anything else as I am happy to do. Take care and I will speak with you soon!

Thanks,
Ray Wittlinger

https://www.eac.gov/voting-equipment/hart-verity-voting-25

Ray Wittlinger
Certification Project Manager
Hart InterCivic
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Austin, Texas 78728
Mobile: 913.645.3608
www.hartintercivic.com

United States Election Assistance Commission

Certificate of Conformance

Hart Verity Voting 2.5

The voting system identified on this certificate has been evaluated at an accredited voting system testing laboratory for conformance to the *Voluntary Voting System Guidelines Version 1.0 (VVSG 1.0)*. Components evaluated for this certification are detailed in the attached Scope of Certification document. This certificate applies only to the specific version and release of the product in its evaluated configuration. The evaluation has been verified by the EAC in accordance with the provisions of the EAC *Voting System Testing and Certification Program Manual* and the conclusions of the testing laboratory in the test report are consistent with the evidence adduced. This certificate is not an endorsement of the product by any agency of the U.S. Government and no warranty of the product is either expressed or implied.

Product Name: Verity Voting

Model or Version: 2.5

Name of VSTL: SLI Compliance

EAC Certification Number: HRT-VERITY-2.5

Date Issued: September 9, 2020

Mona Harrington

Executive Director

Scope of Certification Attached

Scope of Certification

This document describes the scope of the validation and certification of the system defined above. Any use, configuration changes, revision changes, additions or subtractions from the described system are not included in this evaluation.

Significance of EAC Certification

An EAC certification is an official recognition that a voting system (in a specific configuration or configurations) has been tested to and has met an identified set of Federal voting system standards. An EAC certification is **not**:

- An endorsement of a Manufacturer, voting system, or any of the system's components.
- A Federal warranty of the voting system or any of its components.
- A determination that a voting system, when fielded, will be operated in a manner that meets all HAVA requirements.
- A substitute for State or local certification and testing.
- A determination that the system is ready for use in an election.
- A determination that any particular component of a certified system is itself certified for use outside the certified configuration.

Representation of EAC Certification

Manufacturers may not represent or imply that a voting system is certified unless it has received a Certificate of Conformance for that system. Statements regarding EAC certification in brochures, on Web sites, on displays, and in advertising/sales literature must be made solely in reference to specific systems. Any action by a Manufacturer to suggest EAC endorsement of its product or organization is strictly prohibited and may result in a Manufacturer's suspension or other action pursuant to Federal civil and criminal law.

System Overview:

The **Verity Voting 2.5** system represents a set of software applications for pre-voting, voting and post-voting election project activities for jurisdictions of various sizes and political division complexities.

- **Verity Voting 2.5** functions include: Defining the political divisions of the jurisdiction and organizing the election with its hierarchical structure, attributes and associations.
- Defining the election events with their attributes such as the election name, date and type, as well as contests, candidates, referendum questions, voting locations and their attributes.

- Preparing and producing ballots for polling place and absentee voting or by mail voting.
- Preparing media for precinct voting devices and central count devices.
- Configuring and programming the **Verity Scan** digital scanners for marked paper ballots and **Verity Touch Writer** printed vote records.
- Configuring and programming the **Verity Touch Writer** BMD devices.
- Configuring and programming the **Verity Controller** with **Verity Touch Writer Duo** BMD devices.
- Configuring and programming the **Verity Controller** with **Verity Touch** and **Verity Touch with Access** DRE devices.
- Configuring and programming the **Verity Touch Writer Duo Standalone** BMD devices.
- Configuring and programming the **Verity Print** on-demand ballot production device.
- Transmission of the election results via **Verity Relay**.
- Producing the election definition and auditing reports.
- Providing administrative management functions for user, database, networking and system management.
- Import of the Cast Vote Records from **Verity Scan** devices and **Verity Central**.
- Preview and validation of the election results.
- Producing election results tally according to voting variations and election system rules.
- Producing a variety of reports of the election results in the desired format.
- Publishing of the official election results. Auditing of election results including ballot images and log files.

Verity Scan is a digital scanning device (tabulator) that is used in conjunction with an external ballot box. The unit is designed to scan marked paper ballots or Verity Touch Writer Duo printed vote records, interpret and record voter marks on the marked paper ballot or record voter selections on the printed vote records, and deposit into the secure ballot box.

Verity Touch Writer is a standalone Ballot Marking Device (BMD) which also includes an Audio Tactile Interface (ATI). Touch Writer allows voters who cannot hand-mark a paper ballot to generate a machine-readable and human readable paper ballot, based on vote selections made through the accessible electronic interface.

The **Verity Touch Writer Duo** is a daisy chained configuration of a **Verity Controller** device configured with up to twelve **Verity Touch Writer Duo** BMD devices, which allows voters to utilize the touchscreen or optional Audio Tactile Interface to generate a machine-readable and human readable printed vote record, based on vote selections made.

The **Verity Touch Writer Duo Standalone** is a standalone Ballot Marking Device (BMD) which allows voters to utilize the touchscreen or optional Audio Tactile Interface to generate a machine-readable and human readable printed vote record, based on vote selections made.

The **Verity Touch** is a Direct Recording Electronic (DRE) device chained configuration of a **Verity Controller** device configured with up to twelve **Verity Touch or Touch with Access** devices, which allow voters to cast their vote electronically via a touchscreen.

The **Verity Touch with Access** is a DRE device chained configuration of a **Verity Controller** device configured with up to twelve **Verity Touch** or **Touch with Access** devices, which allow voters to cast their vote electronically via a touchscreen or Audio Tactile Interface (ATI).

Verity Print is an on-demand ballot production device for unmarked paper ballots.

Verity Election Management allows users with the Administrator role to import and manage election definitions. Imported election definitions are available through the Elections chevron in Build. Users can also delete, archive, and manage the election definitions.

Verity User Management enables users with the correct role and permissions to create and manage user accounts within the **Verity Voting** system for the local workstation in a standalone configuration, or for the network in a networked configuration.

Verity Desktop enables users, with the correct roles, to set the workstations' date and time, gather **Verity** application hash codes (in order to validate the correctness of the installed applications), and access to the Windows desktop.

Verity Data provides the user with controls for entering and proofing data and audio. **Verity Data** also performs validation on the exported information to ensure that it is ready for use in **Verity Build**.

Verity Build opens the election to proof data, view reports, and print ballots, and allows for configuring and programming the **Verity Scan** digital scanners, **Verity Touch Writer** BMD, **Verity Controller/Touch Writer Duo** BMD devices, **Verity Print**, and **Verity Controller/Touch** series DRE devices, as well as producing the election definition and auditing reports.

Verity Central is a high-speed, central digital ballot scanning system used for high-volume processing of ballots (such as vote by mail). Verity Central is based on COTS scanning hardware coupled with custom **Hart-**developed ballot processing application software which resides on an attached workstation.

Verity Count is an application that tabulates election results and generates reports. **Verity Count** can be used to collect and store all election logs from every **Verity** component/device used in the election, allowing for complete election audit log reviews.

Verity Relay provides remote transmission capability to the **Verity Voting 2.5** system. Utilizing an optional modem with **Verity Scan**, at close of polls, results are transmitted from the polling place device to the **Verity Relay** workstation.

Verity AutoBallot is an optional barcode scanner kit for **Verity Controller, Verity Print,** and **Verity Touch Writer** that allows air-gapped integration between an e-pollbook check-in process and the task of selecting the ballot style for the voting system.

Certified System before Modification (If applicable):

Verity Voting 2.4

Anomalies and/or Additions addressed in Verity Voting 2. 5:

- See Certification Test Report, pages 24-27 for detailed changes.

Mark definition:

System supports marks that cover a minimum of 4% of the rectangular marking area.

Tested Marking Devices:

System supports Black and Blue ballpoint pens; testing was performed with black, blue, dark blue, pink, light green, green, orange, and red pens, as well as #2 pencil lead.

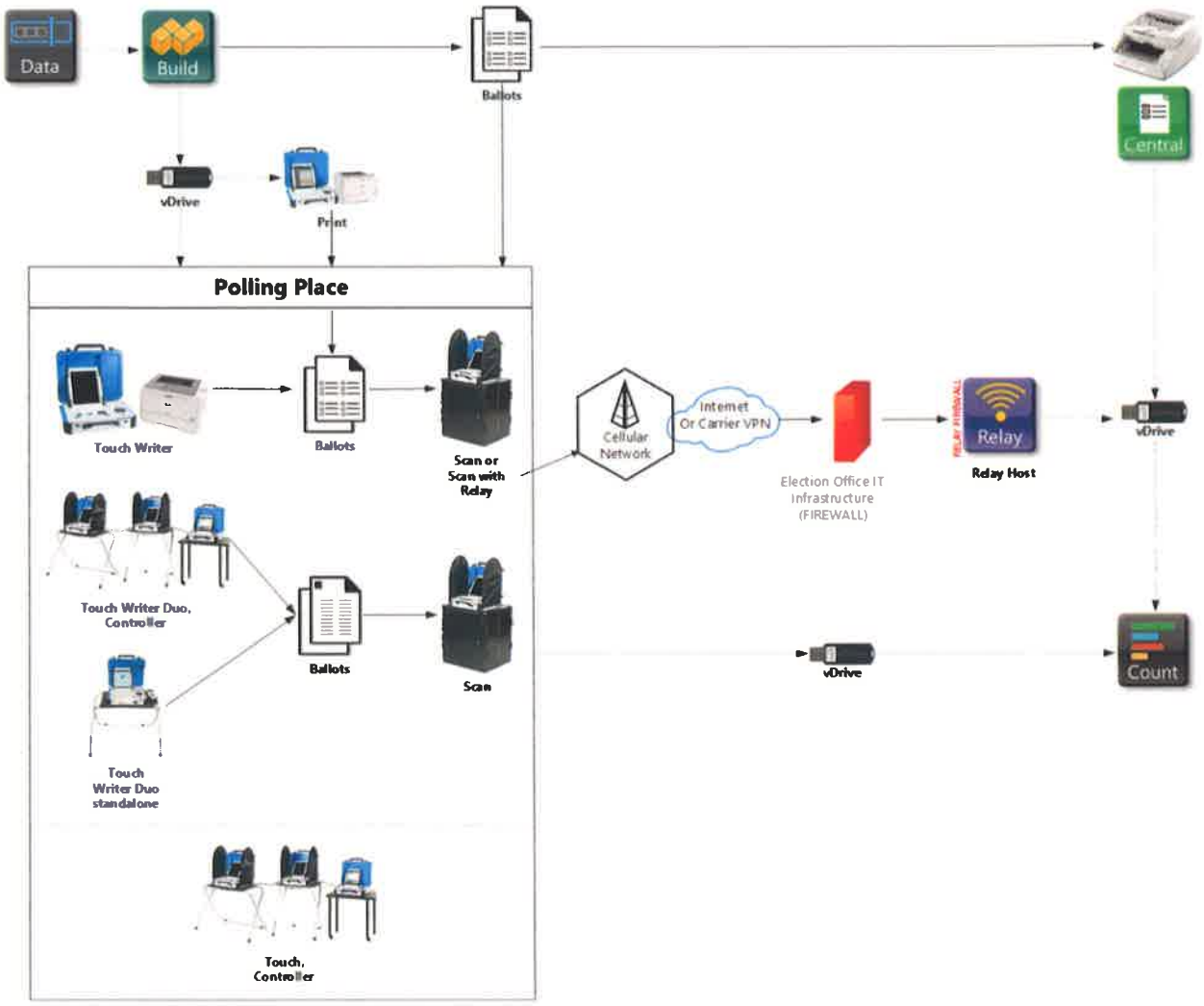
Language capability:

System supports English, Spanish, Chinese, Japanese, Korean, Khmer, Thai, Vietnamese, Tagalog, Ilocano, Haitian Creole, and Hindi.

Components Included:

This section provides information describing the components and revision level of the primary components included in this Certification.

- **System Diagram**



Proprietary Software

System Component	Software or Firmware Version	Hardware Version	Operating System or COTS	Comments
Verity Data	2.5.0			Data management software
Verity Build	2.5.0			Election definition software
Verity Central	2.5.1			High speed digital scanning software
Verity Count	2.5.0			Tabulation and reporting software
Verity Relay	2.5.0			Data transmission software (receiving station)

Verity Print	2.5.1			On-demand ballot printing device firmware
Verity Scan	2.5.1			Digital scanning device firmware
Verity Touch Writer	2.5.1			Ballot marking device
Verity Touch Writer Duo	2.5.1			Ballot marking device, with internal COTS ballot summary printer and optional audio tactile interface
Verity Touch Writer Duo Standalone	2.5.1			Ballot marking device, with internal COTS ballot summary printer and optional audio tactile interface
Verity Controller	2.5.1			Polling place management device
Verity Touch/Verity Touch with Access	2.5.1			Direct Recording Electronic (DRE) voting device. Software also supports the Verity Touch with Access devices, an Accessible DRE voting device, with audio tactile interface

COTS Software and Firmware

Description	Version
Verity Data, Build, Central, Count, Relay, Print, Scan – Paper Ballot Scanner (additional item below), Touch Writer – Electronic BMD Device, Touch Writer Duo – Electronic BMD Device, Controller, Touch – Electronic DRE Device, Touch with Access – Electronic DRE Device	
Microsoft Windows 10 Enterprise 2019 LTSC	10.0.17763
Microsoft SQL Server Standard 2017	14.0.1000.169
McAfee Application Control for Devices (McAfee Solidifier)	8.2.1-143
Verity Scan – Paper Ballot Scanner	
Nuance Western OCR, Desktop, OEM	V20

Hardware

Description	Version
Verity Print – Ballot Printer	3005356 Rev E
Verity Print – Ballot Printer	3005856 Rev B
Verity Scan – Paper Ballot Scanner	3005350 Rev I
Verity Scan – Paper Ballot Scanner	3005800 Rev B
Verity Touch Writer – Electronic BMD Device	3005352 Rev H
Verity Touch Writer – Electronic BMD Device	3005852 Rev B
Verity Touch Writer Duo – Electronic BMD Device	3005700 Rev B
Verity Touch Writer Duo Standalone – Electronic BMD Device	3005730 Rev A
Verity Controller – Networked Centralized Management Device	3005351 Rev E
Verity Controller – Networked Centralized Management Device	3005825 Rev B
Verity Touch – Electronic DRE Device	3005355 Rev E
Verity Touch – Electronic DRE Device	3005854 Rev B
Verity Touch with Access – Electronic DRE Device	3005353 Rev F
Verity Touch with Access – Electronic DRE Device	3005853 Rev B

COTS Equipment

Description	Version
Verity Data, Build	
Verity Data and Build Applications and Workstation Kit • HP Z4 G4 Workstation • HP Z230 and Z240 Workstations supported for existing customers only • Verity Data Software • Verity Build Software	A
OKI Data C831dn Color Printer for existing customers only	N35100A
OKI Data C844dn Color Printer	N35301A
OKI Data C911dn color Printer for existing customers only	N36100A
OKI Data C931e Color Printer	N36100A
OKI Data B432dn Mono Report and Ballot Printer	N22500A
OKI Data B431d Mono Report Printer for existing customers only	N22202A
8-port Ethernet Switch	1405-8GV3
Vinpower Digital USB Duplicator 7-targets	USBShark-7T-BK
Vinpower Digital USB Duplicator 23-targets	USBShark-23T-BK
Verity Central	
Verity Central Applications and Workstation Kit • HP Z4 G4 Workstation • HP Z230 and Z240 Workstations supported for existing customers only • Verity Central Software	A
Canon DR-G1100 High-Speed Scanner	M111181
Canon DR-G1130 High-Speed Scanner	M111171
Canon DR-G2110 High-Speed Scanner	6130030
Canon DR-G2140 High-Speed Scanner	6130020
OKI Data B432dn Mono Printer Report Printer	N22500A
OKI Data B431d Mono Report Printer for existing customers only	N22202A
8-port Ethernet Switch	1405-8GV3
Verity Count	
Verity Count Applications and Workstation Kit • HP Z4 G4 Workstation • HP Z230 and Z240 Workstations supported for existing customers only • Verity Count Software	A
OKI Data B432dn Mono Printer Report Printer	N22500A
OKI Data B431d Mono Report Printer for existing customers only	N22202A
HP 8-port Ethernet Switch	1405-8GV3
Verity Relay	
Verity Relay Applications and Workstation Kit • HP Z4 G4 Workstation • HP Z240 Workstation supported for existing customers only • Verity Relay Software	A
OKI Data B432dn Mono Printer Report Printer	N22500A

OKI Data B431d Mono Report Printer for existing customers only	N22202A
Verity Print	
OKI Data C831dn Color Printer for existing customers only	N35100A
OKI Data B432dn Mono Printer Report Printer	N22500A
OKI Data C844dn Color Printer	N35301A
OKI Data B431d Mono Report Printer for existing customers only	N22202A
Optional AutoBallot Barcode Scanner Kit Includes the following 2d barcode scanner: • Hart part number: 1003672 • Motorola/Zebra part number: DS4308 or DS4608	C
Verity Scan – Paper Ballot Scanner	
Verity Ballot Box	B
Optional Relay Accessory Kit (4G LTE Cat-M1) Includes the following COTS modem • Hart part number: 1005248 • MultiTech part number: MTD-MNA1-2.0	A
Verity Touch Writer – Electronic BMD Device	
OKI Data B432dn Mono Printer Report Printer	N22500A
OKI Data B431d Mono Report Printer for existing customers only	N22202A
Accessible Voting Booth	D
Optional AutoBallot Barcode Scanner Kit Includes the following 2d barcode scanner: • Hart part number: 1003672 Motorola/Zebra part number: DS4308 or DS4608	C
Headphones • Brand: V7, part number HA300-2NP or HA310-2NP	2005230
Verity Touch Writer Duo – Electronic BMD Device	
Brother PJ700 Series Thermal Printer	PJ723
Accessible Voting Booth with ATI Tray	D
Standard Voting Booth	D
Optional Detachable ATI Kit	A
Optional headphones for ATI Kit Brand: V7, part number HA300-2NP or HA310-2NP	C
Verity Controller	
Optional AutoBallot Barcode Scanner Kit Includes the following 2d barcode scanner: • Hart part number: 1003672 Motorola/Zebra part number: DS4308 or DS4608	C
Verity Touch – Electronic DRE Device	
Standard Voting Booth	D
Verity Touch with Access – Electronic DRE Device	
Accessible Voting Booth	D
Headphones Brand: V7, part number HA300-2NP	2005230

System Limitations

This table depicts the limits the system has been tested and certified to meet.

Element	Testing Limit/Requirement Z240 or Z4 G4 64GB Systems (does not include Data/Build/Count combined system)	Testing Limit/Requirement Z230 32GB Systems (includes Z240 or Z4 G4 64GB Data/Build/Count combined system)
Precincts	3,000	2,000
Splits per Precinct	20	20
Total Precincts + Splits in an election	3,000	2,000
Districts for voting devices and applications	400	75
Parties in a General Election	24	24
Parties in a Primary Election	10	10
Contests in an election	2,000	200
Choices in a single contest	300	75
Total contest choices (voting positions) in an election	5,000	600
Max length of choice name	100 characters	100 characters
Max write-in length	25 characters	25 characters
Voting Types	5	5
Max polling places per election	3,050	1,200
Max devices per election	N/A	N/A
vDrive capacity – Scan voting device	25,000 sheets per vDrive	25,000sheets per vDrive
vDrive capacity – Verity Central	80,000 sheets per vDrive	80,000 sheets per vDrive
Number of voters definable per election	2,500,000	1,000,000
Number of total ballots cast per election	1,750,000	1,000,000
Max number of sheets per ballot	4 sheets	4 sheets
Max number of sheets – Verity Scan	25,000	25,000
Max number of CVRs – Verity Count	7,000,000	7,000,000
Ballot Sizes	8.5"x11", 8.5"x14", 8.5"x17", 8.5"x20", 11"x17" (Central only)	8.5"x11", 8.5"x14", 8.5"x17", 8.5"x20", 11"x17" (Central only)
Number of languages in a single election (including English)	12	12

Functionality

2005 VVSG Supported Functionality Declaration

Feature/Characteristic	Yes/No	Comment
Voter Verified Paper Audit Trails		
VVPAT	No	
Accessibility		
Forward Approach	Yes	

Parallel (Side) Approach	Yes	
Closed Primary		
Primary: Closed	Yes	Supports standard closed primary and modified closed primary
Open Primary		
Primary: Open Standard (provide definition of how supported)	Yes	Open Primary
Primary: Open Blanket (provide definition of how supported)	Yes	General "top two"
Partisan & Non-Partisan:		
Partisan & Non-Partisan: Vote for 1 of N race	Yes	
Partisan & Non-Partisan: Multi-member ("vote for N of M") board races	Yes	
Partisan & Non-Partisan: "vote for 1" race with a single candidate and write-in voting	Yes	
Partisan & Non-Partisan "vote for 1" race with no declared candidates and write-in voting	Yes	
Write-In Voting:		
Write-in Voting: System default is a voting position identified for write-ins.	No	By default, the number of write-ins available in a contest is zero, users may increment as necessary
Write-in Voting: Without selecting a write in position.	No	
Write-in: With No Declared Candidates	Yes	
Write-in: Identification of write-ins for resolution at central count	Yes	
Primary Presidential Delegation Nominations & Slates:		
Primary Presidential Delegation Nominations: Displayed delegate slates for each presidential party	Yes	
Slate & Group Voting: one selection votes the slate.	Yes	
Ballot Rotation:		
Rotation of Names within an Office; define all supported rotation methods for location on the ballot and vote tabulation/reporting	Yes	Rotation by precinct and precinct split
Straight Party Voting:		
Straight Party: A single selection for partisan races in a general election	Yes	
Straight Party: Vote for each candidate individually	Yes	
Straight Party: Modify straight party selections with crossover votes	Yes	
Straight Party: A race without a candidate for one party	Yes	
Straight Party: "N of M race (where "N">1)	Yes	
Straight Party: Excludes a partisan contest from the straight party selection	Yes	
Cross-Party Endorsement:		
Cross party endorsements, multiple parties endorse one candidate.	Yes	

Split Precincts:		
Split Precincts: Multiple ballot styles	Yes	
Split Precincts: P & M system support splits with correct contests and ballot identification of each split	Yes	
Split Precincts: DRE matches voter to all applicable races.	Yes	
Split Precincts: Reporting of voter counts (# of voters) to the precinct split level; Reporting of vote totals is to the precinct level	Yes	
Vote N of M:		
Vote for N of M: Counts each selected candidate, if the maximum is not exceeded.	Yes	
Vote for N of M: Invalidates all candidates in an overvote (paper)	Yes	
Recall Issues, with options:		
Recall Issues with Options: Simple Yes/No with separate race/election. (Vote Yes or No Question)	Yes	
Recall Issues with Options: Retain is the first option, Replacement candidate for the second or more options (Vote 1 of M)	Yes	
Recall Issues with Options: Two contests with access to a second contest conditional upon a specific vote in contest one. (Must vote Yes to vote in 2nd contest.)	Yes	
Recall Issues with Options: Two contests with access to a second contest conditional upon any vote in contest one. (Must vote Yes to vote in 2nd contest.)	Yes	
Cumulative Voting		
Cumulative Voting: Voters are permitted to cast, as many votes as there are seats to be filled for one or more candidates. Voters are not limited to giving only one vote to a candidate. Instead, they can put multiple votes on one or more candidate.	Yes	
Ranked Order Voting		
Ranked Order Voting: Voters can write in a ranked vote.	Yes	
Ranked Order Voting: A ballot stops being counting when all ranked choices have been eliminated	N/A	Tabulation rules are unique per jurisdiction
Ranked Order Voting: A ballot with a skipped rank counts the vote for the next rank.	N/A	Tabulation rules are unique per jurisdiction
Ranked Order Voting: Voters rank candidates in a contest in order of choice. A candidate receiving a majority of the first choice votes wins. If no candidate receives a majority of first choice votes, the last place candidate is deleted, each ballot cast for the deleted candidate counts for the second choice candidate listed on the ballot. The process of eliminating the last place candidate and recounting the ballots continues until one candidate receives a majority of the vote	N/A	Tabulation rules are unique per jurisdiction
Ranked Order Voting: A ballot with two choices ranked the same, stops being counted at the point of two similarly ranked choices.	Yes	

Ranked Order Voting: The total number of votes for two or more candidates with the least votes is less than the votes of the candidate with the next highest number of votes, the candidates with the least votes are eliminated simultaneously and their votes transferred to the next-ranked continuing candidate.	N/A	Tabulation rules are unique per jurisdiction
Provisional or Challenged Ballots		
Provisional/Challenged Ballots: A voted provisional ballots is identified but not included in the tabulation, but can be added in the central count.	Yes	
Provisional/Challenged Ballots: A voted provisional ballots is included in the tabulation, but is identified and can be subtracted in the central count	Yes	
Provisional/Challenged Ballots: Provisional ballots maintain the secrecy of the ballot.	Yes	
Overvotes (must support for specific type of voting system)		
Overvotes: P & M: Overvote invalidates the vote. Define how overvotes are counted.	Yes	If the system detects more than the valid number of marks in a contest, it is counted as an overvote
Overvotes: DRE: Prevented from or requires correction of overvoting.	Yes	
Overvotes: If a system does not prevent overvotes, it must count them. Define how overvotes are counted.	Yes	If the system detects more than the valid number of marks in a contest, it is counted as an overvote
Overvotes: DRE systems that provide a method to data enter absentee votes must account for overvotes.	Yes	
Undervotes		
Undervotes: System counts undervotes cast for accounting purposes	Yes	
Blank Ballots		
Totally Blank Ballots: Any blank ballot alert is tested.	Yes	
Totally Blank Ballots: If blank ballots are not immediately processed, there must be a provision to recognize and accept them	Yes	
Totally Blank Ballots: If operators can access a blank ballot, there must be a provision for resolution.	Yes	
Networking		
Wide Area Network – Use of Modems	Yes	With optional Verity Relay
Wide Area Network – Use of Wireless	Yes	With optional Verity Relay
Local Area Network – Use of TCP/IP	Yes	

Local Area Network – Use of Infrared	No	
Local Area Network – Use of Wireless	No	
FIPS 140-2 validated cryptographic module	Yes	
Used as (if applicable):		
Precinct counting device	Yes	
Central counting device	Yes	

Verity Voting 2.5
Change Notes

CONFIDENTIAL AND PROPRIETARY

Hart InterCivic	
Document Number: 4005669	Revision: A.01
Document Title: Verity Voting 2.5 Change Notes	
PDF File Name: Verity Voting 2.5 Change Notes 4005669 A01.pdf	Page 1 of 12

Change History

Version	Date	Author(s)	Description
A.00	05/08/2020	Hart InterCivic	Initial Draft
A.01	05/29/2020	Hart InterCivic	Add to section 3.3.6: Increase ballot limit on Verity Scan vDrive. Remove from section 3.4.1: UEFI Secure Boot on Workstations Added additional documentation changes Add to section 3.4.5: Add keyboard shortcuts for Central
A.02	07/08/2020	Hart InterCivic	Release A.01 did not remove from section 3.4.1: UEFI Secure Boot on Workstations from the body of the document as stated in the Change History. It is now removed.

TABLE OF CONTENTS

List of Figures

1 INTRODUCTION

1.1 Document Purpose

This document provides a description of the features included in Verity Voting Version 2.5. This document also identifies any features found in previous EAC-certified releases that are not included in Version 2.5.

2 BRIEF DESCRIPTION

2.1 Verity Voting 2.5 Abstract

Verity Voting 2.5 is a modification of the EAC-certified Verity Voting 2.4 and includes all features and functionality included in certified system Verity Voting 2.4, unless otherwise noted in this document. Verity Voting 2.5 introduces Windows 10 on all devices and workstations, further enhances security, adds Haitian Creole, allows Verity Touch Writer Duo to function as a Standalone device without the use of Verity Controller, and other changes fully described in Section 3.

All software components will be built at version 2.5.0 during the initial Trusted Build. Any subsequent Trusted Builds of any or all software components during the certification campaign will result in an increment of the 3rd integer of each individual software component version number shown here as "X": 2.5.X.

Verity Voting 2.5 is submitted to the EAC for compliance to the EAC's *Voluntary Voting System Guidelines* v. 1.0 (2005).

Verity Voting components and features not addressed in the following Change Notes are unchanged from the prior versions.

2.1.1 Verity Voting 2.5 Configuration

Verity Voting 2.5 is a voting system that supports paper–based, DRE, and by-mail voting. Different configurations are available depending on the size of polling places, the expected number of voters, and other polling place needs.

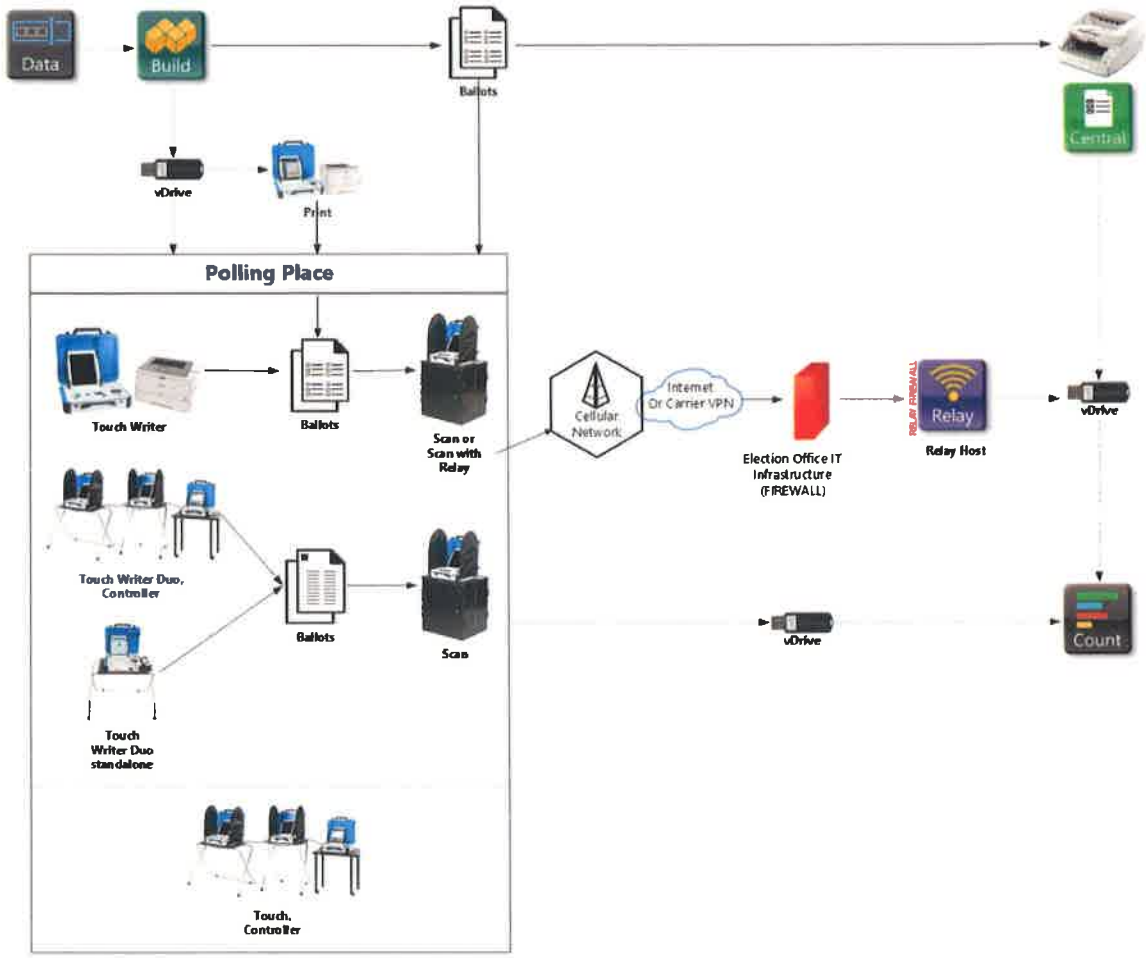


Figure 1 – Verity Voting 2.5 System Abstract Diagram

Overview of the diagram:

- The components are displayed as touch points of data access, transfers, and verification.
- Dotted lines show the flow of data and air gaps using vDrives and are also used to separate the deployment models shown within the polling place.
- Verity Print is a ballot production device that provides unmarked printed ballots.
- Verity Touch Writer and Scan may be installed in polling places to support paper-based voting.
- Verity Controller, Touch Writer Duo, Touch Writer Duo Standalone, and Scan may be installed in polling places to support paper-based voting.
- Verity Controller and Touch may be installed in polling places to support DRE voting.
- Verity Key (not shown) is required for user access into components to load elections, to use critical features, and to generate reports. Feature access depends on the roles applied to user accounts.

The following sections describe features added to Verity Voting 2.5. Features added have been tested and verified by the Hart QA team in accordance with the Software Verification and Validation Process, document 1000560, and are maintained in accordance with Hart's Record Retention Matrix, 1000510.

3 FEATURE ENHANCEMENTS TO VERITY VOTING

3.1 Features for all devices and workstations

- Windows Embedded Standard 7 OS is replaced with Windows 10 Enterprise 2019 LTSC
- Support for Haitian Creole language
- Security enhancement: vDrive file and folder names and paths are added to the signed and validated content.

3.2 Wisconsin Specific Features

- Support for Open Primary logic for the state of Wisconsin. Logic is a combination of Hart's current open primary logic with the addition of a party selector contest.

3.3 Additional Features for Verity Devices

3.3.1 Features for all devices

- A user may now create a recovery vDrive and export temporary logs (these are logs when a vDrive for the currently loaded election is not present) to a USB stick during a system alert.
- Backup data may now be deleted.
- SQL Server 2012 is replaced with SQLite 3.29.

3.3.2 Features for devices with thermal report printers

- Device Tests menu function to send a test page to the thermal roll printer is renamed "Test report printer."

3.3.3 Features for devices that allow poll workers to activate a ballot

- If only one precinct-split will appear on the Select Precinct screen, the system shall automatically select it and not present the Select Precinct screen.
- If only one party will appear on the Select Party screen, the system shall automatically select it and not present the Select Party screen.

3.3.4 Features for devices with ballot entry and review

- New option to require voters to view all contests on the ballot before finishing their voting session. This option is set in Verity Build.

3.3.5 Features for Touch Writer Duo

- Introduction of Standalone configuration that does not require the use of a Verity Controller. The Touch Writer Duo Standalone configuration is akin to the Touch Writer device and includes a thermal report printer and support for the optional AutoBallot barcode scanner.
- New Verity Duo Go, a carrier for use with Verity Touch Writer Duo to enable "curbside" voting.
- Device Tests menu function to send a test page to the full sheet thermal printer is renamed "Test vote record printer."

3.3.6 Features for Verity Scan

- Scan devices that support PVR scanning now also support standard paper ballot scanning in the same session.
- New option for an automatic duplicate vDrive when two vDrives are inserted. This option is set in Verity Build.
- 3G modem support for use with the Relay kit is removed.

- Increase single sheet ballot limit per vDrive to 25,000 to support long early voting events. The Ballot Box limit is unchanged and must be emptied every 4000 sheets.

3.4 Additional Features for Verity Workstations

3.4.1 Features for all workstations

- SQL Server 2012 is replaced with SQL Server 2017.
- Security enhancement: TPM 2.0 support implemented on Z240 and Z4 G4 workstations.

3.4.2 Features for Workstations with ballot proofing

- New report, Translation Proofing Report, added to Verity Data and Verity Build.

3.4.3 Features for Verity Data

- A Party Selector Contest may now be added in an Open Primary election.
- Keyboard shortcut keys added for usability and convenience:
  - Select Election screen
    - Alt+O for "Open"
  - Contest Titles screen
    - Alt+O for "Add Office"
    - Alt+P for "Add Proposition"
    - Alt+R for "Add Party Selector"
  - Choices screen
    - Alt+A for "Add Choice"
    - Alt+D for "Delete Choice"
  - Rotation
    - Alt+G for "Generate Indices"
  - Audio screen
    - Alt+I for "Import"
    - Alt+E for "Export"
    - Alt+N for "Normalize"
    - Alt+A for "Normalize All"
    - Alt+C for "Clear Entry"
  - Import screen
    - Alt+I for "Import"
  - Export screen
    - Alt+E for "Export"

3.4.4 Features for Verity Build

- The following feature enhancements to devices discussed above are settable in Verity Build:
  - New option to require voters to view all contests on the ballot before finishing their voting session.
  - New option for automatic duplicate vDrive creation in Verity Scan.
- Print Queue import now allows write-in text to be defined for each write-in available on the ballot.

3.4.5 Features for Verity Central

- Support for the scanning of Printed Vote Records. The default Voting Method is set in the election's task.
  - Select Election tab
    - Alt+S for "Save" in the preferences menu
  - Scan tab
    - Enter for "Scan" in the Scan menu

        - Alt+R for "Batch Report" in the Manage Batches menu
        - Alt+T for "Change Type" in the Manage Batches menu
        - Alt+N for "Edit Notes" in the Manage Batches menu
        - Alt+D for "Delete Batch" in the Manage Batches menu
        - Enter for "Search" in the Search Ballots menu
        - Alt+S for "Save" in the Settings menu
        - Alt+T for "Test Scan" in the Settings menu
    - Review Tab
        - Alt+A for "Add Choice" in the Review images menu
        - Alt+C for "Clear Filters" in the Review images menu
        - Alt+R for "Refresh List" in the Review images menu
        - Alt+P for "Print List" in the Review images menu
        - Alt+A for "Accept" in the Review Images menu (Ballot Review)
        - Alt+R for "Revert" in the Review Images menu (Ballot Review)
        - Alt+P for "Previous" in the Review Images menu (Ballot Review)
        - Alt+N for "Next" in the Review Images menu (Ballot Review)
        - Alt+Left Arrow for "Previous Unresolved" in the Review Images menu (Ballot Review)
        - Alt+Right Arrow for "Next Unresolved" in the Review Images menu (Ballot Review)
        - ESC for "Return to Page View" in the Review Images menu (Ballot Review)

3.5 Corrected Defects

The following defects found in Verity 2.4 have been corrected in the Verity Voting 2.5 modification

Product	Description of Verity Voting 2.4 Defect	Resolution/Results in Verity Voting 2.5
Verity Count	Application does not save the update a write-in name on the Write-in Candidate screen UI if the change made is *only* to the case of the alphabet (i.e. uppercase, lowercase).	Corrected. Name change is now saved, even when the change is only to case of the alphabet.

3.6 Verification

Features shown in Section 3 have been tested and verified by the Hart QA team in accordance with the Software Verification and Validation Process, document 1000560, and are maintained in accordance with Hart's Record Retention Matrix, 1000510. Records of test results are given in the file HPQC Test Cases.pdf provided in the Verity 2.5 TDP.

4 DOCUMENTATION CHANGES OVERVIEW

Several documents have been replaced and/or revised for the features in Verity Voting 2.5.

4.1 Additional TDP Documents

The following documents are additions to the Verity 2.5 TDP that are not intended to replace existing documentation found the Verity 2.4 TDP package. To see documents that are modified, deleted, or replaced, see section 4.2.

- Verity Voting 2.5 Change Notes 4005669
- Verity Redstone (Verity 2.5) Modification TRD
- Hardware Design file for Touch Writer Duo Standalone
- Hardware Design file for Duo Go Curbside Carrier
- HP Z4 G4 Workstation Manufacturing Document
- Polling Place Field Guide for Touch Writer Duo Standalone and Scan

4.2 Removed TDP Documents

The Logging Design document was removed, as its requirements were satisfied by the included Verity Logging TRD.

The System Limits document was removed, as it is redundant with Verity 2.5 System Administrators Guide Appendix C: Verity System limits & Access.

4.3 Documentation Modified or Replaced in Verity Voting 2.5

The following documents have been Removed, replaced, or modified in the Verity Voting 2.5 TDP:

Device OS Creation and Configuration Process Document Verity 2.4	Replaced with Device OS Creation and Configuration Process Document Verity 2.5.
Device WES7 Image Creation Process Document	Update for Windows 10
Workstation WES7 Image Creation Process Document	Update for Windows 10
The Creation and configuration of the Trusted Build Environment	Update for Verity 2.5
HPQC Test Cases	Updated for additional test cases for the Verity 2.5 modification. Use bookmarks to browse.
Verity 2.4 Implementation Statement	Replaced by the Verity 2.5 Implementation Statement
Verity 2.4 TDP Abstract	Replaced with Verity 2.5 TDP Abstract
Verity 2.4 VVSG 1.0 TDP Trace	Replaced with Verity 2.5 VVSG 1.0 TDP Trace
Index	Updated for all document changes for system Verity Voting 2.5.
Verity 2.4.X COTS List	Replaced with Verity 2.5.X COTS list
Verity Application Installer Build Process Document Verity 2.4.2	Replaced with Verity Application Installer Build Process Document Verity 2.5.0
Verity Entity Relationship Diagram Database - Devices	Update for all database modifications in Verity Voting 2.5 (throughout).
Verity Entity Relationship Diagram Database - Servers (Count Only)	Update for all database modifications in Verity Voting 2.5 (throughout).
Verity Database Attributes	Update for all database modifications in Verity Voting 2.5 (throughout).
Verity Electronics Specification	Updates throughout to add Verity Touch Writer Duo Standalone configuration.
Verity Operational Environment	Update for Verity 2.5 suite of products and version numbers. Includes updates for Windows 10.
Verity Voting 2.4 Usability Impact Statement	Replaced with Verity Voting 2.5 Usability Impact Statement
Verity Voting National Certification Test Specification	Updated for Verity Voting 2.5
Verity Workstation Manufacturing	Added additional detail and notes throughout after internal review. Split into three documents, one for each Hewlett-Packard workstation model for clarity. Update for changes with Windows 10.

Document Control Procedures	Updated to reference Hart's implementation of Propel Product Life Cycle Management Software.
Software Versioning Procedure	Corrections for consistency and wording throughout.
Verity 2.4 Administrator's Guide: Data	User documentation revised throughout for Verity Voting 2.5
Verity 2.4 Administrator's Guide: Build	User documentation revised throughout for Verity Voting 2.5
Verity 2.4 Administrator's Guide: Count	User documentation revised throughout for Verity Voting 2.5
Verity 2.4Administrator's Guide: Central	User documentation revised throughout for Verity Voting 2.5
Verity 2.4 System Administrator's Guide	User documentation revised throughout for Verity Voting 2.5
Verity 2.4 Support Procedures Guide	User documentation revised throughout for Verity Voting 2.5
Verity 2.4 Device Troubleshooting Field Guide	User documentation revised throughout for Verity Voting 2.5
Verity 2.4 Polling Place Field Guide: Controller, Duo, Scan	User documentation revised throughout for Verity Voting 2.5
Verity 2.4 Polling Place Field Guide: Controller, Touch	User documentation revised throughout for Verity Voting 2.5
Verity 2.4 Polling Place Field Guide: Scan, Touch Writer	User documentation revised throughout for Verity Voting 2.5.
Verity 2.4 Polling Place Field Guide: Scan, Touch Writer (when used with Relay)	User documentation revised throughout for Verity Voting 2.5.
2.4 Verity Scan Field Guide: for Centralized Ballot Processing	User documentation revised throughout for Verity Voting 2.5.
Verity 2.4 Print Field Guide	User documentation revised throughout for Verity Voting 2.5
Workstation Configuration Process Document Verity 2.4	Updated throughout for Verity Voting 2.5
Verity Relay Implementation Process	Remove 3G modems
Verity Relay Theory of Operations	Remove 3G modems

U. S. ELECTION ASSISTANCE COMMISSION
VOTING SYSTEM TESTING AND CERTIFICATION PROGRAM
1335 East West Highway, Suite 4300
Silver Spring, MD 20910

August 28, 2020 **Sent via e-mail**

Pam Geppert, Director of Certification & Proposals
Hart InterCivic
15500 Wells Port Drive
Austin, TX 78728

Re: Initial Decision on Certification – Verity Voting 2.5

Dear Ms. Geppert,

This correspondence is to inform you that the Hart InterCivic Verity Voting 2.5 voting system completed the initial step towards receipt of an EAC certification. This Initial Decision on Certification represents an EAC acknowledgement that Verity Voting 2.5 has successfully completed conformance testing to the *Voluntary Voting System Guidelines version 1.0*.

However, as provided in §5.9 of the EAC's *Voting System Testing and Certification Program Manual* (Certification Manual), for an Initial Decision to become final and to issue a certification number and a Certificate of Conformance, a manufacturer must provide documentation to the Program Director verifying that the trusted build has been performed, software has been deposited in an approved repository, and system identification tools are available to election officials. A manufacturer must submit a letter, signed by both its management representative and an SLI Compliance official, stating (under penalty of law) that it has:

1. Performed a trusted build consistent with the requirements of §5.6 of the EAC's Certification Manual;
2. Deposited software consistent with §5.7 of the EAC's Certification Manual;
3. Created and made available system identification tools consistent with §5.8 of the EAC's Certification Manual (a copy and description of the system identification tool developed must be provided with the letter); and
4. Upon a final decision to grant certification, the manufacturer accepts the certification and all conditions placed on the certification.

Upon receipt of documentation demonstrating the successful completion of the requirements above and recommendation of the Program Director, I will issue an Agency Decision granting certification and provide Verity Voting 2.5 with a certification number and Certificate of Conformance.

If you have any questions or need further information, please do not hesitate to contact Jerome Lovato at your earliest convenience. I thank you in advance for your time and attention to this matter.

Sincerely,

Mona Harrington

Mona Harrington
Executive Director
Decision Authority

Cc: Jerome Lovato, EAC
Traci Mapps, SLI Compliance
Jonathon Panek, SLI Compliance

United States Election Assistance Commission

Certificate of Conformance

Hart Verity Voting 2.5

VVSG 2005 VER. I

EAC

CERTIFIED

The voting system identified on this certificate has been evaluated at an accredited voting system testing laboratory for conformance to the *Voluntary Voting System Guidelines Version 1.0 (VVSG 1.0)*. Components evaluated for this certification are detailed in the attached Scope of Certification document. This certificate applies only to the specific version and release of the product in its evaluated configuration. The evaluation has been verified by the EAC in accordance with the provisions of the EAC *Voting System Testing and Certification Program Manual* and the conclusions of the testing laboratory in the test report are consistent with the evidence adduced. This certificate is not an endorsement of the product by any agency of the U.S. Government and no warranty of the product is either expressed or implied.

Product Name: Verity Voting

Model or Version: 2.5

Name of VSTL: SLI Compliance

EAC Certification Number: HRT-VERITY-2.5

Date Issued: September 9, 2020

Mona Harrington

Executive Director

Scope of Certification Attached

Manufacturer:	*Hart InterCivic*	**Laboratory:**	*SLI Compliance*
System Name:	*Verity Voting 2.5*	**Standard:**	*2005 VVSG*
Certificate:	*HRT-Verity-2.5*	**Date:**	*9/3/2020*

Scope of Certification

This document describes the scope of the validation and certification of the system defined above. Any use, configuration changes, revision changes, additions or subtractions from the described system are not included in this evaluation.

Significance of EAC Certification

An EAC certification is an official recognition that a voting system (in a specific configuration or configurations) has been tested to and has met an identified set of Federal voting system standards. An EAC certification is **not**:

- An endorsement of a Manufacturer, voting system, or any of the system's components.
- A Federal warranty of the voting system or any of its components.
- A determination that a voting system, when fielded, will be operated in a manner that meets all HAVA requirements.
- A substitute for State or local certification and testing.
- A determination that the system is ready for use in an election.
- A determination that any particular component of a certified system is itself certified for use outside the certified configuration.

Representation of EAC Certification

Manufacturers may not represent or imply that a voting system is certified unless it has received a Certificate of Conformance for that system. Statements regarding EAC certification in brochures, on Web sites, on displays, and in advertising/sales literature must be made solely in reference to specific systems. Any action by a Manufacturer to suggest EAC endorsement of its product or organization is strictly prohibited and may result in a Manufacturer's suspension or other action pursuant to Federal civil and criminal law.

System Overview:

The **Verity Voting 2.5** system represents a set of software applications for pre-voting, voting and post-voting election project activities for jurisdictions of various sizes and political division complexities.

- **Verity Voting 2.5** functions include: Defining the political divisions of the jurisdiction and organizing the election with its hierarchical structure, attributes and associations.
- Defining the election events with their attributes such as the election name, date and type, as well as contests, candidates, referendum questions, voting locations and their attributes.

- Preparing and producing ballots for polling place and absentee voting or by mail voting.
- Preparing media for precinct voting devices and central count devices.
- Configuring and programming the **Verity Scan** digital scanners for marked paper ballots and **Verity Touch Writer** printed vote records.
- Configuring and programming the **Verity Touch Writer** BMD devices.
- Configuring and programming the **Verity Controller** with **Verity Touch Writer Duo** BMD devices.
- Configuring and programming the **Verity Controller** with **Verity Touch** and **Verity Touch with Access** DRE devices.
- Configuring and programming the **Verity Touch Writer Duo Standalone** BMD devices.
- Configuring and programming the **Verity Print** on-demand ballot production device.
- Transmission of the election results via **Verity Relay**.
- Producing the election definition and auditing reports.
- Providing administrative management functions for user, database, networking and system management.
- Import of the Cast Vote Records from **Verity Scan** devices and **Verity Central**.
- Preview and validation of the election results.
- Producing election results tally according to voting variations and election system rules.
- Producing a variety of reports of the election results in the desired format.
- Publishing of the official election results. Auditing of election results including ballot images and log files.

Verity Scan is a digital scanning device (tabulator) that is used in conjunction with an external ballot box. The unit is designed to scan marked paper ballots or Verity Touch Writer Duo printed vote records, interpret and record voter marks on the marked paper ballot or record voter selections on the printed vote records, and deposit into the secure ballot box.

Verity Touch Writer is a standalone Ballot Marking Device (BMD) which also includes an Audio Tactile Interface (ATI). Touch Writer allows voters who cannot hand-mark a paper ballot to generate a machine-readable and human readable paper ballot, based on vote selections made through the accessible electronic interface.

The **Verity Touch Writer Duo** is a daisy chained configuration of a **Verity Controller** device configured with up to twelve **Verity Touch Writer Duo** BMD devices, which allows voters to utilize the touchscreen or optional Audio Tactile Interface to generate a machine-readable and human readable printed vote record, based on vote selections made.

The **Verity Touch Writer Duo Standalone** is a standalone Ballot Marking Device (BMD) which allows voters to utilize the touchscreen or optional Audio Tactile Interface to generate a machine-readable and human readable printed vote record, based on vote selections made.

The **Verity Touch** is a Direct Recording Electronic (DRE) device chained configuration of a **Verity Controller** device configured with up to twelve **Verity Touch or Touch with Access** devices, which allow voters to cast their vote electronically via a touchscreen.

The **Verity Touch with Access** is a DRE device chained configuration of a **Verity Controller** device configured with up to twelve **Verity Touch** or **Touch with Access** devices, which allow voters to cast their vote electronically via a touchscreen or Audio Tactile Interface (ATI).

Verity Print is an on-demand ballot production device for unmarked paper ballots.

Verity Election Management allows users with the Administrator role to import and manage election definitions. Imported election definitions are available through the Elections chevron in Build. Users can also delete, archive, and manage the election definitions.

Verity User Management enables users with the correct role and permissions to create and manage user accounts within the **Verity Voting** system for the local workstation in a standalone configuration, or for the network in a networked configuration.

Verity Desktop enables users, with the correct roles, to set the workstations' date and time, gather **Verity** application hash codes (in order to validate the correctness of the installed applications), and access to the Windows desktop.

Verity Data provides the user with controls for entering and proofing data and audio. **Verity Data** also performs validation on the exported information to ensure that it is ready for use in **Verity Build**.

Verity Build opens the election to proof data, view reports, and print ballots, and allows for configuring and programming the **Verity Scan** digital scanners, **Verity Touch Writer** BMD, **Verity Controller/Touch Writer Duo** BMD devices, **Verity Print**, and **Verity Controller/Touch** series DRE devices, as well as producing the election definition and auditing reports.

Verity Central is a high-speed, central digital ballot scanning system used for high-volume processing of ballots (such as vote by mail). Verity Central is based on COTS scanning hardware coupled with custom **Hart**-developed ballot processing application software which resides on an attached workstation.

Verity Count is an application that tabulates election results and generates reports. **Verity Count** can be used to collect and store all election logs from every **Verity** component/device used in the election, allowing for complete election audit log reviews.

Verity Relay provides remote transmission capability to the **Verity Voting 2.5** system. Utilizing an optional modem with **Verity Scan**, at close of polls, results are transmitted from the polling place device to the **Verity Relay** workstation.

Verity AutoBallot is an optional barcode scanner kit for **Verity Controller, Verity Print,** and **Verity Touch Writer** that allows air-gapped integration between an e-pollbook check-in process and the task of selecting the ballot style for the voting system.

Certified System before Modification (If applicable):

Verity Voting 2.4

Anomalies and/or Additions addressed in Verity Voting 2. 5:

- See Certification Test Report, pages 24-27 for detailed changes.

Mark definition:

System supports marks that cover a minimum of 4% of the rectangular marking area.

Tested Marking Devices:

System supports Black and Blue ballpoint pens; testing was performed with black, blue, dark blue, pink, light green, green, orange, and red pens, as well as #2 pencil lead.

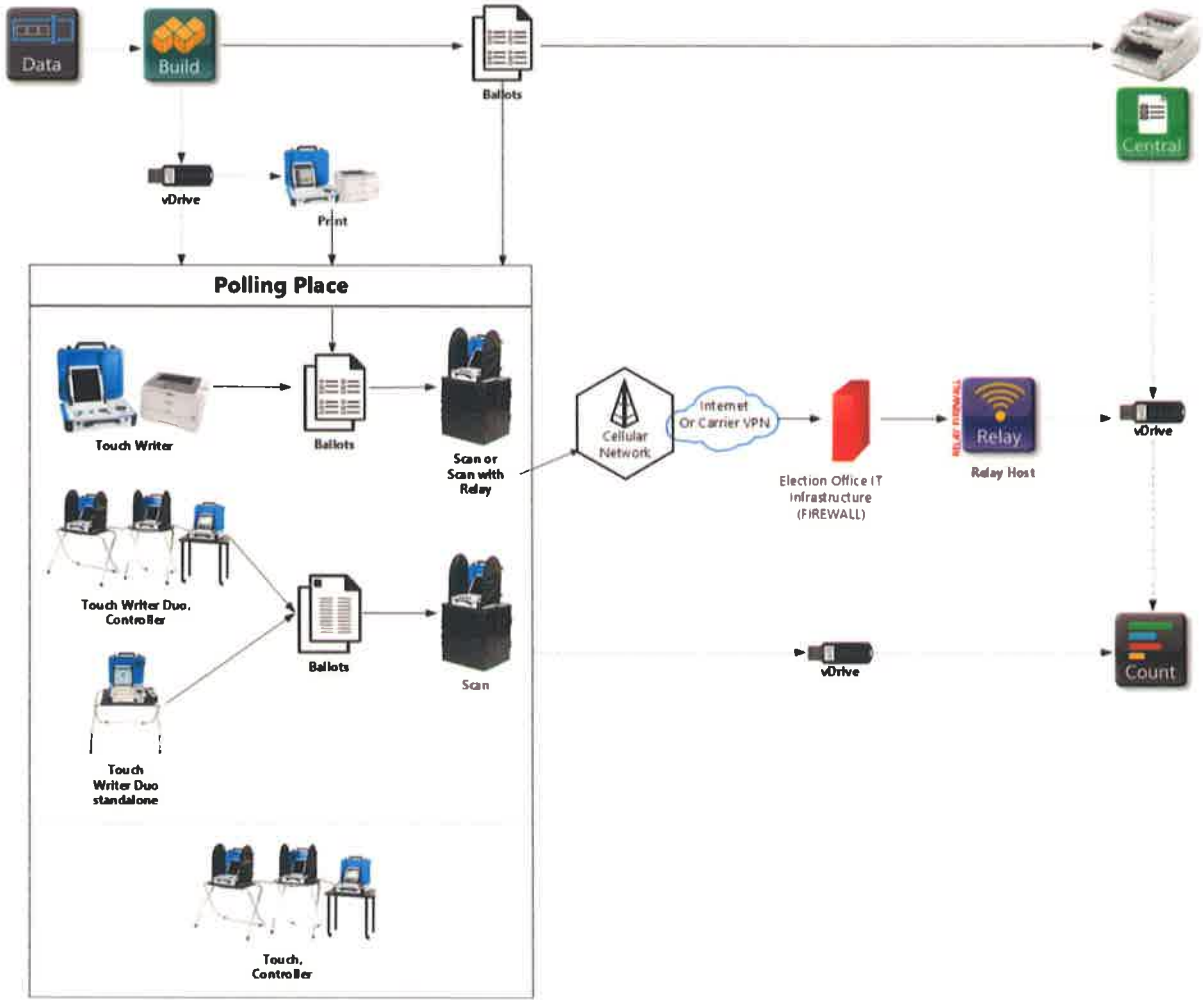
Language capability:

System supports English, Spanish, Chinese, Japanese, Korean, Khmer, Thai, Vietnamese, Tagalog, Ilocano, Haitian Creole, and Hindi.

Components Included:

This section provides information describing the components and revision level of the primary components included in this Certification.

- **System Diagram**



Proprietary Software

System Component	Software or Firmware Version	Hardware Version	Operating System or COTS	Comments
Verity Data	2.5.0			Data management software
Verity Build	2.5.0			Election definition software
Verity Central	2.5.1			High speed digital scanning software
Verity Count	2.5.0			Tabulation and reporting software
Verity Relay	2.5.0			Data transmission software (receiving station)

Verity Print	2.5.1			On-demand ballot printing device firmware
Verity Scan	2.5.1			Digital scanning device firmware
Verity Touch Writer	2.5.1			Ballot marking device
Verity Touch Writer Duo	2.5.1			Ballot marking device, with internal COTS ballot summary printer and optional audio tactile interface
Verity Touch Writer Duo Standalone	2.5.1			Ballot marking device, with internal COTS ballot summary printer and optional audio tactile interface
Verity Controller	2.5.1			Polling place management device
Verity Touch/Verity Touch with Access	2.5.1			Direct Recording Electronic (DRE) voting device. Software also supports the Verity Touch with Access devices, an Accessible DRE voting device, with audio tactile interface

COTS Software and Firmware

Description	Version
Verity Data, Build, Central, Count, Relay, Print, Scan – Paper Ballot Scanner (additional item below), Touch Writer – Electronic BMD Device, Touch Writer Duo – Electronic BMD Device, Controller, Touch – Electronic DRE Device, Touch with Access – Electronic DRE Device	
Microsoft Windows 10 Enterprise 2019 LTSC	10.0.17763
Microsoft SQL Server Standard 2017	14.0.1000.169
McAfee Application Control for Devices (McAfee Solidifier)	8.2.1-143
Verity Scan – Paper Ballot Scanner	
Nuance Western OCR, Desktop, OEM	V20

Hardware

Description	Version
Verity Print – Ballot Printer	3005356 Rev E
Verity Print – Ballot Printer	3005856 Rev B
Verity Scan – Paper Ballot Scanner	3005350 Rev I
Verity Scan – Paper Ballot Scanner	3005800 Rev B
Verity Touch Writer – Electronic BMD Device	3005352 Rev H
Verity Touch Writer – Electronic BMD Device	3005852 Rev B
Verity Touch Writer Duo – Electronic BMD Device	3005700 Rev B
Verity Touch Writer Duo Standalone – Electronic BMD Device	3005730 Rev A
Verity Controller – Networked Centralized Management Device	3005351 Rev E
Verity Controller – Networked Centralized Management Device	3005825 Rev B
Verity Touch – Electronic DRE Device	3005355 Rev E
Verity Touch – Electronic DRE Device	3005854 Rev B
Verity Touch with Access – Electronic DRE Device	3005353 Rev F
Verity Touch with Access – Electronic DRE Device	3005853 Rev B

COTS Equipment

Description	Version
Verity Data, Build	
Verity Data and Build Applications and Workstation Kit • HP Z4 G4 Workstation • HP Z230 and Z240 Workstations supported for existing customers only • Verity Data Software • Verity Build Software	A
OKI Data C831dn Color Printer for existing customers only	N35100A
OKI Data C844dn Color Printer	N35301A
OKI Data C911dn color Printer for existing customers only	N36100A
OKI Data C931e Color Printer	N36100A
OKI Data B432dn Mono Report and Ballot Printer	N22500A
OKI Data B431d Mono Report Printer for existing customers only	N22202A
8-port Ethernet Switch	1405-8GV3
Vinpower Digital USB Duplicator 7-targets	USBShark-7T-BK
Vinpower Digital USB Duplicator 23-targets	USBShark-23T-BK
Verity Central	
Verity Central Applications and Workstation Kit • HP Z4 G4 Workstation • HP Z230 and Z240 Workstations supported for existing customers only • Verity Central Software	A
Canon DR-G1100 High-Speed Scanner	M111181
Canon DR-G1130 High-Speed Scanner	M111171
Canon DR-G2110 High-Speed Scanner	6130030
Canon DR-G2140 High-Speed Scanner	6130020
OKI Data B432dn Mono Printer Report Printer	N22500A
OKI Data B431d Mono Report Printer for existing customers only	N22202A
8-port Ethernet Switch	1405-8GV3
Verity Count	
Verity Count Applications and Workstation Kit • HP Z4 G4 Workstation • HP Z230 and Z240 Workstations supported for existing customers only • Verity Count Software	A
OKI Data B432dn Mono Printer Report Printer	N22500A
OKI Data B431d Mono Report Printer for existing customers only	N22202A
HP 8-port Ethernet Switch	1405-8GV3
Verity Relay	
Verity Relay Applications and Workstation Kit • HP Z4 G4 Workstation • HP Z240 Workstation supported for existing customers only • Verity Relay Software	A
OKI Data B432dn Mono Printer Report Printer	N22500A

OKI Data B431d Mono Report Printer for existing customers only	N22202A
Verity Print	
OKI Data C831dn Color Printer for existing customers only	N35100A
OKI Data B432dn Mono Printer Report Printer	N22500A
OKI Data C844dn Color Printer	N35301A
OKI Data B431d Mono Report Printer for existing customers only	N22202A
Optional AutoBallot Barcode Scanner Kit Includes the following 2d barcode scanner: • Hart part number: 1003672 • Motorola/Zebra part number: DS4308 or DS4608	C
Verity Scan – Paper Ballot Scanner	
Verity Ballot Box	B
Optional Relay Accessory Kit (4G LTE Cat-M1) Includes the following COTS modem • Hart part number: 1005248 • MultiTech part number: MTD-MNA1-2.0	A
Verity Touch Writer – Electronic BMD Device	
OKI Data B432dn Mono Printer Report Printer	N22500A
OKI Data B431d Mono Report Printer for existing customers only	N22202A
Accessible Voting Booth	D
Optional AutoBallot Barcode Scanner Kit Includes the following 2d barcode scanner: • Hart part number: 1003672 Motorola/Zebra part number: DS4308 or DS4608	C
Headphones • Brand: V7, part number HA300-2NP or HA310-2NP	2005230
Verity Touch Writer Duo – Electronic BMD Device	
Brother PJ700 Series Thermal Printer	PJ723
Accessible Voting Booth with ATI Tray	D
Standard Voting Booth	D
Optional Detachable ATI Kit	A
Optional headphones for ATI Kit Brand: V7, part number HA300-2NP or HA310-2NP	C
Verity Controller	
Optional AutoBallot Barcode Scanner Kit Includes the following 2d barcode scanner: • Hart part number: 1003672 Motorola/Zebra part number: DS4308 or DS4608	C
Verity Touch – Electronic DRE Device	
Standard Voting Booth	D
Verity Touch with Access – Electronic DRE Device	
Accessible Voting Booth	D
Headphones Brand: V7, part number HA300-2NP	2005230

System Limitations

This table depicts the limits the system has been tested and certified to meet.

Element	Testing Limit/Requirement Z240 or Z4 G4 64GB Systems (does not include Data/Build/Count combined system)	Testing Limit/Requirement Z230 32GB Systems (includes Z240 or Z4 G4 64GB Data/Build/Count combined system)
Precincts	3,000	2,000
Splits per Precinct	20	20
Total Precincts + Splits in an election	3,000	2,000
Districts for voting devices and applications	400	75
Parties in a General Election	24	24
Parties in a Primary Election	10	10
Contests in an election	2,000	200
Choices in a single contest	300	75
Total contest choices (voting positions) in an election	5,000	600
Max length of choice name	100 characters	100 characters
Max write-in length	25 characters	25 characters
Voting Types	5	5
Max polling places per election	3,050	1,200
Max devices per election	N/A	N/A
vDrive capacity – Scan voting device	25,000 sheets per vDrive	25,000sheets per vDrive
vDrive capacity – Verity Central	80,000 sheets per vDrive	80,000 sheets per vDrive
Number of voters definable per election	2,500,000	1,000,000
Number of total ballots cast per election	1,750,000	1,000,000
Max number of sheets per ballot	4 sheets	4 sheets
Max number of sheets – Verity Scan	25,000	25,000
Max number of CVRs – Verity Count	7,000,000	7,000,000
Ballot Sizes	8.5"x11", 8.5"x14", 8.5"x17", 8.5"x20", 11"x17" (Central only)	8.5"x11", 8.5"x14", 8.5"x17", 8.5"x20", 11"x17" (Central only)
Number of languages in a single election (including English)	12	12

Functionality

2005 VVSG Supported Functionality Declaration

Feature/Characteristic	Yes/No	Comment
Voter Verified Paper Audit Trails		
VVPAT	No	
Accessibility		
Forward Approach	Yes	

Parallel (Side) Approach	Yes	
Closed Primary		
Primary: Closed	Yes	Supports standard closed primary and modified closed primary
Open Primary		
Primary: Open Standard (provide definition of how supported)	Yes	Open Primary
Primary: Open Blanket (provide definition of how supported)	Yes	General "top two"
Partisan & Non-Partisan:		
Partisan & Non-Partisan: Vote for 1 of N race	Yes	
Partisan & Non-Partisan: Multi-member ("vote for N of M") board races	Yes	
Partisan & Non-Partisan: "vote for 1" race with a single candidate and write-in voting	Yes	
Partisan & Non-Partisan "vote for 1" race with no declared candidates and write-in voting	Yes	
Write-In Voting:		
Write-in Voting: System default is a voting position identified for write-ins.	No	By default, the number of write-ins available in a contest is zero, users may increment as necessary
Write-in Voting: Without selecting a write in position.	No	
Write-in: With No Declared Candidates	Yes	
Write-in: Identification of write-ins for resolution at central count	Yes	
Primary Presidential Delegation Nominations & Slates:		
Primary Presidential Delegation Nominations: Displayed delegate slates for each presidential party	Yes	
Slate & Group Voting: one selection votes the slate.	Yes	
Ballot Rotation:		
Rotation of Names within an Office; define all supported rotation methods for location on the ballot and vote tabulation/reporting	Yes	Rotation by precinct and precinct split
Straight Party Voting:		
Straight Party: A single selection for partisan races in a general election	Yes	
Straight Party: Vote for each candidate individually	Yes	
Straight Party: Modify straight party selections with crossover votes	Yes	
Straight Party: A race without a candidate for one party	Yes	
Straight Party: "N of M race (where "N">1)	Yes	
Straight Party: Excludes a partisan contest from the straight party selection	Yes	
Cross-Party Endorsement:		
Cross party endorsements, multiple parties endorse one candidate.	Yes	

Split Precincts:		
Split Precincts: Multiple ballot styles	Yes	
Split Precincts: P & M system support splits with correct contests and ballot identification of each split	Yes	
Split Precincts: DRE matches voter to all applicable races.	Yes	
Split Precincts: Reporting of voter counts (# of voters) to the precinct split level; Reporting of vote totals is to the precinct level	Yes	
Vote N of M:		
Vote for N of M: Counts each selected candidate, if the maximum is not exceeded.	Yes	
Vote for N of M: Invalidates all candidates in an overvote (paper)	Yes	
Recall Issues, with options:		
Recall Issues with Options: Simple Yes/No with separate race/election. (Vote Yes or No Question)	Yes	
Recall Issues with Options: Retain is the first option, Replacement candidate for the second or more options (Vote 1 of M)	Yes	
Recall Issues with Options: Two contests with access to a second contest conditional upon a specific vote in contest one. (Must vote Yes to vote in 2nd contest.)	Yes	
Recall Issues with Options: Two contests with access to a second contest conditional upon any vote in contest one. (Must vote Yes to vote in 2nd contest.)	Yes	
Cumulative Voting		
Cumulative Voting: Voters are permitted to cast, as many votes as there are seats to be filled for one or more candidates. Voters are not limited to giving only one vote to a candidate. Instead, they can put multiple votes on one or more candidate.	Yes	
Ranked Order Voting		
Ranked Order Voting: Voters can write in a ranked vote.	Yes	
Ranked Order Voting: A ballot stops being counting when all ranked choices have been eliminated	N/A	Tabulation rules are unique per jurisdiction
Ranked Order Voting: A ballot with a skipped rank counts the vote for the next rank.	N/A	Tabulation rules are unique per jurisdiction
Ranked Order Voting: Voters rank candidates in a contest in order of choice. A candidate receiving a majority of the first choice votes wins. If no candidate receives a majority of first choice votes, the last place candidate is deleted, each ballot cast for the deleted candidate counts for the second choice candidate listed on the ballot. The process of eliminating the last place candidate and recounting the ballots continues until one candidate receives a majority of the vote	N/A	Tabulation rules are unique per jurisdiction
Ranked Order Voting: A ballot with two choices ranked the same, stops being counted at the point of two similarly ranked choices.	Yes	

Ranked Order Voting: The total number of votes for two or more candidates with the least votes is less than the votes of the candidate with the next highest number of votes, the candidates with the least votes are eliminated simultaneously and their votes transferred to the next-ranked continuing candidate.	N/A	Tabulation rules are unique per jurisdiction
Provisional or Challenged Ballots		
Provisional/Challenged Ballots: A voted provisional ballots is identified but not included in the tabulation, but can be added in the central count.	Yes	
Provisional/Challenged Ballots: A voted provisional ballots is included in the tabulation, but is identified and can be subtracted in the central count	Yes	
Provisional/Challenged Ballots: Provisional ballots maintain the secrecy of the ballot.	Yes	
Overvotes (must support for specific type of voting system)		
Overvotes: P & M: Overvote invalidates the vote. Define how overvotes are counted.	Yes	If the system detects more than the valid number of marks in a contest, it is counted as an overvote
Overvotes: DRE: Prevented from or requires correction of overvoting.	Yes	
Overvotes: If a system does not prevent overvotes, it must count them. Define how overvotes are counted.	Yes	If the system detects more than the valid number of marks in a contest, it is counted as an overvote
Overvotes: DRE systems that provide a method to data enter absentee votes must account for overvotes.	Yes	
Undervotes		
Undervotes: System counts undervotes cast for accounting purposes	Yes	
Blank Ballots		
Totally Blank Ballots: Any blank ballot alert is tested.	Yes	
Totally Blank Ballots: If blank ballots are not immediately processed, there must be a provision to recognize and accept them	Yes	
Totally Blank Ballots: If operators can access a blank ballot, there must be a provision for resolution.	Yes	
Networking		
Wide Area Network – Use of Modems	Yes	With optional Verity Relay
Wide Area Network – Use of Wireless	Yes	With optional Verity Relay
Local Area Network – Use of TCP/IP	Yes	

Local Area Network – Use of Infrared	No	
Local Area Network – Use of Wireless	No	
FIPS 140-2 validated cryptographic module	Yes	
Used as (if applicable):		
Precinct counting device	Yes	
Central counting device	Yes	

Certification Test Report - Modification

Report Number HIN-20001-CTR-01

Hart InterCivic Verity Voting 2.5

Prepared for:

Vendor Name	*Hart InterCivic Inc. (Hart)*
Vendor System	*Verity Voting 2.5*
EAC Application No.	*HRT-Verity-2.5*
Vendor Address	*15500 Wells Port Drive* *Austin, TX 78728*

Prepared by:

SLI Compliance℠
4720 Independence St.
Wheat Ridge, CO 80033
303-422-1566
www.SLICompliance.com

NVLAP® TESTING
NVLAP Lab Code 200733-0

Accredited by the National Institute of Standards and Technology (NIST) National Voluntary Lab Accreditation Program (NVLAP) and accredited by the Election Assistance Commission (EAC) for VSTL status.

Revision History

Date	Release	Author	Revision Summary
August 14th, 2020	1.0	J. Panek	Initial Draft

Disclaimer

The Certification Test results reported herein must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government. Results herein relate only to the items tested.

Trademarks

- SLI is a registered trademark of SLI Compliance, a Division of Gaming Laboratories International, LLC
- Verity is a trademark of Hart InterCivic Inc.
- All products and company names are used for identification purposes only and may be trademarks of their respective owners.

The tests referenced in this document were performed in a controlled environment using specific systems and data sets, and results are related to the specific items tested. Actual results in other environments may vary.

Opinions and Interpretations

There are no opinions or interpretations included in this report, except as noted under Recommendations.

Other Labs Performing Hardware Testing

SLI Compliance is responsible for all core voting system tests as identified in NIST Handbook 150-22 (2017). Regarding non-core hardware testing for this certification test campaign, this report contains data that were produced under subcontract by the following labs:

Laboratory	Address
NTS – EMI / EMC	1736 Vista View Dr. Longmont, CO 80504

TABLE OF CONTENTS

List of Tables

1 Introduction

SLI Compliance is submitting this report as a summary of the certification testing efforts for the **Hart Verity Voting 2.5** voting system against the Voluntary Voting System Guidelines 1.0 (VVSG 1.0). The purpose of this document is to provide an overview of the certification testing effort and the findings of the testing effort for the **Verity Voting 2.5** system.

This test campaign included review of updates made to the Technical Data Package, source code review, and testing of the **Hart Verity Voting 2.5** voting system. The process consisted of the development of a test plan, managing system configurations, executing component and system level tests prepared by SLI, and analysis of results. The review and testing were performed at SLI's Wheat Ridge, Colorado facility, from June 22nd, 2020 to August 14th, 2020.

1.1 References

1. Election Assistance Commission Voluntary Voting System Guidelines version 1.0 (EAC VVSG 1.0), Volumes I and II
2. NIST Handbook 150: 2016
3. NIST Handbook and 150-22: 2017
4. EAC Voting System Testing and Certification Program Manual, United States Election Assistance Commission, v 2.0, May 2015
5. SLI VSTL Quality System Manual, v 3.2, prepared by SLI, dated June 8th, 2020

1.2 Document Overview

This document contains the following sections:

- System Identification identifies hardware and software for the **Verity Voting 2.5** system.
- System Overview discusses the functionality of **Verity Voting 2.5** system software and firmware.
- Certification Test Background is a summary of the testing process.
- Certification Test Results Summary contains the results and analysis of the testing effort.
- Attachments:
  - Attachment A - Warrant of Change Control
  - Attachment B - Attestation of Durability for Verity Voting
  - Attachment C - Attestation of Integrity for Verity Voting
  - Attachment D - Attestation of Production Hardware and Software for Verity Voting
  - Attachment E - Verity 2.5.1 Record of Trusted Build

- Attachment F - Verity Voting 2.5 Discrepancy Report
- Attachment G - Verity 2.5 Source Code Review Summary
- Attachment H - Hart Verity Voting 2.5 Modification Test Plan v1.1
- Attachment I - Hart Verity 2.5 EAC Electrical Hardware Test Plan v1.0
- Attachment J - Immunity Test Report for Verity Touch Writer Duo Standalone
- Attachment K - Radiated and Conducted Emissions Test Report for Verity Touch Writer Duo Standalone

1.3 Terms and Abbreviations

The following terms and abbreviations may be used in this document:

Table 1 – Terms and Abbreviations

Term	Abbreviation	Description
Ballot Marking Device	BMD	An accessible computer-based voting system that produces a marked paper ballot that is the result of voter interaction with visual or audio prompts.
Cast Vote Record	CVR	Record of all selections made by a single voter whether in electronic or paper. Also referred to as a ballot image when used to refer to electronic ballots.
Central Count Scanner	CCS	High Speed Digital Scanner is a ballot scanning device typically located at a central count facility and is operated by an automated multi-sheet feeding capability.
Chevron (Arrows at top of current screen)	No Abbreviation	Verity software applications are organized around easy-to-follow workflows, with specific activities associated with "chevrons" or "arrows" in the application user interface.
Compact Flash card	CF	This is a type of flash memory card in a standardized enclosure often used in voting systems to store ballot and/or vote results data.
Compact Flash AST	CFAST	A compact flash media based on the Serial ATA bus rather than the Parallel ATA bus, used by the original Compact Flash.
Commercial Off the Shelf	COTS	Commercial, readily available hardware devices (such as card readers, printers or personal computers) or software products (such as

Term	Abbreviation	Description
		operating systems, programming language compilers, or database management systems).
Election Assistance Commission	EAC	An independent, bipartisan commission created by the Help America Vote Act (HAVA) of 2002 that operates the federal government's voting system certification program.
Election Management System	EMS	Typically utilizes a database management system to enter jurisdiction information (district, precincts, languages, etc.) as well as election specific information (races, candidates, voter groups (parties), etc.). In addition, the EMS is also used to lay out the ballots, download the election data to the voting devices, upload the results and produce the final results reports.
Electromagnetic Compatibility	EMC	The goal of EMC is to validate the correct functioning of different equipment in the same environment and the avoidance of any interference effects between them.
Functional Configuration Audit	FCA	Exhaustive verification of every system function and combination of functions cited in the vendor's documentation. The FCA verifies the accuracy and completeness of the system's Voter Manual, Operations Procedures, Maintenance Procedures, and Diagnostic Testing Procedures.
National Institute of Standards and Technology	NIST	A non-regulatory federal agency within the U.S. Dept. of Commerce. Its mission is to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life.
National Voluntary Laboratory Accreditation Program	NVLAP	A division of NIST that provides third-party accreditation to testing and calibration laboratories.
Physical Configuration Audit	PCA	The testing activities associated with the physical aspects of the system (hardware, documentation, builds, source code, etc.).

Term	Abbreviation	Description
Primary – Closed	No Abbreviation	The Closed Primary election segregates each political party onto its own ballot, along with all pertinent non-political contests and referendums.
Primary - Open	No Abbreviation	The Open Primary election combines all political parties' contests onto a single ballot, along with all pertinent non-political contests and referendums.
Precinct Count Scanner	PCS	A precinct-count optical scanner is a mark sense-based ballot and vote counting device located at a precinct and is typically operated by scanning one ballot at a time.
Request For Information	RFI	A form used by testing laboratories to request, from the EAC, interpretation of a technical issue related to testing of voting systems.
Requirements Matrix	N/A	This is the matrix created by the EAC and maintained by SLI that traces the requirements to the various test modules and test methods.
Standard Lab Procedure	SLP	SLI's quality system documentation is made up of standard lab procedures (SLPs), which are procedures required to ensure a systematic, repeatable and accurate approach to voting systems testing and governing the actual performance of SLI's work.
(Verity) Tab	No Abbreviation	Verity software applications are organized around easy-to-follow workflows and activities; a "Tab" provides specific activities associated with "chevron" workflows in the application user interface.
Technical Data Package	TDP	This is the data package that is supplied by the vendor and includes: Functional Requirements, Specifications, End-user documentation, Procedures, System Overview, Configuration Management Plan, Quality Assurance Program, and manuals for each of the required hardware, software, firmware components of each voting system.
Test Method	No Abbreviation	SLI proprietary documents which are designed to group sets of EAC VVSG requirements in a logical manner that can be utilized to efficiently

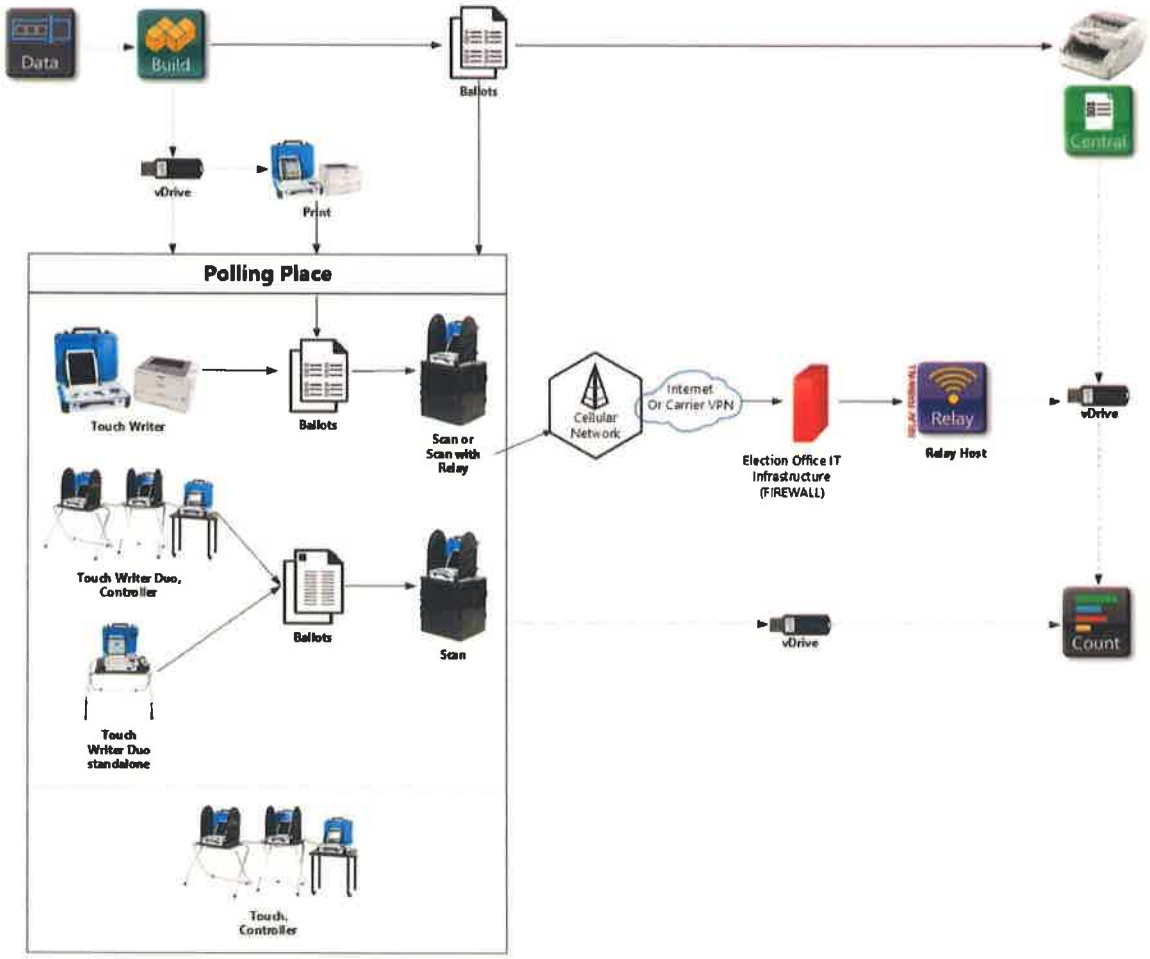
Term	Abbreviation	Description
		validate where and how requirements, or portions of a requirement, are met.
Test Module	No Abbreviation	An actionable component of a Test Method, that functionally verifies that a requirement is met within a voting system. Test Modules are at a generic level within the Test Method, and are customized for a particular voting system, within a Test Suite.
Test Suite	No Abbreviation	An actionable grouping of test modules designed to test a set of functions of a voting system or component in a specific way.
Validation	No Abbreviation	Confirmation by examination and through provision of objective evidence that the requirements for a specific intended use or application have been fulfilled (ISO 9000).
Verification	No Abbreviation	Confirmation by examination and through provision of objective evidence that specified requirements have been fulfilled (ISO 9000).
Voluntary Voting Systems Guidelines Volumes I & II	VVSG	A set of specifications and requirements against which voting systems can be tested to determine if the systems provide all of the basic functionality, accessibility and security capabilities required of these systems.
Voting System Test Lab	VSTL	The accredited lab where the voting system is being tested.
Voting System Under Test	VSUT	The designation for a voting system that is currently being tested.
Voting Test Specialist	VTS	An SLI Compliance employee who has been qualified to perform EAC voting system certification testing.

2 System Identification

This section details the scope of the **Verity Voting 2.5** voting system and associated components.

The **Verity Voting 2.5** system is composed of software applications, central count location devices and polling place devices with accompanying firmware, and COTS hardware and software.

2.1 System Diagram



Overview of the diagram:

- The components are displayed as touch points of data access, transfers, and verification.
- Dotted lines show the flow of data and air gaps using **Verity vDrives** and are also used to separate the deployment models shown within the polling place.
- **Verity Print** is a ballot production device that provides unmarked printed ballots.
- **Verity Touch Writer** and **Scan** may be installed in polling places to support paper-based voting.
- **Verity Controller**, **Touch Writer Duo**, and **Scan** may be installed in polling places to support paper-based voting.
- **Verity Touch Writer Duo Standalone** and **Scan** may be installed in polling places to support paper-based voting.

- **Verity Controller** and **Touch** may be installed in polling places to support DRE voting.
- **Verity Key** (not shown) is required for user access into components to load election elections, to use critical features, and to generate reports. Feature access depends on the roles applied to user accounts.
- **vDrive Duplicator** (not shown) is an optional device, used for populating multiple **vDrives** simultaneously.
- **Verity Relay** is an optional results transmission feature.
- **Verity AutoBallot** (not shown) is an optional barcode scanner kit for Verity Controller, Verity Print and Verity Touch Writer that allows air-gapped integration between an e-pollbook check-in process and the task of selecting the ballot style for the voting system.

2.2 Software and Firmware

The software and firmware employed by **Verity Voting 2.5** consists of 2 types, custom and commercial off the shelf (COTS). COTS applications were verified to be pristine or were subjected to source code review for analysis of any modifications and verification of meeting the pertinent standards.

The tables below detail each application employed by the **Verity Voting 2.5** system.

Table 2 – Software and Firmware

System Component	Application(s)	Version
Verity Data	Ballot setup and configuration software	2.5.0
Verity Build	EMS software	2.5.0
Verity Central	High-speed digital scanner software	2.5.1
Verity Count	Central count location accumulation, tallying, and reporting software	2.5.0
Verity Relay	Data transmission software	2.5.0
Verity Scan	Digital scanner firmware	2.5.1
Verity Touch Writer	BMD firmware	2.5.1
Verity Touch Writer Duo	BMD firmware	2.5.1
Verity Touch Writer Duo Standalone	BMD firmware	2.5.1
Verity Controller	Verity device firmware	2.5.1
Verity Touch	DRE firmware	2.5.1
Verity Touch with Access	DRE firmware	2.5.1
Verity Print	Printer firmware	2.5.1

Table 3 – COTS Software and Firmware

Description	Version
Verity Data/Build	
Microsoft Windows 10 Enterprise 2019 LTSC	10.0.17763
Microsoft SQL Server Standard 2017	14.0.1000.169
McAfee Application Control for Devices (McAfee Solidifier)	8.2.1-143
Verity Central	
Microsoft Windows 10 Enterprise 2019 LTSC	10.0.17763
Microsoft SQL Server Standard 2017	14.0.1000.169
McAfee Application Control for Devices (McAfee Solidifier)	8.2.1-143
Verity Count	
Microsoft Windows 10 Enterprise 2019 LTSC	10.0.17763
Microsoft SQL Server Standard 2017	14.0.1000.169
McAfee Application Control for Devices (McAfee Solidifier)	8.2.1-143
Verity Relay	
Microsoft Windows 10 Enterprise 2019 LTSC	10.0.17763
Microsoft SQL Server Standard 2017	14.0.1000.169
McAfee Application Control for Devices (McAfee Solidifier)	8.2.1-143
Verity Print	
Microsoft Windows 10 Enterprise 2019 LTSC	10.0.17763
SQLite	3.28.0
McAfee Application Control for Devices (McAfee Solidifier)	8.2.1-143
Verity Scan – Paper Ballot Scanner	
Microsoft Windows 10 Enterprise 2019 LTSC	10.0.17763
SQLite	3.28.0
McAfee Application Control for Devices (McAfee Solidifier)	8.2.1-143
Nuance Western OCR, Desktop, OEM	V20
Verity Touch Writer – Electronic BMD Device	
Microsoft Windows 10 Enterprise 2019 LTSC	10.0.17763
SQLite	3.28.0

McAfee Application Control for Devices (McAfee Solidifier)	8.2.1-143
Verity Touch Writer Duo – Electronic BMD Device	
Microsoft Windows 10 Enterprise 2019 LTSC	10.0.17763
SQLite	3.28.0
McAfee Application Control for Devices (McAfee Solidifier)	8.2.1-143
Verity Touch Writer Duo Standalone – Electronic BMD Device	
Microsoft Windows 10 Enterprise 2019 LTSC	10.0.17763
SQLite	3.28.0
McAfee Application Control for Devices (McAfee Solidifier)	8.2.1-143
Verity Controller – Networked Centralized Management Device	
Microsoft Windows 10 Enterprise 2019 LTSC	10.0.17763
SQLite	3.28.0
McAfee Application Control for Devices (McAfee Solidifier)	8.2.1-143
Verity Touch - Electronic DRE Device	
Microsoft Windows 10 Enterprise 2019 LTSC	10.0.17763
SQLite	3.28.0
McAfee Application Control for Devices (McAfee Solidifier)	8.2.1-143
Verity Touch with Access - Electronic DRE Device	
Microsoft Windows 10 Enterprise 2019 LTSC	10.0.17763
SQLite	3.28.0
McAfee Application Control for Devices (McAfee Solidifier)	8.2.1-143

2.3 Equipment (Hardware)

The hardware employed by **Verity Voting 2.5** consists of 2 types, custom and commercial off the shelf (COTS). COTS hardware was verified to be pristine or was subjected to review for analysis of any modifications and verification of meeting the pertinent standards.

The tables below detail each device employed by the **Verity Voting 2.5** system.

Table 4 – Equipment (Hardware)

Hardware Description	Version
Verity Print – Ballot Printer	3005356 Rev E
Verity Print – Ballot Printer*	3005856 Rev B

Verity Scan – Paper Ballot Scanner	3005350 Rev I
Verity Scan – Paper Ballot Scanner*	3005800 Rev B
Verity Touch Writer – Electronic BMD Device	3005352 Rev H
Verity Touch Writer – Electronic BMD Device*	3005852 Rev B
Verity Touch Writer Duo – Electronic BMD Device	3005700 Rev B
Verity Touch Writer Duo Standalone – Electronic BMD Device	3005730 Rev A
Verity Controller – Networked Centralized Management Device	3005351 Rev E
Verity Controller – Networked Centralized Management Device*	3005825 Rev B
Verity Touch - Electronic DRE Device	3005355 Rev E
Verity Touch - Electronic DRE Device*	3005854 Rev B
Verity Touch with Access - Electronic DRE Device	3005353 Rev F
Verity Touch with Access - Electronic DRE Device*	3005853 Rev B

* SmartPanel updated in previous certification modification for tablet electronics obsolescence

Table 5 – COTS Equipment

COTS Hardware Description	Version
Verity Data/Build	
Verity Data and Build Applications and Workstation Kit • HP Z4 G4 Workstation • HP Z230 and Z240 Workstations supported for existing customers only • Verity Data Software • Verity Build Software	A
OKI Data C831dn Color Printer for existing customers only	N35100A
OKI Data C844dn Color Printer	N35301A
OKI Data C911dn Color Printer for existing customers only	N36100A
OKI Data C931e Color Printer	N36100A
OKI Data B432dn Mono Report and Ballot Printer	N22500A
OKI Data B431d Mono Report Printer for existing customers only	N22202A
HP 8-port Ethernet Switch	1405-8GV3
Vinpower Digital 7-target USB Duplicator	USBShark-7T-BK
Vinpower Digital 23-target USB Duplicator	USBShark-23-BK
Verity Central	
Verity Central Applications and Workstation Kit	A

• HP Z4 G4 Workstation • HP Z230 and Z240 Workstations supported for existing customers only • Verity Central Software	
Canon DR G1100 High-Speed Scanner	M111181
Canon DR G1130 High-Speed Scanner	M111171
Canon DR-G2110 High-Speed Scanner	6130030
Canon DR-G2140 High-Speed Scanner	6130020
OKI Data B432dn Mono Printer Report printer	N22500A
OKI Data B431d Mono Report Printer for existing customers only	N22202A
HP 8-port Ethernet Switch	1405-8GV3
Verity Count	
Verity Count Applications and Workstation Kit • HP Z4 G4 Workstation • HP Z230 and Z240 Workstations supported for existing customers only • Verity Count Software	A
OKI Data B432dn Mono Report printer	N22500A
OKI Data B431d Mono Report Printer for existing customers only.	N22202A
HP 8-port Ethernet Switch	1405-8GV3
Verity Relay	
Verity Relay Applications and Workstation Kit • HP Z4 G4 Workstation • HP Z240 Workstation supported for existing customers only • Verity Relay Software	A
OKI Data B432dn Mono Report printer	N22500A
OKI Data B431d Mono Report Printer for existing customers only.	N22202A
HP 8-port Ethernet Switch	1405-8GV3
Verity Print	
OKI Data C831dn Color Printer	N35100A
OKI Data B432dn Mono Blank Ballot Printer	N22500A
OKI Data C844dn Color Printer	N35301A
OKI Data B431d Mono Printer for existing customers only	N22202A
Optional AutoBallot Barcode Scanner Kit	C

Includes the following 2d barcode scanner: • Hart part number: 1003672 Motorola/Zebra part number: DS4308 or DS4608	
Verity Scan – Paper Ballot Scanner	
Verity Ballot Box	B
Optional Relay Accessory kit (4G LTE Cat-M1)	A
Verity Touch Writer – Electronic BMD Device	
OKI Data B432dn Mono Marked Ballot Printer	N22500A
OKI Data B431d Mono Report Printer for existing customers only	N22202A
Accessible Voting Booth	D
Optional AutoBallot Barcode Scanner Kit Includes the following 2d barcode scanner: • Hart part number: 1003672 Motorola/Zebra part number: DS4308 or DS4608	C
Headphones • Brand: V7, part number HA300-2NP or HA310-2NP	2005230
Verity Touch Writer Duo – Electronic BMD Device	
Brother PJ700 Series Thermal Printer	PJ723
Accessible Voting Booth with ATI Tray	D
Standard Voting Booth	D
Optional detachable ATI Kit	A
Optional headphones for ATI Kit • Brand: V7, part number HA300-2NP or HA310-2NP	C
Verity Touch Writer Duo Standalone – Electronic BMD Device	
Brother PJ700 Series Thermal Printer	PJ723
Accessible Voting Booth with ATI Tray	D
Standard Voting Booth	D
Optional detachable ATI Kit	A
Optional headphones for ATI Kit • Brand: V7, part number HA300-2NP or HA310-2NP	C
Verity Controller	
Optional AutoBallot Barcode Scanner Kit Includes the following 2d barcode scanner:	C

• Hart part number: 1003672 Motorola/Zebra part number: DS4308 or DS4608	
Verity Touch - Electronic DRE Device	
Standard Voting Booth	D
Verity Touch with Access - Electronic DRE Device	
Accessible Voting Booth	D
Headphones • Brand: V7, part number HA300-2NP or HA310-2NP	2005230

2.4 Documentation

The documents that are a part of the examination of the **Verity Voting 2.5** system are listed in the table below:

Table 6 – Documentation

Document Title	Version
6641-037 A01_Verity_2.5_Administrators Guide_Data.pdf	A.01
6641-038 A01_Verity_2.5_Administrators Guide_Build.pdf	A.01
6641-039 A00_Verity_2.5_Administrators Guide_Central.pdf	A.00
6641-040 A00_Verity_2.5_Administrators Guide_Count.pdf	A.00
6641-041 A00_Verity_2.5_Administrators Guide_Relay.pdf	A.00
6641-042 A01_Verity_2.5_System Administrators Guide.pdf	A.01
6643-008 A02_Verity_2.5_Support Procedures Guide.pdf	A.02
6651-030 A03_Verity_2.5_Polling Place Field Guide - CDS.pdf	A.03
6651-031 A02_Verity_2.5_Polling Place Field Guide - SW.pdf	A.02
6651-032 A02_Verity_2.5_Polling Place Field Guide - CT.pdf	A.02
6651-033 A02_Verity_2.5_Polling Place Field Guide - SRW.pdf	A.02
6651-035 A00_Verity_2.5_Verity Print Field Guide.pdf	A.00
6651-037 A04_Verity_2.5_Polling Place Field Guide - DS.pdf	A.04
6653-008 A03_Verity_2.5_Device Troubleshooting Field Guide.pdf	A.03
6673-010 E_Verity_Relay Implementation Process.pdf	E
6675-011 A_Verity_OKI B432 Tray Extension Kit Installation.pdf	A

Document Title	Version
All-In-One Code Framework Coding Standards.pdf	© 2014 Microsoft Corporation
Change Notes Hart Verity Voting 2.5.0 to 2.5.1 4005680 A00.pdf	A.00
Configuration Management Process 1001074 D01.pdf	D.01
Continual Improvement Process 1000550 E02.pdf	E.02
Control of Nonconforming Product Procedure 1000657 B02.pdf	B.02
Device Configuration Process Document 4005523 B00.pdf	B.00
Device OS Creation and Configuration Process Document Verity 2.5 4005675 A00.pdf	A.00
Device Win10 Creation Process Document Verity 4005676 A00.pdf	A.00
Document Control Procedure 1000538 E06.pdf	E.06
Factory TUV SUD inspection 2019 June report signed.pdf	N/A
Hardware 2005713-CFAST Door Security Kit Design.pdf	B
Hardware 3005018-ATI Kit Design.pdf	A
Hardware 3005174-AutoBallot Kit Design.pdf	B
Hardware 3005350-Scan Design.pdf	I
Hardware 3005351-Controller Design.pdf	E
Hardware 3005352-Touch Writer Design.pdf	H
Hardware 3005353-Touch with Access Design.pdf	F
Hardware 3005355-Touch Design.pdf	E
Hardware 3005356-Print Design.pdf	E
Hardware 3005357-Ballot Box Design.pdf	D
Hardware 3005358-Standard Booth Design.pdf	C
Hardware 3005359-Accessible Booth Design.pdf	D
Hardware 3005700-Touch Writer Duo Design.pdf	B
Hardware 3005730-Touch Writer Duo Standalone Design.pdf	A
Hardware 3005800-Scan Design.pdf	B
Hardware 3005801-Accessible Booth With ATI Tray Design.pdf	A
Hardware 3005825-Controller Design.pdf	B

Document Title	Version
Hardware 3005852-Touch Writer Design.pdf	B
Hardware 3005853-Touch with Access Design.pdf	B
Hardware 3005854-Touch Design.pdf	B
Hardware 3005856-Print Design.pdf	B
Hardware 3005905-Duo Go Design.pdf	A
Hardware Design Development Procedure 1000513 D01.pdf	D.01
Hardware PCB Photos.pdf	N/A
Hardware Verification and Validation Process 1000514 D01.pdf	D.01
Hart Safety Certificate U8 17 10 90917 004.pdf	N/A
Hart Safety Certificate U8 090917 0006.pdf	N/A
Hart Safety Certificate U8 090917 0008 Rev. 00.pdf	Rev. 00
Hart Secure Ballot Stock Specification 4005526 A01.pdf	A.01
HP Z4 G4 Verity Win10 Workstation Manufacturing 4005670 A01.pdf	A.01
HP Z230 Verity Win10 Workstation Manufacturing 4005674 A01.pdf	A.01
HP Z240 Verity Win10 Workstation Manufacturing 4005673 A01.pdf	A.01
HPQC Test Cases.pdf	N/A
Quality Manual 1000490 D04.pdf	D.04
Record Retention Matrix 1000510 E02.pdf	E.02
Software Design Development Procedure 1000566 D02.pdf	D.02
Software Production 1000551 E01.pdf	E.01
Software Test Design Development 1000508 D02.pdf	D.02
Software Verification and Validation Process 1000560 D02.pdf	D.02
Software Versioning Procedure 1001070 C05.pdf	C.05
SQA Requirements Management Process 1000540 A02.pdf	A.02
Supplier Qualification and Management 1000563 C02.pdf	C.02
The Creation and Configuration of the Access Build Environment 4005517 A01.pdf	A.01
The Creation and Configuration of the MCU Build Environment 4005519 A02.pdf	A.02

Document Title	Version
The Creation and Configuration of the Trusted Build Environment 4005518 A04.pdf	A.04
Verity 2.5 Implementation Statement 4005668 A02.pdf	A.02
Verity 2.5 Notice of Protected Information 1000781 A01.pdf	A.01
Verity 2.5 TDP Abstract 1000780 A02.pdf	A.02
Verity 2.5 VVSG 1.0 TDP Trace.pdf	N/A
Verity 2.5.X COTS List.pdf	N/A
Verity Airgap Interface Technical Reference 4005512 A02.pdf	A.02
Verity Application Framework TRD 4005634 A00.pdf	A.00
Verity Application Installer Build Process Document Verity 2.5.1 4005672 A01.pdf	A.01
Verity Application Programming Interface Specification 4005604 A04.pdf	A.04
Verity Ballot Creation TRD 4005636 A00.pdf	A.00
Verity Base Station Microcontroller Specification 4005462 A01.pdf	A.01
Verity Build TRD 4005628 A00.pdf	A.00
Verity Central TRD 4005632 A00.pdf	A.00
Verity Coding Standard 4005498 A14.pdf	A.14
Verity Controller TRD 4005624 A01.pdf	A.01
Verity Count TRD 4005629 A01.pdf	A.01
Verity Data TRD 4005627 A00.pdf	A.00
Verity Database Attributes 4005543 C04.pdf	C.04
Verity Device Suite TRD 4005621 A00.pdf	A.00
Verity Election Definition Data TRD 4005639 A01.pdf	A.01
Verity Election Management TRD 4005631 A00.pdf	A.00
Verity Electronics Specification 4005461 A21.pdf	A.21
Verity Entity Relationship Diagram Database - Devices.pdf	N/A
Verity Entity Relationship Diagram Database - Servers (Count Only).pdf	N/A
Verity Entity Relationship Diagram Database - Servers (No Count).pdf	N/A
Verity Key Design 4005514 A02.pdf	A.02

Document Title	Version
Verity Logging TRD 4005635 A00.pdf	A.00
Verity Omni Modification TRD 4005655 A01.pdf	A.01
Verity Operational Environment 4005515 C15.pdf	C.15
Verity PC Application Framework User Interface Design Document.pdf	5
Verity Performance Characteristics 4005497 C03.pdf	C.03
Verity Print TRD 4005626 A00.pdf	A.00
Verity Redstone Modification TRD 4005671 A01.pdf	A.01
Verity Relay Theory of Operations 4005571 A06.pdf	A.06
Verity Risk and Threat Assessment 4005513 C05.pdf	C.05
Verity Scan TRD 4005623 A00.pdf	A.00
Verity Security Requirements 4005464 A07.pdf	A.07
Verity Shared Device User Interface Design Document.pdf	7
Verity Software Architecture-Design 4005463 B02.pdf	B.02
Verity Summative Usability Report 4005496 A00.pdf	A.00
Verity Summative Usability Test Plan 4005495 A01.pdf	A.01
Verity Supply Chain PRD 4005302 C01.pdf	C.01
Verity Touch TRD 4005633 A00.pdf	A.00
Verity Touch Writer Duo Base Station Microcontroller Specification 4005638 A00.pdf	A.00
Verity Touch Writer Duo TRD 4005625 A00.pdf	A.00
Verity Touch Writer TRD 4005622 A00.pdf	A.00
Verity User Management TRD 4005630 A00.pdf	A.00
Verity Vote Counting and Cast Vote Records TRD 4005640 A00.pdf	A.00
Verity Voting 2.5 Change Notes 4005669 A02.pdf	A.02
Verity Voting 2.5 Usability Impact Statement.pdf	N/A
Verity Voting 2.5.1 Source Documentation.zip	N/A
Verity Voting National Certification Test Specification 4005527 B04.pdf	B.04
VirTex Q01 Quality Manual Rev R.pdf	R
Voting System Implementation and Maintenance 1000745 C02.pdf	C.02

Document Title	Version
VSTL Product Submission Procedure 1000565 D02.pdf	D.02
Workstation Configuration Process Document Verity 2.5 4005678 A02.pdf	A.02
Workstation Win10 Creation Process Document Verity 2.5 4005677 A00.pdf	A.00

2.5 Materials

Items identified in the table reflect materials required to perform hardware, software, telecommunications, security, accuracy, and integrated system tests in a manner that reflects real world use and needs.

The following test materials are required for the performance of testing including, as applicable, test ballot layout and generation materials, test ballot sheets, and any other materials used in testing.

- Ballots & blank ballot grade paper
- Thumb drives
- USB dongles
- Ballot marking pens
- Printer paper rolls

3 System Overview

3.1 Scope of the Hart Verity Voting 2.5 Voting System

This section provides a description of the scope of **Verity Voting 2.5** voting system components.

The **Verity Voting 2.5** system represents a set of software applications for pre-voting, voting and post-voting election project activities for jurisdictions of various sizes and political division complexities.

Verity Voting 2.5 functions include:

- Defining the political divisions of the jurisdiction and organizing the election with its hierarchical structure, attributes, and associations.
- Defining the election events with their attributes such as the election name, date and type, as well as contests, candidates, referendum questions, voting locations and their attributes.
- Preparing and producing ballots for polling place and absentee voting or by-mail voting.
- Preparing media for precinct voting devices and central count devices.

  - Configuring and programming the **Verity Scan** digital scanners for marked paper ballots and Verity Touch Writer printed vote records.
  - Configuring and programming the **Verity Touch Writer** BMD devices.
  - Configuring and programming the **Verity Touch Writer Duo Standalone** BMD devices.
  - Configuring and programming the **Verity Controller** with **Verity Touch Writer Duo** BMD devices.
  - Configuring and programming the **Verity Controller** with **Verity Touch** and **Touch Writer Duo** DRE devices.
  - Configuring and programming the **Verity Print** on-demand ballot production device.
  - Transmission of the election results via **Verity Relay**.
  - Producing the election definition and auditing reports.
  - Providing administrative management functions for user, database, networking and system management.
  - Import of the Cast Vote Records from **Verity Scan** devices and **Verity Central.**
  - Preview and validation of the election results.
  - Producing election results tally according to voting variations and election system rules.
  - Producing a variety of reports of the election results in the desired format.
  - Publishing of the official election results. Auditing of election results including ballot images and log files.
- **Verity Scan** is a digital scan precinct ballot counter (tabulator) that is used in conjunction with an external ballot box. The unit is designed to scan marked paper ballots or Verity Touch Writer Duo printed vote records, interpret and record voter marks on the marked paper ballot or record voter selections on the printed vote records, and deposit the ballots into the secure ballot box.
- **Verity Relay** provides remote transmission capability. Utilizing an optional modem with **Verity Scan**, at close of polls, results are transmitted from the polling place device to the **Verity Relay** workstation.
- The **Verity Touch Writer** is a standalone precinct level Ballot Marking Device (BMD) which also includes an Audio Tactile Interface (ATI), which allows voters who cannot complete a paper ballot to generate a machine-readable and human readable paper ballot, based on vote selections made, using the ATI.
- The **Verity Touch Writer Duo** is a daisy chained configuration of a **Verity Controller** device configured with up to twelve **Verity Touch Writer Duo** BMD devices, which allows voters to utilize the touchscreen or optional Audio Tactile Interface to generate a machine-readable and human readable printed vote record, based on vote selections made.

- The **Verity Touch Writer Duo Standalone** is a standalone BMD device, which allows voters to utilize the touchscreen or optional Audio Tactile Interface to generate a machine-readable and human readable printed vote record, based on vote selections made.
- The **Verity Touch** is a Direct Recording Electronic (DRE) device chained configuration of a **Verity Controller** device configured with up to twelve **Verity Touch** devices, which allows voters to cast their vote electronically via a touchscreen.
- The **Verity Touch with Access** is a DRE device chained configuration of a **Verity Controller** device configured with up to twelve **Verity Touch** or **Touch with Access** devices, which allows voters to cast their vote electronically via a touchscreen or Audio Tactile Interface (ATI).
- **Verity Print** is an on-demand ballot production device for unmarked paper ballots.
- **Verity Election Management** allows users with the Administrator role to import and manage election definitions. Imported election definitions are available through the Elections chevron in Build. Users can also delete, archive, and manage the election definitions.
- **Verity User Manager** enables users with the correct role and permissions to create and manage user accounts within the **Verity Voting** system for the local workstation in a standalone configuration, or for the network in a networked configuration.
- **Verity Desktop** enables users with the correct roles to set the workstations' date and time, gather **Verity** application hash codes (in order to validate the correctness of the installed applications), and access to Windows desktop.
- **Verity Data** provides the user with controls for entering and proofing data and audio. **Verity Data** also performs validation on the exported information to ensure that it will successfully import into **Verity Build**.
- **Verity Build** opens the election to proof data, view reports, and print ballots, and allows for configuring and programming the **Verity Scan** digital scanners, and **Verity Touch Writer** and **Controller/Touch Writer Duo** BMD devices, **Verity Print**, **Verity Controller/Touch** series devices, as well as producing the election definition and auditing reports.
- **Verity Central** is a high-speed, central digital ballot scanning system used for high-volume processing of ballots (such as vote by mail). The unit is based on COTS scanning hardware coupled with custom **Hart-**developed ballot processing application software which resides on an attached workstation.
- **Verity Count** is an application that tabulates election results and generates reports. **Verity Count** can be used to collect and store all election logs from every **Verity** component/device used in the election, allowing for complete election audit log reviews.

3.2 Engineering Changes

Verity Voting 2.5 is a modification of the EAC certified **Verity Voting 2.4** system.

The modifications to **Verity Voting 2.5** address multiple aspects of the system, including features for all devices and workstations, state specific features, updates to the operating system (OS), security enhancements, inclusion of the Touch Writer Duo Standalone, as well as associated documentation updates.

The following modifications are implemented in this release:

Features for all devices and workstations

- Windows Embedded Standard 7 OS is being replaced with Windows 10 Enterprise 2019 LTSC.
- Support has been added for the Haitian Creole language.
- The vDrive file and the folder names and paths have been added to the signed and validated content.

Wisconsin-specific features

- Support has been added for the Open Primary logic for the state of Wisconsin. This logic is a combination of Hart's current open primary logic with the addition of a party selector contest.

Additional Features for Verity Devices

All Verity Devices

- A user may now create a recovery vDrive and export temporary logs to a USB stick during a system alert. These are logs for when a vDrive for the currently loaded election is not present.
- Backup data may now be deleted.
- SQL Server 2012 is replaced with SQLite 3.29.

Features for devices with the thermal report printers

- Device Tests menu function to send a test page to the thermal roll printer has been renamed "Test report printer."

Features for devices that allow poll workers to activate a ballot

- If only one precinct-split will appear on the Select Precinct screen, the system shall automatically select it and not present the Select Precinct screen.
- If only one party will appear on the Select Party screen, the system shall automatically select it and not present the Select Party screen.

Features for devices with ballot entry and review

- An option has been added to require voters to view all contests on the ballot before finishing their voting session. This option is set in Verity Build.

Features for Touch Writer Duo

- Introduction of Standalone configuration that does not require the use of a Verity Controller. The Touch Writer Duo Standalone configuration is akin to the Touch Writer device and includes a thermal report printer and support for the optional AutoBallot barcode scanner.
- Device Tests menu function to send a test page to the full sheet thermal printer is renamed "Test vote record printer."

Features for Verity Scan

- Scan devices that support Print Vote Record (PVR) scanning now also support standard paper ballot scanning in the same session.
- An option has been added for an automatic duplicate of the vDrive when two vDrives are inserted. This option is set in Verity Build.
- 3G modem support for use with the Relay kit has been removed.
- The single sheet ballot limit per vDrive has been increased to 25,000 to support long early voting events. The Ballot Box limit is unchanged and must be emptied every 4000 sheets.

Additional Features for Verity Workstation Software

Features for All Workstation Software

- SQL Server 2012 has been replaced with SQL Server 2017.
- TPM 2.0 support has been implemented on Z240 and Z4 G4 workstations.

Features for Workstation Software with Ballot Proofing

- A new report titled "Translation Proofing Report" has been added to Verity Data and Verity Build.

Features for Verity Data

- A Party Selector Contest may now be added in an Open Primary election.
- Keyboard shortcut keys have been added for usability and convenience:
  - Select Election screen
    - Alt+O for "Open"
  - Contest Titles screen
    - Alt+O for "Add Office"
    - Alt+P for "Add Proposition"
    - Alt+R for "Add Party Selector"
  - Choices screen
    - Alt+A for "Add Choice"
    - Alt+D for "Delete Choice"
  - Rotation
    - Alt+G for "Generate Indices"
  - Audio screen
    - Alt+I for "Import"

        - Alt+E for "Export"
        - Alt+N for "Normalize"
        - Alt+A for "Normalize All"
        - Alt+C for "Clear Entry"
    - Import screen
        - Alt+I for "Import"
    - Export screen
        - Alt+E for "Export"

Features for Verity Build

- The following feature enhancements to devices discussed above are settable in Verity Build:
    - A new option to require voters to view all contests on the ballot before finishing their voting session.
    - A new option for automatic duplicate vDrive creation in Verity Scan.
- The Print Queue import now allows write-in text to be defined for each write-in available on the ballot.

Features for Verity Central

- Support has been added for the scanning of Printed Vote Records. The default Voting Method is set in the election's task.
- Keyboard shortcut keys have been added for usability and convenience:
    - Select Election tab
        - Alt+S for "Save" in the preferences menu
    - Scan tab
        - Enter for "Scan" in the Scan menu
        - Alt+R for "Batch Report" in the Manage Batches menu
        - Alt+T for "Change Type" in the Manage Batches menu
        - Alt+N for "Edit Notes" in the Manage Batches menu
        - Alt+D for "Delete Batch" in the Manage Batches menu
        - Enter for "Search" in the Search Ballots menu
        - Alt+S for "Save" in the Settings menu
        - Alt+T for "Test Scan" in the Settings menu
    - Review Tab
        - Alt+A for "Add Choice" in the Review images menu
        - Alt+C for "Clear Filters" in the Review images menu
        - Alt+R for "Refresh List" in the Review images menu
        - Alt+P for "Print List" in the Review images menu
        - Alt+A for "Accept" in the Review Images menu (Ballot Review)
        - Alt+R for "Revert" in the Review Images menu (Ballot Review)
        - Alt+P for "Previous" in the Review Images menu (Ballot Review)
        - Alt+N for "Next" in the Review Images menu (Ballot Review)
        - Alt+Left Arrow for "Previous Unresolved" in the Review Images menu (Ballot Review)
        - Alt+Right Arrow for "Next Unresolved" in the Review Images

menu (Ballot Review)
- ESC for "Return to Page View" in the Review Images menu (Ballot Review)

Corrected Defects

The following defects have been corrected in the Verity Voting 2.5 modification:

Product	Description of Defect	Resolution/Results in Verity Voting 2.5
Verity Count	The application does not save an update to a write-in name on the Write-in Candidate screen UI if the change made is only to the case of the alphabet (i.e. uppercase, lowercase).	The name change is now properly saved, even when the change is only to case of the alphabet.
Verity Data	The Polling Place List report does not list the name of all the precinct splits or the precincts if only one Precinct with two splits are selected or if only two precincts are selected.	No software change to Verity Data was required. A formula used for the row and column grouping in a sub report that controls the layout of the precinct/split grid was corrected in the report template.

4 Certification Test Background

This section provides a brief overview of the EAC Certification Program and the activities involved for a voting system to be considered for certification against the EAC VVSG and the EAC program manual.

4.1 PCA - Document and Source Code Reviews

The Physical Configuration Audit (PCA) review of the **Verity Voting 2.5** documentation submitted in the Technical Data Package (TDP) was performed in order to verify conformance with the Election Assistance Commission Voluntary Voting System Guidelines 1.0 (EAC VVSG 1.0). Source code was reviewed for each modified software and firmware application declared within the voting system.

All PCA document reviews were conducted in accordance with Vol. 2 Section 2 of the EAC VVSG 1.0, to demonstrate that the system meets the requirements. Inconsistencies or errors in documentation were identified to **Hart** in a Discrepancy Report for resolution or comment. This Discrepancy Report is included as Attachment F in this document.

All PCA source code reviews were conducted in accordance with Vol. 1 Section 5.2 and Vol. 2 Section 5 of the EAC VVSG 1.0, to demonstrate that the system meets the requirements. Inconsistencies or errors in the source code were identified to **Hart** for resolution or comment. This source code review summary is included as Attachment G in this document.

4.2 FCA - Functional & System Testing

The Functional Configuration Audit (FCA) review of the documentation submitted by **Hart** in the TDP was conducted according to the VVSG 1.0 Vol. 2 Section 6.7.

SLI's standard Test Suites were customized for the **Verity Voting 2.5** system and conducted in accordance with Vol. 2 Section 6 of the VVSG 1.0. Simulations of elections were conducted to demonstrate a beginning-to-end use case process for the **Verity Voting 2.5** system.

4.2.1 Test Methods

All test methods employed are within the scope of SLI's VSTL accreditation. The following validated test methods were employed during this test campaign:

Table 7 – Test Methods

SLI VSTL Test Method Name
TM_Accumulating_and_Transmitting_Results v1.1
TM_Accuracy v1.2
TM_Audit_Record_Data v1.1
TM_Error Message and Recovery v1.3
TM_Pre-Voting_Capabilities v1.2
TM_Readiness v1.1
TM_Security_Access_Control v1.1
TM_Security_Access_Control_Measures v1.1
TM_Security_Physical_Security_Measures v1.1
TM_Security_Software_Security v1.1
TM_Security_Telecommunications_and_Data_Transmission v1.2
TM_Security_Transmission_of_Official_Data_over_Public_Networks v1.1
TM_Security_Wireless_Communications v1.2
TM_Straight_Party_Voting v1.1
TM_Tally_and_Reporting v1.1
TM_Telecommunications v1.1
TM_Voting_Capabilities v1.3
TM_Voting_Straight_Party v1.2

The above listed test methods are implemented in a complementary fashion: modules are employed from various methods to form suites. Suites include a logical sequence

of functionality that is used to validate the requirement addressed by each module within the suite.

4.3 Hardware Testing

Hardware testing was conducted by a certified third-party hardware test laboratory to verify the new **Verity Touch Writer Duo Standalone** is compliant with the EAC VVSG 1.0 hardware requirements.

SLI Compliance is responsible for all core voting system tests as identified in the NIST NVLAP Handbook 150-22 (2017). Regarding non-core hardware testing for this certification test campaign, this report contains data that was produced under subcontract by the following lab:

Laboratory	Address	Test(s)	Date(s)
NTS – EMI / EMC	1736 Vista View Dr. Longmont, CO 80504	**EMC / EMI Tests:** Radiated Emissions, Conducted Emissions, ESD, Electromagnetic Susceptibility, Electrical Fast Transient, Lightning Surge, Conducted RF Immunity, Magnetic Fields Immunity, Electrical Power Disturbance	7/7/2020 – 7/10/2020

5 Certification Test Results Summary

5.1 Source Code Review Summary

SLI has reviewed the modified software source code for each application in the **Verity Voting 2.5** voting system to determine the code's compliance with the EAC VVSG 1.0, *Volume 1 Sections 5, 9* and *Volume 2 Section 5.4* and for compliance with **HART**'s internally developed coding standards. **Verity Voting 2.5** is implemented with the C, C++, and C# languages.

5.1.1 Evaluation of Source Code

As a modification project, the **Verity Voting 2.5** code base was reviewed using the final **Verity Voting 2.4** code as the baseline, to which the initial **Verity Voting 2.5** code base was compared. The differences found between those two code bases served as the starting point of the code review.

The source code was written adequately in terms of the VVSG 1.0. The code is modular and there is sufficient error handling. Readability is sufficient and supports maintainability. The source code was found to be compliant to the VVSG 1.0 and **Hart** declared industry standards. Please see Attachment G for details on the **Verity Voting 2.5** source code review.

5.2 Technical Data Package Review Summary

As this is a modification project, SLI reviewed the **Verity Voting 2.5** TDP against the final TDP for **Verity Voting 2.4.** The differences between the two TDPs were reviewed for compliance with the EAC VVSG 1.0 according to *Volume 2 Section 2*. The documents that are a part of the **Verity Voting 2.5** system are detailed in section 2.4 of this document.

5.2.1 Evaluation of TDP

Eight documentation discrepancies were written during the PCA documentation review phase. The issues identified were related to either incorrect or missing information. Details of the discrepancies can be found in Attachment F of this document.

In all instances, the discrepancies were addressed and resolved with updated documentation prior to the writing of this report. Once all identified discrepancies were resolved, the Technical Data Package for the **Verity Voting 2.5** voting system was found to comply with all applicable standards.

5.3 Functional Testing Summary

5.3.1 Test Suites Utilized

SLI performed tests designed to functionally verify the modifications listed in section 3.2 of this report. The testing incorporated end-to-end election scenarios testing the functionality supported by **Hart**. The following sections detail the test suites that were executed.

5.3.1.1 Accuracy

An Accuracy test suite was performed to verify the system's ability to record, store, consolidate, and report selections made by the voter, without error. This test suite utilized the **Verity Central** and **Verity Scan** devices. Pre-marked ballots in all supported ballot sizes were processed through the devices. Results were processed through **Verity Count** and examined for completeness and correctness.

5.3.1.2 Closed Primary Election

A Closed Primary test suite was performed in order to verify proper integration of the full **Verity Voting 2.5** system, and that all components continue to work as expected.

5.3.1.3 Error Message and Recovery

An Error Message and Recovery test suite was performed on the new **Verity Touch Writer Duo Standalone** device.

5.3.1.4 General Election 1

A General Election test suite was performed in order to verify proper integration of the full **Verity Voting 2.5** system, and that all components continue to work as

expected. This election variant focused on election components such as N of M, overvotes, undervotes multiple precincts, and scanning to accept both ballots and PVRs in a single session.

5.3.1.5 General Election 2

A second variation of a General Election test suite was performed in order to verify proper integration of the full **Verity Voting 2.5** system, and that all components continue to work as expected. This election variant included basic election components, as well as the Haitian Creole and Spanish languages.

5.3.1.6 Modifications

The Modification test suite examined each modification introduced into **Verity Voting 2.5** in order to verify that the modifications implemented, and the subsequent Trusted Build of the firmware, did not adversely affect operations. Various elections were used to exercise the devices and workstations such that each specific modification was functionally verified, with an appropriate quantity of regression testing performed as determined by analysis od the modifications.

5.3.1.7 Open Primary Election

The full **Verity Voting 2.5** system was reviewed in order to verify proper integration of the voting system and that all components continue to work as expected. This election variation included the modification for Wisconsin state-specific Party Selector Contest functionality.

5.3.1.8 Security

A security test suite was designed and executed to examine various security enhancements to the **Verity Voting 2.5** system as a primary focus. Beyond review of the modifications and enhancements to the system, additional testing was performed to verify the security posture of the system.

The examination of the McAfee Whitelisting tool version was completed to ensure it was properly implemented on a new windows-based operating system. All attempts to circumvent or render the whitelisting ineffective were unsuccessful. Software access controls were tested. All attempts to circumvent or manipulate the kiosk mode were unsuccessful. All user roles and authentication mechanisms were properly implemented per the vendor documentation. Attempts for user privilege escalation and all attempts to perform unauthorized or restricted system functionality were unsuccessful.

Automated vulnerability scans were taken of all networked machines to establish system vulnerabilities as well as determine any and all open networking ports. Communications between **Verity Relay** and **Verity Scan** were monitored after leaving the public cellular network. Network analysis tools were used to obtain network packet captures to examine communication and authentication attempts between devices, and to assess that appropriate encryption is utilized. Vulnerability

scans were conducted of all devices that were connected via public or proprietary networking. The communications between **Verity Controller** and daisy chained devices were also examined to confirm that communications were encrypted and that "Man in the Middle" attacks were resisted, and unsuccessful.

5.3.1.9 Verity Central

The **Verity Central** application was retested in order to verify that the modifications implemented, and the subsequent Trusted Build of the software, did not adversely affect operations within the application.

5.3.1.10 Verity Count

The **Verity Count** application was re-tested in order to verify that the modifications implemented, and the subsequent Trusted Build of the software, did not adversely affect operations within the application.

5.3.1.11 Verity Data/Build

The **Verity Data/Build** application was re-tested in order to verify that the modifications implemented, and the subsequent Trusted Build of the software, did not adversely affect operations within the application.

5.3.1.12 Verity Relay

The **Verity Relay** application was re-tested in order to verify that the modifications implemented, and the subsequent Trusted Build of the software, did not adversely affect operations within the application.

5.3.1.13 Verity Touch Writer Duo Standalone

All features and functionality of the new **Verity Touch Writer Duo Standalone** device were tested in-depth to verify they work as documented, and that all functionality is appropriately documented.

5.3.1.14 2-Hour Backup Battery

A 2-Hour Backup Battery test suite was performed on the new **Verity Touch Writer Duo Standalone** device.

5.3.2 Evaluation of Functional Testing

In this test campaign, **the Verity Voting 2.5** voting system was subjected to examination for changes, updates, and modifications made from the previously certified system, **Verity Voting 2.4**, against applicable requirements within the EAC VVSG 1.0.

Through the duration of testing, two functional discrepancies were written. Details of these discrepancies can be found in Attachment F. These discrepancies were reported and appropriately resolved. Once the discrepancies were addressed, no violation of conformance to EAC VVSG 1.0 requirements was observed. All

components of the **Verity Voting 2.5** voting system have successfully passed all tests.

5.4 Hardware Test Summary

SLI and their certified third-party hardware test laboratory, National Technical Systems (NTS), performed an analysis and review of the modified **Verity Voting 2.5** system hardware components. During execution of testing performed at NTS, an SLI representative was present to oversee the testing.

The test methodologies for all tests are identified in the hardware test plan and hardware test reports, listed in section 1.2 of this document.

The hardware testing for this test campaign consisted of the following electromagnetic emissions and immunity tests for the **Verity Touch Writer Duo Standalone**:

- Radiated Emissions – FCC, Part 15 Class B ANSI C63.4.
- Conducted Emissions – FCC, Part 15 Class B ANSI C63.4.
- ESD – IEC 61000-4-2 (2008) Ed. 2.0.
- Electromagnetic Susceptibility – IEC 61000-4-3 (1996).
- Electrical Fast Transient – IEC 61000-4-4 (2004-07) Ed. 2.0.
- Lightning Surge – IEC 61000-4-5 (1995-02).
- Conducted RF Immunity – IEC 61000-4-6 (1996-04).
- Magnetic Fields Immunity – IEC 61000-4-8 (1993-06).
- Electrical Power Disturbance – IEC 61000-4-11 (1996-06).

5.4.1 Evaluation of Hardware Testing

As this test campaign was a modification of an EAC certified voting system, only modified hardware components of the **Verity Voting 2.5** voting system were evaluated against applicable hardware requirements.

One discrepancy was written during this test campaign for an issue encountered during hardware testing. Details can be found in Attachment F of this document. **Hart** sufficiently addressed the issue and subsequently passed all hardware tests.

6 Recommendation

SLI has successfully completed the testing of the **Hart Verity Voting 2.5** voting system. It has been determined that the system meets the required acceptance criteria of the Election Assistance Commission's Voluntary Voting System Guidelines 1.0.

This recommendation reflects the opinion of SLI Compliance based on testing scope and results. It is SLI's recommendation based on this testing effort that the EAC grant certification of the **Hart Verity Voting 2.5** voting system.

SLI:

Traci Mapps
Director
August 17th, 2020

7 Appendix – Ancillary Products

Ancillary systems represent products and utilities that are not part of the EAC certified system configuration, however, they may be used to facilitate testing.

Ancillary systems include:

- Optional Verity Duo Go - a carrier for use with **Verity Touch Writer Duo** and **Verity Touch Writer Duo Standalone** to allow for "curbside" voting.
- Optional ATI Device

  Manufacturer: AbleNet
  Device: Dual Jelly Bean Switch

End of Certification Test Report

Verity Voting 2.5
Change Notes

CONFIDENTIAL AND PROPRIETARY

Hart InterCivic	
Document Number: 4005669	Revision: A.01
Document Title: Verity Voting 2.5 Change Notes	
PDF File Name: Verity Voting 2.5 Change Notes 4005669 A01.pdf	Page 1 of 12

Change History

Version	Date	Author(s)	Description
A.00	05/08/2020	Hart InterCivic	Initial Draft
A.01	05/29/2020	Hart InterCivic	Add to section 3.3.6: Increase ballot limit on Verity Scan vDrive. Remove from section 3.4.1: UEFI Secure Boot on Workstations Added additional documentation changes Add to section 3.4.5: Add keyboard shortcuts for Central
A.02	07/08/2020	Hart InterCivic	Release A.01 did not remove from section 3.4.1: UEFI Secure Boot on Workstations from the body of the document as stated in the Change History. It is now removed.

TABLE OF CONTENTS

List of Figures

1 INTRODUCTION

1.1 Document Purpose

This document provides a description of the features included in Verity Voting Version 2.5. This document also identifies any features found in previous EAC-certified releases that are not included in Version 2.5.

2 BRIEF DESCRIPTION

2.1 Verity Voting 2.5 Abstract

Verity Voting 2.5 is a modification of the EAC-certified Verity Voting 2.4 and includes all features and functionality included in certified system Verity Voting 2.4, unless otherwise noted in this document. Verity Voting 2.5 introduces Windows 10 on all devices and workstations, further enhances security, adds Haitian Creole, allows Verity Touch Writer Duo to function as a Standalone device without the use of Verity Controller, and other changes fully described in Section 3.

All software components will be built at version 2.5.0 during the initial Trusted Build. Any subsequent Trusted Builds of any or all software components during the certification campaign will result in an increment of the 3rd integer of each individual software component version number shown here as "X": 2.5.X.

Verity Voting 2.5 is submitted to the EAC for compliance to the EAC's *Voluntary Voting System Guidelines* v. 1.0 (2005).

Verity Voting components and features not addressed in the following Change Notes are unchanged from the prior versions.

2.1.1 Verity Voting 2.5 Configuration

Verity Voting 2.5 is a voting system that supports paper–based, DRE, and by-mail voting. Different configurations are available depending on the size of polling places, the expected number of voters, and other polling place needs.

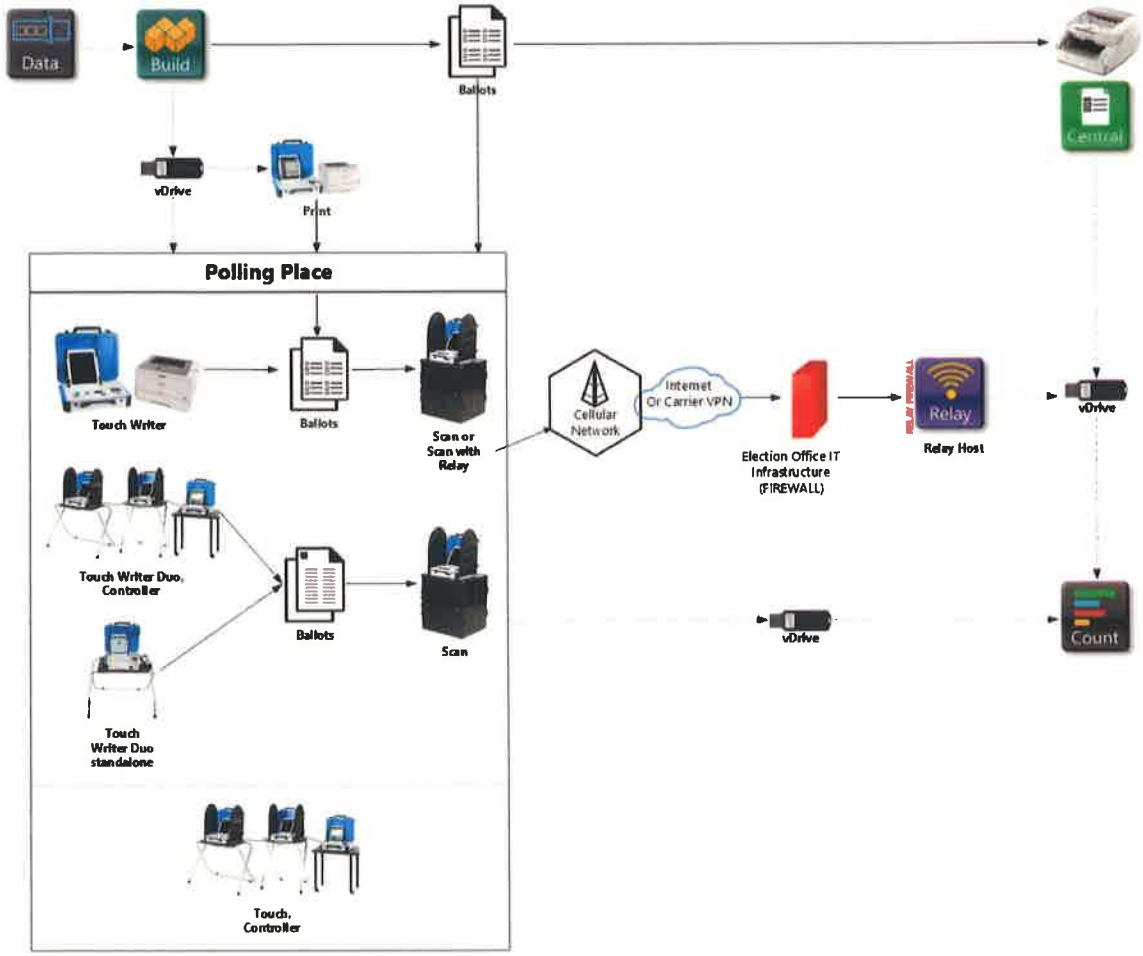


Figure 1 – Verity Voting 2.5 System Abstract Diagram

Overview of the diagram:

- The components are displayed as touch points of data access, transfers, and verification.
- Dotted lines show the flow of data and air gaps using vDrives and are also used to separate the deployment models shown within the polling place.
- Verity Print is a ballot production device that provides unmarked printed ballots.
- Verity Touch Writer and Scan may be installed in polling places to support paper-based voting.
- Verity Controller, Touch Writer Duo, Touch Writer Duo Standalone, and Scan may be installed in polling places to support paper-based voting.
- Verity Controller and Touch may be installed in polling places to support DRE voting.
- Verity Key (not shown) is required for user access into components to load elections, to use critical features, and to generate reports. Feature access depends on the roles applied to user accounts.

The following sections describe features added to Verity Voting 2.5. Features added have been tested and verified by the Hart QA team in accordance with the Software Verification and Validation Process, document 1000560, and are maintained in accordance with Hart's Record Retention Matrix, 1000510.

3 FEATURE ENHANCEMENTS TO VERITY VOTING

3.1 Features for all devices and workstations

- Windows Embedded Standard 7 OS is replaced with Windows 10 Enterprise 2019 LTSC
- Support for Haitian Creole language
- Security enhancement: vDrive file and folder names and paths are added to the signed and validated content.

3.2 Wisconsin Specific Features

- Support for Open Primary logic for the state of Wisconsin. Logic is a combination of Hart's current open primary logic with the addition of a party selector contest.

3.3 Additional Features for Verity Devices

3.3.1 Features for all devices

- A user may now create a recovery vDrive and export temporary logs (these are logs when a vDrive for the currently loaded election is not present) to a USB stick during a system alert.
- Backup data may now be deleted.
- SQL Server 2012 is replaced with SQLite 3.29.

3.3.2 Features for devices with thermal report printers

- Device Tests menu function to send a test page to the thermal roll printer is renamed "Test report printer."

3.3.3 Features for devices that allow poll workers to activate a ballot

- If only one precinct-split will appear on the Select Precinct screen, the system shall automatically select it and not present the Select Precinct screen.
- If only one party will appear on the Select Party screen, the system shall automatically select it and not present the Select Party screen.

3.3.4 Features for devices with ballot entry and review

- New option to require voters to view all contests on the ballot before finishing their voting session. This option is set in Verity Build.

3.3.5 Features for Touch Writer Duo

- Introduction of Standalone configuration that does not require the use of a Verity Controller. The Touch Writer Duo Standalone configuration is akin to the Touch Writer device and includes a thermal report printer and support for the optional AutoBallot barcode scanner.
- New Verity Duo Go, a carrier for use with Verity Touch Writer Duo to enable "curbside" voting.
- Device Tests menu function to send a test page to the full sheet thermal printer is renamed "Test vote record printer."

3.3.6 Features for Verity Scan

- Scan devices that support PVR scanning now also support standard paper ballot scanning in the same session.
- New option for an automatic duplicate vDrive when two vDrives are inserted. This option is set in Verity Build.
- 3G modem support for use with the Relay kit is removed.

- Increase single sheet ballot limit per vDrive to 25,000 to support long early voting events. The Ballot Box limit is unchanged and must be emptied every 4000 sheets.

3.4 Additional Features for Verity Workstations

3.4.1 Features for all workstations

- SQL Server 2012 is replaced with SQL Server 2017.
- Security enhancement: TPM 2.0 support implemented on Z240 and Z4 G4 workstations.

3.4.2 Features for Workstations with ballot proofing

- New report, Translation Proofing Report, added to Verity Data and Verity Build.

3.4.3 Features for Verity Data

- A Party Selector Contest may now be added in an Open Primary election.
- Keyboard shortcut keys added for usability and convenience:
  - Select Election screen
    - Alt+O for "Open"
  - Contest Titles screen
    - Alt+O for "Add Office"
    - Alt+P for "Add Proposition"
    - Alt+R for "Add Party Selector"
  - Choices screen
    - Alt+A for "Add Choice"
    - Alt+D for "Delete Choice"
  - Rotation
    - Alt+G for "Generate Indices"
  - Audio screen
    - Alt+I for "Import"
    - Alt+E for "Export"
    - Alt+N for "Normalize"
    - Alt+A for "Normalize All"
    - Alt+C for "Clear Entry"
  - Import screen
    - Alt+I for "Import"
  - Export screen
    - Alt+E for "Export"

3.4.4 Features for Verity Build

- The following feature enhancements to devices discussed above are settable in Verity Build:
  - New option to require voters to view all contests on the ballot before finishing their voting session.
  - New option for automatic duplicate vDrive creation in Verity Scan.
- Print Queue import now allows write-in text to be defined for each write-in available on the ballot.

3.4.5 Features for Verity Central

- Support for the scanning of Printed Vote Records. The default Voting Method is set in the election's task.
  - Select Election tab
    - Alt+S for "Save" in the preferences menu
  - Scan tab
    - Enter for "Scan" in the Scan menu

        - Alt+R for "Batch Report" in the Manage Batches menu
        - Alt+T for "Change Type" in the Manage Batches menu
        - Alt+N for "Edit Notes" in the Manage Batches menu
        - Alt+D for "Delete Batch" in the Manage Batches menu
        - Enter for "Search" in the Search Ballots menu
        - Alt+S for "Save" in the Settings menu
        - Alt+T for "Test Scan" in the Settings menu
    - Review Tab
        - Alt+A for "Add Choice" in the Review images menu
        - Alt+C for "Clear Filters" in the Review images menu
        - Alt+R for "Refresh List" in the Review images menu
        - Alt+P for "Print List" in the Review images menu
        - Alt+A for "Accept" in the Review Images menu (Ballot Review)
        - Alt+R for "Revert" in the Review Images menu (Ballot Review)
        - Alt+P for "Previous" in the Review Images menu (Ballot Review)
        - Alt+N for "Next" in the Review Images menu (Ballot Review)
        - Alt+Left Arrow for "Previous Unresolved" in the Review Images menu (Ballot Review)
        - Alt+Right Arrow for "Next Unresolved" in the Review Images menu (Ballot Review)
        - ESC for "Return to Page View" in the Review Images menu (Ballot Review)

3.5 Corrected Defects

The following defects found in Verity 2.4 have been corrected in the Verity Voting 2.5 modification

Product	Description of Verity Voting 2.4 Defect	Resolution/Results in Verity Voting 2.5
Verity Count	Application does not save the update a write-in name on the Write-in Candidate screen UI if the change made is *only* to the case of the alphabet (i.e. uppercase, lowercase).	Corrected. Name change is now saved, even when the change is only to case of the alphabet.

3.6 Verification

Features shown in Section 3 have been tested and verified by the Hart QA team in accordance with the Software Verification and Validation Process, document 1000560, and are maintained in accordance with Hart's Record Retention Matrix, 1000510. Records of test results are given in the file HPQC Test Cases.pdf provided in the Verity 2.5 TDP.

4 DOCUMENTATION CHANGES OVERVIEW

Several documents have been replaced and/or revised for the features in Verity Voting 2.5.

4.1 Additional TDP Documents

The following documents are additions to the Verity 2.5 TDP that are not intended to replace existing documentation found the Verity 2.4 TDP package. To see documents that are modified, deleted, or replaced, see section 4.2.

- Verity Voting 2.5 Change Notes 4005669
- Verity Redstone (Verity 2.5) Modification TRD
- Hardware Design file for Touch Writer Duo Standalone
- Hardware Design file for Duo Go Curbside Carrier
- HP Z4 G4 Workstation Manufacturing Document
- Polling Place Field Guide for Touch Writer Duo Standalone and Scan

4.2 Removed TDP Documents

The Logging Design document was removed, as its requirements were satisfied by the included Verity Logging TRD.

The System Limits document was removed, as it is redundant with Verity 2.5 System Administrators Guide Appendix C: Verity System limits & Access.

4.3 Documentation Modified or Replaced in Verity Voting 2.5

The following documents have been Removed, replaced, or modified in the Verity Voting 2.5 TDP:

Device OS Creation and Configuration Process Document Verity 2.4	Replaced with Device OS Creation and Configuration Process Document Verity 2.5.
Device WES7 Image Creation Process Document	Update for Windows 10
Workstation WES7 Image Creation Process Document	Update for Windows 10
The Creation and configuration of the Trusted Build Environment	Update for Verity 2.5
HPQC Test Cases	Updated for additional test cases for the Verity 2.5 modification. Use bookmarks to browse.
Verity 2.4 Implementation Statement	Replaced by the Verity 2.5 Implementation Statement
Verity 2.4 TDP Abstract	Replaced with Verity 2.5 TDP Abstract
Verity 2.4 VVSG 1.0 TDP Trace	Replaced with Verity 2.5 VVSG 1.0 TDP Trace
Index	Updated for all document changes for system Verity Voting 2.5.
Verity 2.4.X COTS List	Replaced with Verity 2.5.X COTS list
Verity Application Installer Build Process Document Verity 2.4.2	Replaced with Verity Application Installer Build Process Document Verity 2.5.0
Verity Entity Relationship Diagram Database - Devices	Update for all database modifications in Verity Voting 2.5 (throughout).
Verity Entity Relationship Diagram Database - Servers (Count Only)	Update for all database modifications in Verity Voting 2.5 (throughout).
Verity Database Attributes	Update for all database modifications in Verity Voting 2.5 (throughout).
Verity Electronics Specification	Updates throughout to add Verity Touch Writer Duo Standalone configuration.
Verity Operational Environment	Update for Verity 2.5 suite of products and version numbers. Includes updates for Windows 10.
Verity Voting 2.4 Usability Impact Statement	Replaced with Verity Voting 2.5 Usability Impact Statement
Verity Voting National Certification Test Specification	Updated for Verity Voting 2.5
Verity Workstation Manufacturing	Added additional detail and notes throughout after internal review. Split into three documents, one for each Hewlett-Packard workstation model for clarity. Update for changes with Windows 10.

Document Control Procedures	Updated to reference Hart's implementation of Propel Product Life Cycle Management Software.
Software Versioning Procedure	Corrections for consistency and wording throughout.
Verity 2.4 Administrator's Guide: Data	User documentation revised throughout for Verity Voting 2.5
Verity 2.4 Administrator's Guide: Build	User documentation revised throughout for Verity Voting 2.5
Verity 2.4 Administrator's Guide: Count	User documentation revised throughout for Verity Voting 2.5
Verity 2.4Administrator's Guide: Central	User documentation revised throughout for Verity Voting 2.5
Verity 2.4 System Administrator's Guide	User documentation revised throughout for Verity Voting 2.5
Verity 2.4 Support Procedures Guide	User documentation revised throughout for Verity Voting 2.5
Verity 2.4 Device Troubleshooting Field Guide	User documentation revised throughout for Verity Voting 2.5
Verity 2.4 Polling Place Field Guide: Controller, Duo, Scan	User documentation revised throughout for Verity Voting 2.5
Verity 2.4 Polling Place Field Guide: Controller, Touch	User documentation revised throughout for Verity Voting 2.5
Verity 2.4 Polling Place Field Guide: Scan, Touch Writer	User documentation revised throughout for Verity Voting 2.5.
Verity 2.4 Polling Place Field Guide: Scan, Touch Writer (when used with Relay)	User documentation revised throughout for Verity Voting 2.5.
2.4 Verity Scan Field Guide: for Centralized Ballot Processing	User documentation revised throughout for Verity Voting 2.5.
Verity 2.4 Print Field Guide	User documentation revised throughout for Verity Voting 2.5
Workstation Configuration Process Document Verity 2.4	Updated throughout for Verity Voting 2.5
Verity Relay Implementation Process	Remove 3G modems
Verity Relay Theory of Operations	Remove 3G modems

ES&S

Presentation

and

Request for Approval

EVS 6.1.1.0

July 12, 2021

- Ben Swartz, Senior State Certification Manager
  - **Questionnaire from Philadelphia County, PA**
  - **Questionnaire from Hampton County, SC**
  - **Questionnaire from Lee County, SC**
  - **Questionnaire from South Carolina State Election Commission**

COPY

Tennessee Secretary of State
Tre Hargett

Elections Division
312 Rosa L. Parks Avenue, 7th Floor
Nashville, Tennessee 37243-1102

Mark Goins
Coordinator of Elections

615-741-7956
Mark.Goins@tn.gov

July 14, 2021

Ben Swartz
Sr. State Certification Manager
11208 John Galt Boulevard
Omaha, NE 68137

Dear Mr. Swartz:

On July 12, 2021, you came before the State Election Commission (SEC) and presented the ES&S EVS 6.1.1.0. The SEC reviewed the questionnaires provided by jurisdictions currently using the ES&S EVS 6.1.1.0 voting system.

This letter is to inform you that the SEC and I certified the ES&S EVS 6.1.1.0 voting system on July 12, 2021. This voting system may be sold to counties in Tennessee.

As you know, the State Election Commission requires the use of ballot tote bins to be used with optical scanners.

Thank you for your cooperation in the certification process.

Sincerely,

Mark Goins

Mark Goins
Coordinator of Elections

Attachment: EAC Certification – ESSEVS6110

ELECTION Systems & Software

July 1, 2021

Sent via UPS and Email

Mr. Mark Goins
Division of Elections
Tennessee Department of State
312 Rosa L. Parks Avenue
7th Floor, William R. Snodgrass Tower
Nashville, TN 37243

RE: Request for State Certification of Election Systems & Software's EVS 6.1.1.0 Voting System

Dear Mr. Goins:

Election Systems & Software (ES&S) is pleased to present this request to the Tennessee State Election Commission for state certification consideration of our most recent Election Assistance Commission (EAC) Certified *EVS 6.1.1.0 Voting System*.

On July 27, 2020, the EAC granted certification of EVS 6.1.1.0 for conformance to the *Voluntary Voting System Guidelines (VVSG) v 1.0* standards and is an upgrade to the EVS 6.0.2.0 release certified by the Tennessee State Election Commission on July 22, 2019.

In addition to EAC Certification, 12 states have state certified the EVS 6.1.1.0 release. Those states are Delaware, Kansas, Missouri, Mississippi, Ohio, Oregon, Pennsylvania, Texas, Washington, West Virginia, and Virginia. Included with this cover letter is a completed survey from Hampton County, South Carolina as well as the City of Philadelphia.

The table below represents the major components of the EVS 6.1.1.0 voting system version numbers in comparison to the EVS 6.0.2.0 voting system version numbers.

Tennessee **State Certification of EVS 6.1.1.0** **EAC Certified: 7/27/2020** **VVSG v. 1.0 Compliant**			
		EVS 6.0.2.0	**EVS 6.1.1.0**
Election Management System (EMS)	ElectionWare	5.0.1.0	6.0.1.0
ES&S Tabulators	DS200 Precinct Tabulator (HW 1.2, 1.3)	2.17.0.0	2.30.0.0
	DS450 Central Tabulator (HW 1.0)	3.1.0.0	3.4.0.0
	DS850 Central Tabulator (HW 1.0)	3.1.0.0	3.4.0.0
Universal Voting System	ExpressVote	1.5.0.0 (HW 1.0) 2.4.0.0 (HW 2.1)	4.0.0.0 (HW 1.0/2.1)

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Below is a brief summary of the enhancements since EVS 6.0.2.0 that are being submitted for State Certification consideration. Please refer to the System Overview for additional details pertaining to the products within the EVS 6.1.1.0 voting system.

- **Beneficial Enhancements on the Election Management System (EMS)**

  The primary upgrade on the EMS is the Operating System has been updated to Windows 10 and Server 2016. The EVS 6.1.1.0 release also has the option to enable BitLocker and AppLocker on the EMS as a tool a jurisdiction could use to further lockdown their EMS.

- **Beneficial Enhancements on the ExpressVote:**

  When jurisdictions upgrade to EVS 6.1.1.0, jurisdictions and voters will see a revamped voter experience on the ExpressVote. The ExpressVote can now display 1-4 columns worth of contest/candidates. In previous versions of the ExpressVote, the ExpressVote only displayed one contest at a time. The ExpressVote now supports the ability to display text formatted with different colors and attributes (ie: font size, color, and strikethrough for an example). Lastly, the ExpressVote now has the ability for a voter to brighten/dim the display.

- **Beneficial Enhancements on the DS200**

  The main feature of DS200 v. 2.30.0.0 is on the write-in review tape which now sorts write-ins by precinct and suppresses on that report the contests that did not have any write-ins, avoiding wasteful printing. An optional, self-locking Compact Flash card containing the firmware and operating system can also be utilized to protect the firmware and operating system from unauthorized use.

- **Beneficial Enhancements on the DS450/DS850**

  The primary feature for the DS450/DS850 is the optional, read-only Compact Flash card containing the firmware and operating system can be utilized to protect the firmware and operating system from unauthorized use.

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Included with this cover letter is an enclosed CD-ROM that contains the Pro V&V EVS 6.1.1.0 VSTL Test Report, the EAC Scope of Certification for EVS 6.1.1.0, ES&S' Technical Data Package which includes the system overview, system operation manuals, security documents, maintenance manuals, etc., and the completed surveys required for certification approval.

In pursuant of item B under the Second Step of the Tennessee procedures for certifying voting systems, ES&S respectfully request the examination and approval of EVS 6.1.1.0 be scheduled at the July 12, 2021 Tennessee State Election Commission meeting.

If you require additional documentation or clarification, please do not hesitate to contact me via telephone at 402-970-1143 or email at ben.swartz@essvote.com.

Sincerely,

Benjamin Swartz
Sr. State Certification Manager
Election Systems & Software, LLC

Encl: Product Brochures, EAC Scope of Certification, CD Rom Containing Technical Data Package (TDP)

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United States Election Assistance Commission

Certificate of Conformance

ES&S EVS 6.1.1.0

The voting system identified on this certificate has been evaluated at an accredited voting system testing laboratory for conformance to the *Voluntary Voting System Guidelines Version 1.0 (VVSG 1.0)*. Components evaluated for this certification are detailed in the attached Scope of Certification document. This certificate applies only to the specific version and release of the product in its evaluated configuration. The evaluation has been verified by the EAC in accordance with the provisions of the EAC *Voting System Testing and Certification Program Manual* and the conclusions of the testing laboratory in the test report are consistent with the evidence adduced. This certificate is not an endorsement of the product by any agency of the U.S. Government and no warranty of the product is either expressed or implied.

Product Name: EVS

Model or Version: 6.1.1.0

Name of VSTL: Pro V&V

EAC Certification Number: ESSEVS6110

Date Issued: July 27, 2020

Mona Harrington

Executive Director

Scope of Certification Attached

Scope of Certification

This document describes the scope of the validation and certification of the system defined above. Any use, configuration changes, revision changes, additions or subtractions from the described system are not included in this evaluation.

Significance of EAC Certification

An EAC certification is an official recognition that a voting system (in a specific configuration or configurations) has been tested to and has met an identified set of Federal voting system standards. An EAC certification is **not**:

- An endorsement of a Manufacturer, voting system, or any of the system's components.
- A Federal warranty of the voting system or any of its components.
- A determination that a voting system, when fielded, will be operated in a manner that meets all HAVA requirements.
- A substitute for State or local certification and testing.
- A determination that the system is ready for use in an election.
- A determination that any particular component of a certified system is itself certified for use outside the certified configuration.

Representation of EAC Certification

Manufacturers may not represent or imply that a voting system is certified unless it has received a Certificate of Conformance for that system. Statements regarding EAC certification in brochures, on Web sites, on displays, and in advertising/sales literature must be made solely in reference to specific systems. Any action by a Manufacturer to suggest EAC endorsement of its product or organization is strictly prohibited and may result in a Manufacturer's suspension or other action pursuant to Federal civil and criminal law.

System Overview

The ES&S EVS 6.1.1.0 (EVS6110) voting system is a modification of the EVS 6.1.0.0 voting system, certified on September 24, 2019. EVS6110 introduces multiple performance and optimization improvements for Electionware.

EVS6110 includes the following hardware: ExpressTouch™ Electronic Universal Voting System, ExpressVote XL™ Full-Faced Universal Voting System, ExpressVote® Universal Voting System hardware 1.0, ExpressVote® Universal Voting System hardware 2.1, DS450® High-Throughput Central Tabulator, DS850® High-Speed Central Tabulator and DS200® Precinct-Based Tabulator.

Electionware® election management software is an end-to-end election management software

application that provides election definition creation, ballot formation, equipment configuration, result consolidation, adjudication, and report creation. Electionware is composed of five software groups: Define, Design, Deliver, Results, and Manage.

ExpressVote XL™ is a hybrid paper-based polling place voting device that provides a full-faced touch screen vote capture interface that incorporates the printing of the voter's selections as a cast vote record and tabulation scanning in a single unit.

ExpressTouch® is a DRE voting system which supports electronic vote capture for curbside voting at the polling place.

ExpressVote® Hardware 1.0 is a hybrid paper-based polling place voting device that provides touch screen vote capture that incorporates the printing of the voter's selections as a cast vote record to be scanned for tabulation in any one of the ES&S precinct or central scanners.

ExpressVote® Hardware 2.1 is a hybrid paper-based polling place voting device that provides touch screen vote capture that incorporates the printing of the voter's selections as a cast vote record to be scanned for tabulation in any one of the ES&S precinct or central scanners.

DS200® is a polling place paper-based voting system, specifically a digital scanner and tabulator that simultaneously scans the front and back of a paper ballot and/or vote summary card in any of four orientations for conversion of voter selection marks to electronic cast vote records (CVR).

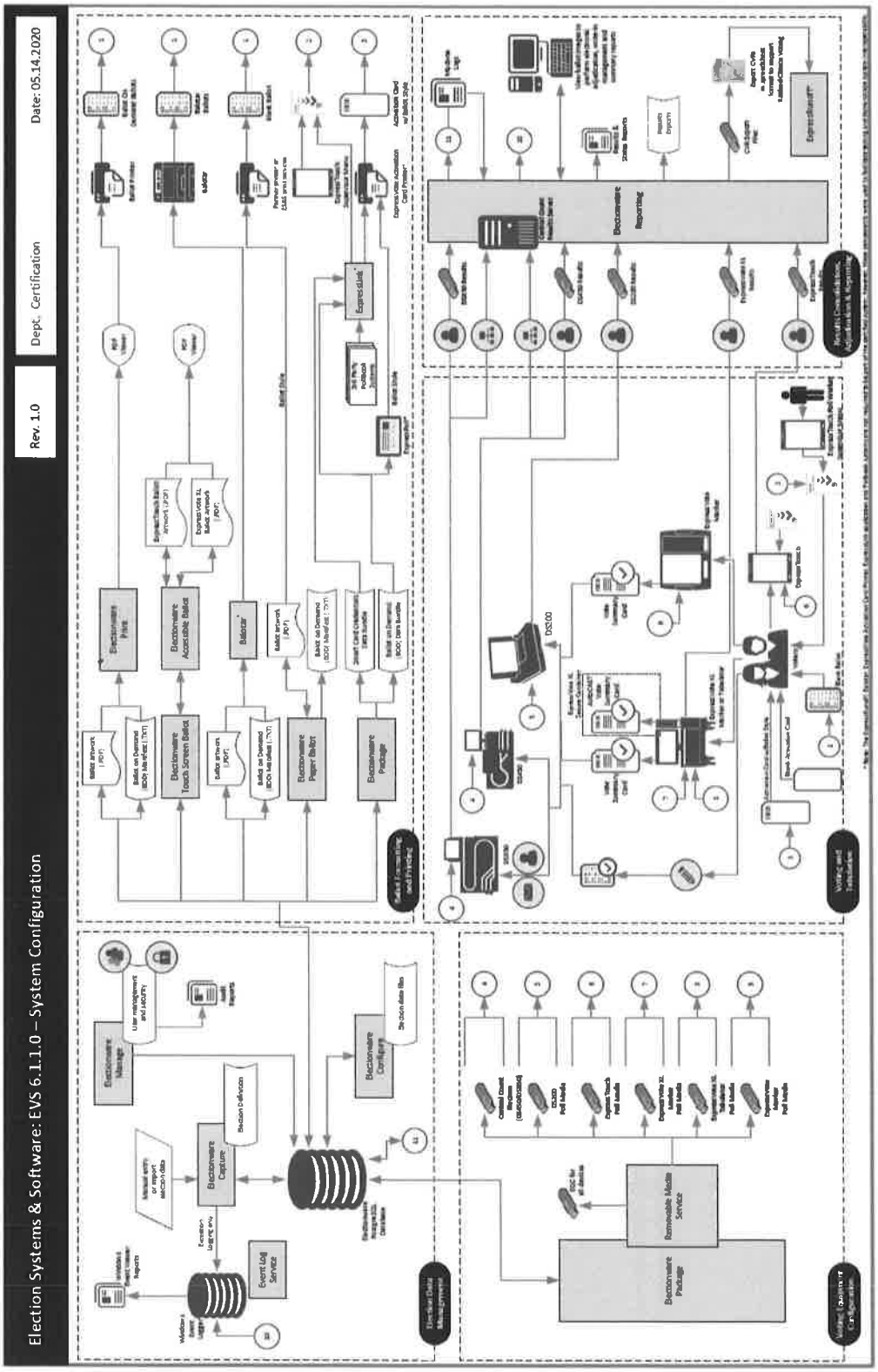
DS450® is a central scanner and tabulator that simultaneously scans the front and back of a paper ballot and/or vote summary card in any of four orientations for conversion of voter selection marks to electronic CVRs.

DS850® is a central scanner and tabulator that simultaneously scans the front and back of a paper ballot and/or vote summary card in any of four orientations for conversion of voter selection marks to electronic CVRs.

Event Log Service (ELS) monitors and logs users' interactions with the election management system. Events that happen when a connection to the database is not available are logged to the Windows operating system log through the ELS.

Removable Media Service (RMS) is a utility that runs in the background of the Windows operating system. RMS reads specific information from any attached USB devices so that an ES&S application such as Electionware can use that information for media validation purposes.

System Diagram



Certified System before Modification (<u>If applicable</u>):

EVS 6.1.0.0

Changes addressed by modification

Software/Firmware

Cross-Product Changes

- Security Enhancements

  Added critical Windows security updates available at the time of certification testing.

  Impacted products: Election Management System

- Arial Fonts

  Included the recommended Arial fonts, which allows states to have better flexibility for ballot/election layout.

  Impacted products: Election Management System

- Increased RAM Potential

  Provided the option for increased physical RAM on the EMS in the client, server and/or standalone configurations (optional). Increased the amount of virtual RAM available to Electionware (optional).

  Impacted products: Election Management System

- Modified Password Policy

  Provided a method for modifying the Microsoft Windows password policy to not expire on the EMS (optional).

  Impacted products: Election Management System

Electionware

- Adjudication
  - Added an updated JAR file to prevent relocated JAI classes from loading. This prevents the Internal Error displayed when attempting to view ExpressVote XL write-in images.
  - Adjusted misalignment of write-in snippets for ExpressVote XL and ExpressVote vote summary cards so they reflect the correct ballot image.
  - Provided an additional user logging message to enhance the transparency and security of the database. This additional logging is included within the Reporting module to assist users during ballot adjudication.
- Performance Improvement

- Provided an additional internal Postgres system logging message to enhance the security and performance of the database. This additional logging is included within the internal Postgres logging for analytical, internal traceability and allows for further indexing for added performance

- Exports/Reporting
  - Removed all empty entries in the CVR export report.

Mark Definition

ES&S' declared mark recognition for the DS200, DS450, and DS850 is a mark across the oval that is 0.02" long x 0.03" wide at any direction.

Tested Marking Devices:

Bic Grip Roller Pen

Language Capability

System supports English, Spanish, Chinese, Korean, Japanese, Hindi, Bengali, Vietnamese, Tagalog, Creole, Russian, French. In addition, Punjabi and Gujarati are supported by ExpressVote XL and Electionware only.

Proprietary Components Included

This section provides information describing the components and revision level of the primary components included in this Certification.

System Component	Software or Firmware Version	Hardware Version	Model	Comments
Electionware	6.0.1.0			Election management software that provides end-to-end election management activities
ES&S Event Log Service (ELS)	2.0.0.0			Logs users' interactions with EMS
Removable Media Service	2.0.0.0			Utility that runs in the background of the Windows operating system
DS200	2.30.0.0	1.2, 1.3		Precinct count tabulator that scans voter selections from both sides of the ballot simultaneously
DS200 Ballot Box		1.0, 1.1	98-00009	Collapsible ballot box
DS200 Ballot Box		1.2, 1.3, 1.4, 1.5	57521	Plastic ballot box
DS200 Tote Bin		1.0	00074	Tote bin ballot box
DS200 Ballot Trolley			60	Rolling bag for transporting scanned ballots (optional)
DS200 Ballot Tote Bag			212516	Bag for transporting scanned ballots (optional)
DS450	3.4.0.0	1.0		Central count scanner and tabulator
DS450 Cart			3002	
DS850	3.4.0.0	1.0		Central count scanner and tabulator
DS850 Cart			6823	
ExpressVote XL	1.0.3.0	1.0		Hybrid full-faced paper-based vote capture and selection device and precinct count tabulator
ExpressTouch	1.0.3.0	1.0		DRE
ExpressVote HW1.0	4.0.0.0	1.0		Hybrid paper-based vote capture and selection device
ExpressVote HW2.1	4.0.0.0	1.0		Hybrid paper-based vote capture and selection device
ExpressVote Rolling Kiosk		1.0	98-00049	Portable Voting Booth
Voting Booth			98-00051	Stationary Voting Booth
Voting Booth Workstation			87035	Stationary voting booth
Quad Express Cart			41404	Portable Voting Booth
MXB ExpressVote Voting Booth			95000	Sitting and Standing Voting Booth
ExpressVote Single Table			87033	Voting Table for One Unit

System Component	Software or Firmware Version	Hardware Version	Model	Comments
ExpressVote Double Table			87032	Voting Table for Two Units
ADA Table			87031	Voting Table for One Unit
Universal Voting Console (UVC)		2.0	98-00077	Detachable ADA support peripheral
Tabletop Easel			14040	Portable Voting Booth
ExpressTouch Voting Booth			98-00081	Stationary Voting Booth
SecureSetup	3.0.0.2			Proprietary Hardening Script

COTS Software

Manufacturer	Application	Version
Microsoft Corporation	Windows Server 2016	(64-bit)
Microsoft Corporation	Windows 10 Enterprise LTSC	SP1 (64-bit)
Microsoft Corporation	WSUS Microsoft Windows Offline Update Utility	11.6.1
Microsoft Corporation	January 2020 Security Rollup for Windows 10	windows10.0-kb4534273-x64_74bf76bc5a941bbbd0052caf5c3f956867e1de38.msu
Microsoft Corporation	January 2020 Security Rollup for Server 2016	windows10.0-kb4534271-x64_a009e866038836e277b167c85c58bbf1e0cc5dc8.msu
Microsoft Corporation	January 2020 Security Rollup for Server 2016 - Servicing Stack Update	windows10.0-kb4520724-x64_97604f0b532d6da814b4120fc43b2d9f6fd0b356.msu
Symantec	Endpoint Protection	14.2.0_MP1 (64-bit)
Symantec	Endpoint Protection Intelligent Updater (File-based protection)	20190329-001-core15sdsv5i64.exe
Symantec	Endpoint Protection Intelligent Updater (Network-based protection)	20190328-061-IPS_IU_SEP_14RUI.exe
Symantec	Endpoint Protection Intelligent Updater (Behavior-based protection)	20190325-001-SONAR_IU_SEP.exe
Amyuni	PDF Converter Printer Driver	5.5
Cerberus	FTP Server – Enterprise	10.0.8 (64-bit)
Sumatra	PDF	3.1.2 (64-bit)
RSA Security	BSAFE Crypto-C ME for Windows 32-bit	4.1

COTS Hardware

Manufacturer	Hardware	Model/Version
Dell	EMS Server	PowerEdge T430, T630
Dell	EMS Client or Standalone Workstation	Latitude 5580, OptiPlex 5040, 5050, 7020
Dell	Trusted Platform Module (TPM) Chip 1.2 and 2.0 (optional)	M48YR

Manufacturer	Hardware	Model/Version
Innodisk	USB EDC H2SE (8GB) for ExpressVote 1.0	DEEUH1-01GI72AC1SB
Innodisk	USB EDC H2SE (16GB) for ExpressVote 2.1	DEEUH1-16GI72AC1SB
Delkin	USB Embedded 2.0 Module Flash Drive	MY08TQJ7A-RA000-D / 8GB
Delkin	USB Embedded 2.0 Module Flash Drive	MY16TNK7A-RA042-D/ 16 GB
Delkin	USB Flash Drive (512MB, 1GB, 2GB, 4GB, 8GB)	N/A
Delkin	Compact Flash Memory Card (1GB)	CE0GTFHHK-FD038-D
Delkin	Secure Compact Flash Card (2GB)	CE02TLQCK-FD000-D
Delkin	Compact Flash Memory Card Reader/Writer	6381
Delkin	CFAST Card (2GB, 4GB)	N/A
Delkin	USB Flash Drive BitLocker 32.2 MB Storage for Security Key (optional)	N/A
Lexar	CFAST Card Reader/Writer	LRWCR1TBNA
CardLogix	Smart Card	CLXSU128kC7/ AED C7
SCM Microsystems	Smart Card Writer	SCR3310
Avid	Headphones	86002
Zebra Technologies	QR Code Scanner (integrated)	DS457-SR20009, DS457-SR2000ZZWW
Symbol	QR Code Scanner (external)	DS9208
Dell	DS450 Report Printer	S2810dn
OKI	DS450 and DS850 Report Printer	B431DN, B431D, B432DN
OKI	DS450 and DS850 Audit Printer	Microline 420
APC	DS450 UPS	Back-UPS Pro 1500, Smart-UPS 1500
APC	DS850 UPS	Back-UPS RS 1500, Pro 1500
Tripp Lite	DS450 Surge Protector	Spike Cube
Seiko Instruments	Thermal Printer	LTPD-347B
NCR/Nashua	Paper Roll	2320
Fujitsu	Thermal Printer	FTP-62GDSL001, FTP-63GMCL153
HP	Ink Cartridge for DS450/DS850 Ballot Number Imprinting	87002
TDS	Ink Cartridge for DS200 Ballot Number Imprinting	2278

System Limitations

This table depicts the limits the system has been tested and certified to meet.

System Characteristic	Boundary or Limitation	Limiting Component
Max. precincts allowed in an election	9,900	Electionware
Max. candidates allowed per election	10,000	Electionware
Max. contests allowed in an election	10,000	Electionware
Max. contests allowed per ballot style	500 or # of positions on ballot	N/A

System Characteristic	Boundary or Limitation	Limiting Component
Max. candidates (ballot choices) allowed per contest	230	Electionware
Max. number of parties allowed	General election: 75 Primary election: 30 (including nonpartisan party)	Electionware
Max. 'vote for' per contest	230	Electionware
Ballot formats	All paper ballots used in an election must be the same length. Voteable paper ballots must contain the same number of rows	Ballot scanning equipment
Max. ballot styles	15,000	Electionware
Max. ballots per batch	1,500	DS450/DS850
Max. precinct types/groups	25 (arbitrary)	Electionware
Max. precincts of a given type	250 (arbitrary)	Electionware
Max. reporting groups	14	Electionware

Component Limitations

ExpressVote

1. Capacities exceed all documented limitations for the ES&S election management, vote tabulation and reporting system. For this reason, election management system and ballot tabulator limitations define the boundaries and capabilities of the ExpressVote system as the maximum capacities of the ExpressVote are never approached during testing.
2. Does not offer primary support based on the ES&S definition of Open Primary, which is the ability to select a party and vote based on that party.
3. Does not support Massachusetts Group Vote.
4. Does not support Universal Primary Contest.
5. Does not support Multiple Target Cross Endorsement.
6. Does not support Reviewer or Judges Initials boxes.
7. Does not support multi-card ballots.
8. Does not support Team Write-in.

ExpressVote XL

1. Capacities exceed all documented limitations for the ES&S election management, vote tabulation and reporting system. For this reason, election management system and ballot tabulator limitations define the boundaries and capabilities of the ExpressVote XL system as the maximum capacities of the ExpressVote XL are never approached during testing.
2. Does not offer primary support based on the ES&S definition of Open Primary, which is the ability to select a party and vote based on that party.
3. Does not support Massachusetts Group Vote.
4. Does not support Universal Primary Contest.

5. Does not support Multiple Target Cross Endorsement.
6. Does not support Reviewer or Judges Initials boxes.
7. Does not support multi-card ballots.
8. In a general election, ExpressVote XL screen can hold 32 party columns if set up as columns or 16 party rows if set up as rows.
9. Does not support Team Write-in.

ExpressTouch

1. Capacities exceed all documented limitations for the ES&S election management, vote tabulation and reporting system. For this reason, election management system limitations define the boundaries and capabilities of the ExpressTouch system as the maximum capacities of the ES&S ExpressTouch are never approached during testing.
2. Does not offer open primary support based on the ES&S definition of Open Primary, which is the ability to select a party and vote based on that party.
3. Does not support Massachusetts Group Vote.
4. Does not support Universal Primary Contest.
5. Does not support Multiple Target Cross Endorsement.
6. Does not support Team Write-in.

Electionware

1. Electionware software field limits were calculated based on an average character width for ballot and report elements. Some uses and conditions, such as magnified ballot views or combining elements on printed media or ballot displays, may result in field limits (and associated warnings) lower than those listed. Check printed media and displays before finalizing the election.
2. Ballot Images function is limited to 250 districts per export.
3. Support the language and special characters listed above in Supported Languages section. Language special characters other than those on this list may not appear properly when viewed on equipment displays or reports.
4. The Straight Party feature must not be used in conjunction with the Multiple Target Cross Endorsement features.
5. The 'MasterFile.txt' and the 'Votes File.txt' do not support results for elections that contain multiple sheets or multiple ExpressVote cards per voter. These files can be produced using the Electionware > Reporting > Tools > Export Results menu option. This menu option is available when the Rules Profile is set to "Illinois".

Electionware Paper Ballot

1. The paper ballot code channel, which is the series of black boxes that appear between the timing track and ballot contests, limits the number of available ballot variations depending on how a jurisdiction uses this code to differentiate ballots. The code can be used to differentiate ballots using three different fields defined as: Sequence (available codes 1-16,300), Type (available codes 1-30), or Split (available codes 1-18).

2. For paper ballots, if Sequence is used as a ballot style ID, it must be unique election-wise and Split code will always be 1. In this case, the practical style limit would be 16,300.
3. The ExpressVote activation card has a ballot ID consisting of three different fields defined as: Sequence (available codes 1-16,300), Type (available codes 1-30), or Split (available codes 1-18).
4. Grid Portrait and Grid Landscape ballot types are New York specific and not for general use.

DS200

1. Configured for an early vote station does not support precinct level results reporting. An election summary report of tabulated vote totals is supported.
2. Storage limitation for write-in ballot images is 3,600 images. Each ballot image includes a single ballot face, or one side of one page.
3. Write-in image review requires a minimum 1GB of onboard RAM.
4. To successfully use the write-in report, ballots must span three or more vertical columns. If the column is greater than 1/3 of the ballot width (two columns or less), the write-in image will be too wide to print on the tabulator report tape.

Functionality

2005 VVSG Supported Functionality Declaration

Feature/Characteristic	Yes/No	Comment
Voter Verified Paper Audit Trails		
VVPAT	No	
Accessibility		
Forward Approach	Yes	
Parallel (Side) Approach	Yes	
Closed Primary		
Primary: Closed	Yes	
Open Primary		
Primary: Open Standard (provide definition of how supported)	No	
Primary: Open Blanket (provide definition of how supported)	No	
Partisan & Non-Partisan:		
Partisan & Non-Partisan: Vote for 1 of N race	Yes	
Partisan & Non-Partisan: Multi-member ("vote for N of M") board races	Yes	
Partisan & Non-Partisan: "vote for 1" race with a single candidate and write-in voting	Yes	
Partisan & Non-Partisan "vote for 1" race with no declared candidates and write-in voting	Yes	
Write-In Voting:		
Write-in Voting: System default is a voting position identified for write-ins.	Yes	
Write-in Voting: Without selecting a write in position.	Yes	
Write-in: With No Declared Candidates	Yes	
Write-in: Identification of write-ins for resolution at central count	Yes	

Feature/Characteristic	Yes/No	Comment
Primary Presidential Delegation Nominations & Slates:		
Primary Presidential Delegation Nominations: Displayed delegate slates for each presidential party	No	
Slate & Group Voting: one selection votes the slate.	No	
Ballot Rotation:		
Rotation of Names within an Office; define all supported rotation methods for location on the ballot and vote tabulation/reporting	Yes	
Straight Party Voting:		
Straight Party: A single selection for partisan races in a general election	Yes	
Straight Party: Vote for each candidate individually	Yes	
Straight Party: Modify straight party selections with crossover votes	Yes	
Straight Party: A race without a candidate for one party	Yes	
Straight Party: "N of M race (where "N">1)	Yes	
Straight Party: Excludes a partisan contest from the straight party selection	Yes	
Cross-Party Endorsement:		
Cross party endorsements, multiple parties endorse one candidate.	Yes	
Split Precincts:		
Split Precincts: Multiple ballot styles	Yes	
Split Precincts: P & M system support splits with correct contests and ballot identification of each split	Yes	
Split Precincts: DRE matches voter to all applicable races.	Yes	
Split Precincts: Reporting of voter counts (# of voters) to the precinct split level; Reporting of vote totals is to the precinct level	Yes	It is possible to list the number of voters.
Vote N of M:		
Vote for N of M: Counts each selected candidate, if the maximum is not exceeded.	Yes	
Vote for N of M: Invalidates all candidates in an overvote (paper)	Yes	
Recall Issues, with options:		
Recall Issues with Options: Simple Yes/No with separate race/election. (Vote Yes or No Question)	No	
Recall Issues with Options: Retain is the first option, Replacement candidate for the second or more options (Vote 1 of M)	No	
Recall Issues with Options: Two contests with access to a second contest conditional upon a specific vote in contest one. (Must vote Yes to vote in 2nd contest.)	No	
Recall Issues with Options: Two contests with access to a second contest conditional upon any vote in contest one. (Must vote Yes to vote in 2nd contest.)	No	
Cumulative Voting		
Cumulative Voting: Voters are permitted to cast, as many votes as there are seats to be filled for one or more candidates. Voters are not limited to giving only one vote to a candidate. Instead, they can put multiple votes on one or more candidate.	No	
Ranked Order Voting		

Feature/Characteristic	Yes/No	Comment
Ranked Order Voting: Voters can write in a ranked vote.	Yes	Ballots can be formatted for Ranked Order Voting and the system supports export of CVR data for processing of Ranked Order Voting Rounds
Ranked Order Voting: A ballot stops being counted when all ranked choices have been eliminated	Yes	Ballots can be formatted for Ranked Order Voting and the system supports export of CVR data for processing of Ranked Order Voting Rounds
Ranked Order Voting: A ballot with a skipped rank counts the vote for the next rank.	Yes	Ballots can be formatted for Ranked Order Voting and the system supports export of CVR data for processing of Ranked Order Voting Rounds
Ranked Order Voting: Voters rank candidates in a contest in order of choice. A candidate receiving a majority of the first choice votes wins. If no candidate receives a majority of first choice votes, the last place candidate is deleted, each ballot cast for the deleted candidate counts for the second choice candidate listed on the ballot. The process of eliminating the last place candidate and recounting the ballots continues until one candidate receives a majority of the vote	No	
Ranked Order Voting: A ballot with two choices ranked the same, stops being counted at the point of two similarly ranked choices.	Yes	Ballots can be formatted for Ranked Order Voting and the system supports export of CVR data for processing of Ranked Order Voting Rounds
Ranked Order Voting: The total number of votes for two or more candidates with the least votes is less than the votes of the candidate with the next highest number of votes, the candidates with the least votes are eliminated simultaneously and their votes transferred to the next-ranked continuing candidate.	No	
Provisional or Challenged Ballots		
Provisional/Challenged Ballots: A voted provisional ballots is identified but not included in the tabulation, but can be added in the central count.	Yes	
Provisional/Challenged Ballots: A voted provisional ballots is included in the tabulation, but is identified and can be subtracted in the central count	Yes	

Feature/Characteristic	Yes/No	Comment
Provisional/Challenged Ballots: Provisional ballots maintain the secrecy of the ballot.	Yes	
Overvotes (must support for specific type of voting system)		
Overvotes: P & M: Overvote invalidates the vote. Define how overvotes are counted.	Yes	
Overvotes: DRE: Prevented from or requires correction of overvoting.	Yes	
Overvotes: If a system does not prevent overvotes, it must count them. Define how overvotes are counted.	Yes	
Overvotes: DRE systems that provide a method to data enter absentee votes must account for overvotes.	Yes	
Undervotes		
Undervotes: System counts undervotes cast for accounting purposes	Yes	
Blank Ballots		
Totally Blank Ballots: Any blank ballot alert is tested.	Yes	
Totally Blank Ballots: If blank ballots are not immediately processed, there must be a provision to recognize and accept them	Yes	
Totally Blank Ballots: If operators can access a blank ballot, there must be a provision for resolution.	Yes	
Networking		
Wide Area Network – Use of Modems	No	
Wide Area Network – Use of Wireless	No	
Local Area Network – Use of TCP/IP	No	
Local Area Network – Use of Infrared	No	
Local Area Network – Use of Wireless	No	
FIPS 140-2 validated cryptographic module	Yes	
Used as (if applicable):		
Precinct counting device	Yes	DS200, ExpressTouch, ExpressVote XL
Central counting device	Yes	DS450 and/or DS850

Baseline Certification Engineering Change Orders (ECO)

This table depicts the ECOs certified with the voting system:

Change ID	Date	Component	Description	Inclusion
ECO 1029	9/24/19	ExpressVote	Upgrade to 8GB Innodisk on EV 1.0	DeMinimis Optional
ECO 1034	10/28/19	ExpressVote Voting Booth	Enhanced Voting Booth	DeMinimis Optional
ECO 1035	2/13/20	DS200	Improve thermal stability and higher resolution calibration characteristics.	DeMinimis Optional
ECO 1041	10/28/19	ExpressVote XL	Add brace to Wheel Struts	DeMinimis Optional
ECO 1043	10/30/19	ExpressVote	Add 16G Innodisk to EV 1.0	DeMinimis Optional
ECO 1044	9/13/19	DS200 Ballot Tote	Add ballot Tote Bag	DeMinimis Optional
ECO 1047	2/28/20	ExpressVote XL	Aesthetic changes, modifications to cart and curtain hardware.	DeMinimis Optional
ECO 1054	02/14/20	ExpressVote/ExpressVote XL	Update Ballot Bin	DeMinimis Optional
ECO 1055	12/19/19	DS200 Ballot Bin tote	Add Ballot Tote Bag	DeMinimis Optional

Voting System Reference Questions

Reference Name and Contact Information: Nick Custodio, Nick.Custodio@phila.gov, 215-686-3460

Jurisdiction Name: Philadelphia County

Quantity, type and version of voting equipment and software installed: EVS 6.1.1.0 – 3,750 Expressvote XLs, 4 DS850s, 8 DS450s, Electionware v 6.0.1.0, Toolbox 4.0.0.0, Balotar v 3.0.5.1 (for absentee/mail-in and ballot on-demand printing)

How many voters are in your jurisdiction?

1,052,175

When did your jurisdiction purchase the system?

2019

How many elections have you used the system?

5

Have any upgrades been made to the system since you purchased it? Why?

2 – Increased RAM and went to Windows 7 64-bit, then upgraded to Windows 10 64-bit. Both upgrades provided a significant increase in processing capacity on the workstations. Upgrades included additional firmware and software improvements on the Expressvote XLs and Central Count scanners.

Are you still using the same system?

Yes

Describe your overall impression of the system based on experiences in your jurisdiction.

The system provides wide-ranging functionality for a complete, hybrid election involving paper ballots of the absentee/mail-in and provisional variety in addition to electronic voting machines. The Expressvote XL provides a familiar feel for the voters while utilizing modern touch screen capabilities, enabling our county to layout ballots in any conceivable configuration in keeping with state regulations – not being locked into pre-determined push-button grids. The ballots can be laid out minutely to match our often complex needs. Reporting features provide multiple avenues to take in terms of PDFs, CSVs, and text, allowing for confirmation of accurate results by comparing and contrasting the various reports and implementing cleanly with our public results website.

Are you satisfied with the training provided to your staff?

Yes

Are you satisfied with the training provided for poll officials?

Yes

Are you satisfied with the support the vendor has provided for early voting (if applicable), Election Day, and post-election activities?

Yes, the vendor provides the county with knowledgeable support staff throughout the election cycle: engaging at the initial stages of database development; providing on-site logic and accuracy maintenance support; working with the county on election day for technical support on the Expressvote XLs and operating the central count scanners; and remaining available after certification whenever additional questions are raised.

Are you satisfied with the cost of support? Do you feel the cost of support is competitive or too expensive?

Yes; the cost is competitive

Describe any issues the vendor has had meeting your jurisdiction's requirements, if any.

Describe any issues your jurisdiction has had regarding equipment availability, if any.

Describe any issues your jurisdiction has had regarding the accuracy of election results, if any.

Describe any other issues your jurisdiction has had with the system, if any.

Due to the limitations imposed by contemporary certifications imposed by the commonwealth of Pennsylvania, requiring an outdated Windows 7 installation on our election management workstations, early versions of the software had some difficulty processing an election of the scope and complexity required by our jurisdiction. However, these issues are no longer apparent since our upgrades in the last two years have been installed.

Has the vendor been responsive in addressing issues?

Yes

Describe any feedback (positive or negative) received from poll officials about the system.

Positive feedback regarding the ease of setup and usability of the Expressvote XL.

Describe any feedback (positive or negative) received from voters about the system.

Positive feedback on the usability, look, and feel of the voting experience.

Do you feel like you have gotten your money's worth for the system?

Yes

Would you recommend this system for use in other jurisdictions?

Yes!

Voting System Reference Questions

Reference Name and Contact Information: Debra Bryant, Dir. – (803) 914-2082 – dbryant@hamptoncountysc.org

Jurisdiction Name: Hampton County Board of Voter Registration and Elections

Quantity, type and version of voting equipment and software installed: 73 ExpressVotes & 22 DS200s – Version: EVS 6.1.1.0

How many voters are in your jurisdiction? 12,971

When did your jurisdiction purchase the system? Delivered to us by SEC July 2019

How many elections have you used the system? With new version, One

Have any upgrades been made to the system since you purchased it? Why? One, recent purchase.

Are you still using the same system? Yes

Describe your overall impression of the system based on experiences in your jurisdiction. Coming from a small county, the system worked well for us. Training was key.

Are you satisfied with the training provided to your staff? Yes

Are you satisfied with the training provided for poll officials? Yes

Are you satisfied with the support the vendor has provided for early voting (if applicable), Election Day, and post-election activities? NA

Are you satisfied with the cost of support? Do you feel the cost of support is competitive or too expensive? I am not sure. I hope that it is competitive.

Describe any issues the vendor has had meeting your jurisdiction's requirements, if any.

Describe any issues your jurisdiction has had regarding equipment availability, if any.

Describe any issues your jurisdiction has had regarding the accuracy of election results, if any.

Describe any other issues your jurisdiction has had with the system, if any.

Has the vendor been responsive in addressing issues? NA

Describe any feedback (positive or negative) received from poll officials about the system. Officials say they like the system and that it is easy to use after they have gone through the training.

Describe any feedback (positive or negative) received from voters about the system. Voters say they like the system.

Do you feel like you have gotten your money's worth for the system? Yes

Would you recommend this system for use in other jurisdictions? Yes

Voting System Reference Questions

Reference Name and Contact Information: **Stan Barnhill, Lee County Voter Registration and Elections, 803-484-1832, sbarnhill@leecountysc.org**

Jurisdiction Name: **Lee County**

Quantity, type and version of voting equipment and software installed: **EVS 6.1.1.0 ExpressVote v 4.0.0.0 (60) Digital Scanners - DS200 v. 2.30.0.0 (25), ElectionWare v. 6.0.1.0 Desktop PC (2)**

How many voters are in your jurisdiction? **12,000**

When did your jurisdiction purchase the system? **2019**

How many elections have you used the system? **6**

Have any upgrades been made to the system since you purchased it? Why? **Yes. Scheduled routine periodic maintenance.**

Are you still using the same system? **Yes**

Describe your overall impression of the system based on experiences in your jurisdiction. **The Election Systems & Software (ES&S) ExpressVote System performs as advertised.**

Are you satisfied with the training provided to your staff? **The training provided by ES&S was satisfactory.**

Are you satisfied with the training provided for poll officials? **Yes.**

Are you satisfied with the support the vendor has provided for early voting (if applicable), Election Day, and post-election activities? **Yes.**

Are you satisfied with the cost of support? Do you feel the cost of support is competitive or too expensive? **Support is expensive, but worth it.**

Describe any issues the vendor has had meeting your jurisdiction's requirements, if any. **No issues experienced with the vendor meeting Lee County's requirements.**

Describe any issues your jurisdiction has had regarding equipment availability, if any. **No issues experienced in regards to equipment availability.**

Describe any issues your jurisdiction has had regarding the accuracy of election results, if any. **Have yet to experience any issues in regard to the accuracy of election results.**

Describe any other issues your jurisdiction has had with the system, if any. **Deployment of the system can be a logistical burden. Training of non-tech savvy poll officials is strenuous.**

Has the vendor been responsive in addressing issues? **The vendor is responsive to addressing issues with the system.**

Describe any feedback (positive or negative) received from poll officials about the system. **Poll officials' feedback is extreme positive when compared to the previous system.**

Describe any feedback (positive or negative) received from voters about the system. **Voters' feedback with the system has been very positive.**

Do you feel like you have gotten your money's worth for the system? **Yes.**

Would you recommend this system for use in other jurisdictions? **Yes.**

Voting System Reference Questions

Reference Name and Contact Information: **James Posey, Database Supervisor 803-734-9489**

Jurisdiction Name: **South Carolina Election Commission**

Quantity, type and version of voting equipment and software installed:

25-ExpressVotes, 5-DS200s and 1-DS450 all used with EVS 6.1.1.0.

Pollbooks

ExpressLink Printers

How many voters are in your jurisdiction? **Over 3.5 million statewide**

When did your jurisdiction purchase the system? **2019**

How many elections have you used the system? **14 Elections Programmed for Counties to carryout**

Have any upgrades been made to the system since you purchased it? **One**

Why? **Upgraded to Windows 10**

Are you still using the same system? **Yes**

Describe your overall impression of the system based on experiences in your jurisdiction. **Very user friendly and reliable.**

Are you satisfied with the training provided to your staff? **Yes**

Are you satisfied with the training provided for poll officials? **Yes**

Are you satisfied with the support the vendor has provided for early voting (if applicable), Election Day, and post-election activities? **Yes**

Are you satisfied with the cost of support? **Yes**

Do you feel the cost of support is competitive or too expensive? **Competitive**

Describe any issues the vendor has had meeting your jurisdiction's requirements, if any. **None, Equipment was delivered as promised.**

Describe any issues your jurisdiction has had regarding equipment availability, if any. **None**

Describe any issues your jurisdiction has had regarding the accuracy of election results, if any. **None**

Describe any other issues your jurisdiction has had with the system, if any. **None**

Has the vendor been responsive in addressing issues? **Yes, although issues have been minor**

Describe any feedback (positive or negative) received from poll officials about the system. **They appreciate the ease of use compared to the iVotronics.**

Describe any feedback (positive or negative) received from voters about the system.

Voters appreciate the paper ballot that they can feed into the scanners themselves. The ease of use also generates positive comments.

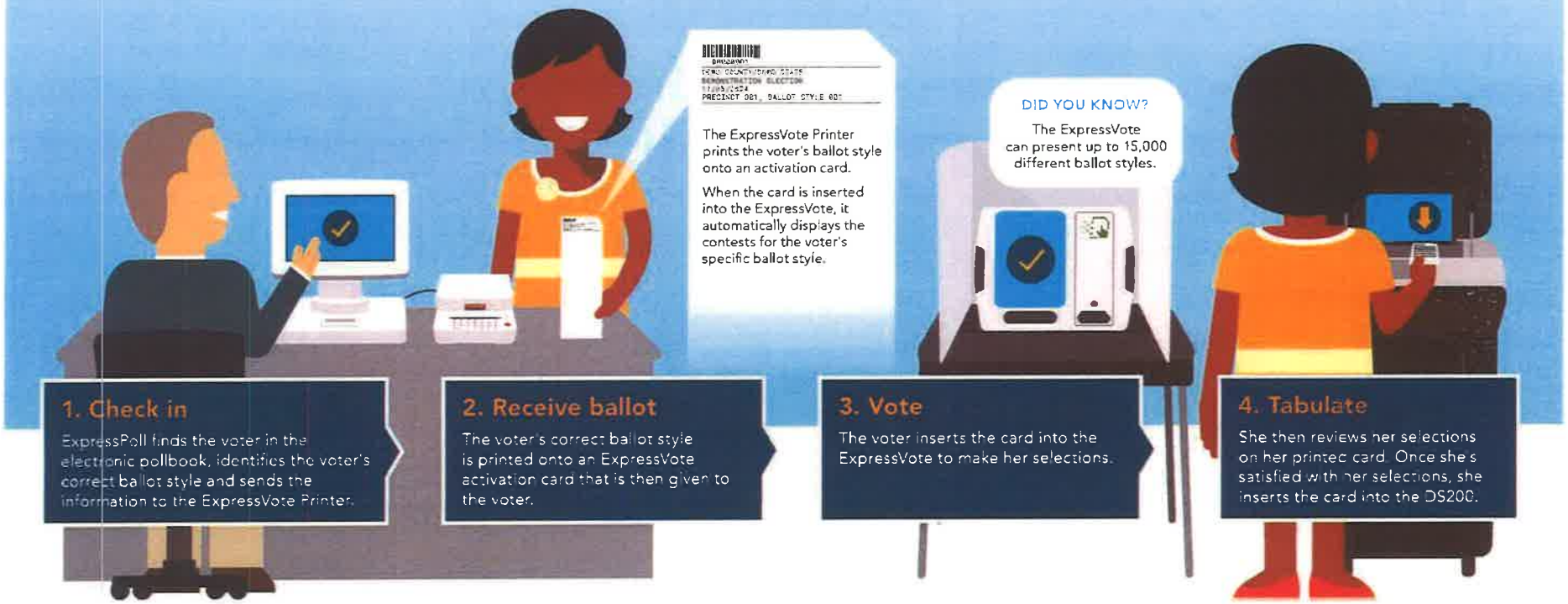
Do you feel like you have gotten your money's worth for the system? **Yes**

Would you recommend this system for use in other jurisdictions? **Yes**

YOUR COMPLETE VOTING SOLUTION

ExpressPoll® Electronic Pollbook + **ExpressVote® Printer** Activation Card Printer + **ExpressVote®** Universal Voting System + **DS200®** Precinct Scanner and Tabulator

A complete solution for early voting, vote centers and in-person absentee environments.
This solution provides an unbeatable experience for voters and poll workers.



ExpressPoll + ExpressVote Printer

- Increases the accuracy of voters' personal information by finding them by name, DOB or voter ID.
- Reduces waiting time for voters by quickly seeing if a ballot has been issued for a voter.
- Identifies the correct ballot style specific to the voter's party and precinct.
- Eliminates ballot picking and pulling and reduces paper ballot inventory by printing the voter's ballot style onto an activation card.
- Shares real-time data with the ExpressPoll Connect, a web application that allows election administrators to monitor polling locations and proactively address issues.

ExpressVote + DS200

- Produces an independent voter-verifiable paper record.
- Reduces costs by eliminating the need for traditional pre-printed paper ballots.
- Eliminates unclear marks and the need for voter mark interpretation.
- Stores each voter-verifiable paper record once it is cast.

ExpressVote®

Universal Voting System as a Marker

Multilingual

Touch Screen and Display

Allows voters to easily make vote selections and review their selection.

Instruction Panel

A visual guide that shows voters how to use the ExpressVote.

Card Slot

Where the voter inserts their card to activate selections.

Visual Aids

High contrast and zoom functionality.

Front Access Panel

Headphone jack, a port for a Sip-and-Puff device or two-position rocker switch, and Audio-Tactile Keypad make the unit ADA friendly.

Audio-Tactile Keypad

Enables ADA voters to control audio and navigate the ballot.

ACTIVATING THE VOTE SESSION:

Election officials can configure the ExpressVote to best fit their needs. The voter receives an activation card to begin the process.

- If only one ballot style is programmed for the election, a blank card activates the vote session.
- Multiple ballot styles with a blank card prompt poll workers to select the correct ballot style for the voter.
- A card with an activation barcode displays the correct options for the voter if the election has multiple ballot styles.

ExpressVote Key Features

As a marker, the ExpressVote handles the entire marking process, eliminating unclear marks and the need for voter mark interpretation. Voters utilize the touch screen to mark their vote selections, receiving a verifiable paper vote record upon completion. The ExpressVote is used during early voting or in precincts and vote centers on Election Day to serve every eligible voter, including those with special needs.

EASY TO SET UP AND USE

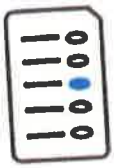
The one-step startup and poll-closing procedure make the ExpressVote an ideal device for poll workers. The intuitive design offers streamlined simplicity for poll workers and election staff. The ExpressVote is also small, lightweight and easy to move.

CONTROLLED AND REDUCED COSTS

Traditional ballot printing costs can be significantly reduced by eliminating the need for pre-printed paper ballots. Voters activate their vote session, make their selections and receive a paper record to cast. This process consumes 70 percent less paper than traditional ballots.

INNOVATIVE DESIGN

Voters review a summary page and can make changes before receiving their verifiable paper vote record. The ExpressVote prevents overvotes and undervotes with prompts and on-screen feedback. ExpressVote in marking mode neither stores nor tabulates vote counts. The system produces a verifiable paper record for each voter.



VERIFIABLE PAPER RECORD

After all selections are made, a human- and machine-readable paper record is produced that includes text and an optical scan barcode. Vote summary cards are digitally scanned for tabulation on an ES&S DS200®, DS450®, DS850® or ExpressVote® XL device.

SECURE

The ExpressVote Universal Voting System utilizes a variety of functions to ensure election data and cast vote records are secure. In its current certification as a marking device, no vote data is stored in the device. Its system functions are only executable during election events, in the manner and order intended by election officials performing their duties.

For more information visit ***www.essvote.com***

ExpressVote Marker Open Procedures

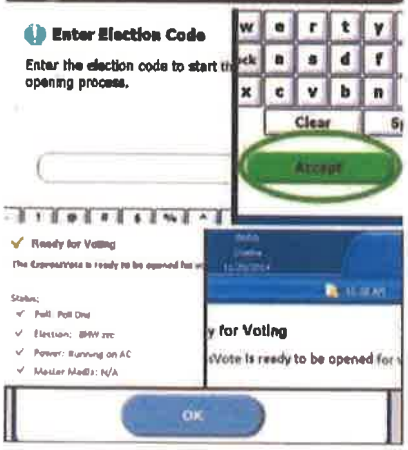
Before you begin, be sure you have the barrel key and Election Code.

1. Plug in the ExpressVote power cord.

2. Using the barrel key, open the left side access door and verify the Election Definition flash drive is plugged in.

3. Flip the Power Switch to **On** and flip the Mode Switch to **Voter**.
   Note: *The system startup can take several minutes.*

4. For accessible voting, plug in ADA accessories. The keypad plugs into the left side access compartment and headphones on the front of the unit.
   Note: *Be sure to close and lock the compartment.*



5. Enter the Election Code when prompted.
   Then touch **Accept**.

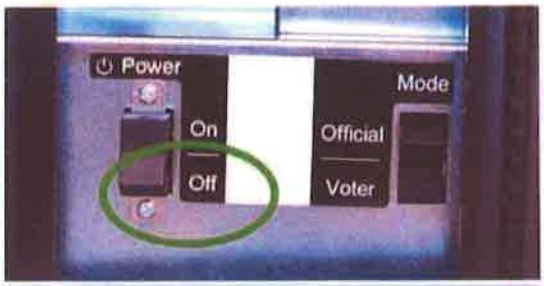
6. Green check marks will confirm that the unit is plugged into power and the election and poll names are accurate.
   Confirm the date and time are correct at the top of the screen.
   Then touch **OK** to display the Voter Welcome Screen.

The ExpressVote is now open.

****DISCLAIMER: These procedures are guidelines. Any requirements outlined by the jurisdiction must be followed.*

ExpressVote Marker Close Procedures

Before you begin, be sure you have the barrel key.



1. Using the barrel key, open the left side access compartment and flip the Power Switch to **Off.**

2. Unplug the unit, and if applicable, unplug any ADA accessories.
   Note: *Be sure to close and re-lock the compartment.*
   Return the unit and ADA accessories to the soft-sided case.

The ExpressVote is now closed.

****DISCLAIMER: These procedures are guidelines. Any requirements outlined by the jurisdiction must be followed.*

ELECTION Systems & Software

Universal Voting

SECURE EQUIPMENT THAT FITS ALL VOTERS

ACCESSIBLE VOTING FOR ALL

At Election Systems & Software (ES&S) we're serious about accurately capturing the intent of every voter. We closely follow the guidelines set by the Americans with Disabilities Act (ADA) to ensure voting on our machines provides a simple, private and inclusive voting experience.

The ES&S ExpressVote family of products, including the ExpressVote® and ExpressVote XL™ Universal Voting Systems, has received high praise for the inclusiveness it brings to the election process. Both voting machines can be configured in several ways to serve every voter as fully-compliant ADA voting solutions during early voting and on Election Day. On an ES&S Universal Voting System EVERYONE votes in the same private and independent manner.

WHY ADA COMPLIANCE?

Every voter counts and according to the U.S. Election Assistance Commission (EAC), more than 35 million Americans with disabilities are eligible to vote in the United States. The Americans with Disabilities Act helps ensure fairness in the voting process for people with disabilities.

HOW DO WE ENSURE ACCESSIBILITY?

ES&S follows all ADA requirements and works with voters with disabilities as well as advocates and experts in the field of accessibility to test our equipment first hand. This valuable feedback helps guide our product development teams, and in turn, ensures EVERY voter can exercise their constitutional right to vote with anonymity on a universal voting system. To protect voter privacy, the printed vote summary card does not specify whether assistive devices were used to conduct a voting session.

Version 1.0.0

OUR ADA-COMPLIANT PRODUCTS

Developed using universal design principles and input from election officials and disability organizations, our ExpressVote and ExpressVote XL include the following accessibility features:

- Seated- and standing-height configurations to serve both seated and standing voters
- Adjustable on-screen high contrast and zoom functionality display settings to make on-screen text more readable
- Audio ballots in voters' selected language
- Audio ballot option for visually impaired voters as well as voters with a disability or special need.
- Screen prompts, symbols and audio to help voters navigate the vote selection process.
- Assistive technology connections and devices
- Voter's option to blank the screen for privacy

The ES&S ExpressVote family of products provide all voters, regardless of limitations, with the option to navigate ballot selections independently using various ADA support peripherals including:

Headphones

Audio-tactile keypad with Braille legends

Sip-and-puff device

Two-position rocker switch

Each device offers an intuitive vote selection process through the use of screen prompts, symbols and optional audio. Any of these features can be used by any voter without poll worker assistance. Voters can also verify the printed paper record using the same accessible devices they used when marking the ballot.

ES&S AND ADVANCING EQUAL ACCESS

ES&S is committed to helping jurisdictions navigate the Americans with Disabilities Act by answering the needs of all their constituents and monitoring developments from the U.S. Department of Justice and the EAC.

WHAT ELECTION OFFICIALS AND VOTERS ARE SAYING:

"I just had the most WONDERFUL experience. I am totally blind, and I voted myself! I was in tears by the time I left the polling station – for the first time in years I VOTED without assistance. THANK YOU! Because of you I have the capability of exercising my rights as a US Citizen … Because of you, I can vote right along my sighted peers without feeling 'frowned' upon. I am now an equal."

Jeanette, voter from VA, Nov. 2016

"In a 2016 test by 100 blind voters, the National Federation of the Blind in Michigan determined that most testers preferred the ES&S equipment — quadriplegia voters and those with brain injuries, gave the ES&S devices 'high marks.'"

(August 6, 2018). *Blind Michigan voters may struggle with new voting machines.* APNews.com

"The Michigan Bureau of Elections held a mock election which allowed testers and poll workers to experience each of the machines and tabulate votes for both disabled and non-disabled voters. Of the three systems tested, the ExpressVote is the only one I am comfortable recommending. Set-up was achieved independently by the voter, prompts were spoken efficiently, and a ballot could be completed using the fewest number of key presses."

J.J. Meddaugh. (May 20, 2016). *A Mock Election: We Tested 3 Modern Voting Machines for Accessibility.* Blindbargains.com

DS200®

Precinct Scanner and Tabulator

Protective Cover

Cover has heavy-duty rubber seal to shelter DS200 from elements during transport.

Easy to Set Up

Lid-up, power-on approach allows poll workers to easily open polls.

Touch Screen and Display

Provides voters with instructions and immediate feedback. Tension bearings hold screen in place for custom positioning.

Ballot/Card Slot

Voters cast both ballots and vote summary cards here; accommodates up to 19-inch ballots.

Auxiliary Ballot Compartment

Main Ballot Compartment

Easy, hassle-free storage of up to 2,500 ballots.

11

The number of 14-inch flat ballots processed per minute

DS200 Key Features

The DS200 is a precinct-based scanner and vote tabulator equipped with the latest in ES&S' patented technology. Fully certified and compliant with EAC guidelines, the DS200 enhances the voting experience for voters and election officials alike. Our patented IMR® and PTRAC® technology ensures even the most poorly marked ballots are read accurately and consistently — protecting voter intent. All of this is designed to make everyone's job easier.

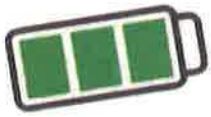
ACCURATE

The DS200 combines the ES&S-patented Intelligent Mark Recognition (IMR®) and patented Positive Target Recognition & Alignment Compensation (PTRAC®) systems to accurately track and pinpoint target locations. This technology accommodates ballots inserted at angles or with erroneous marks to uphold voter intent. This precision improves the reliability of elections.

SECURE

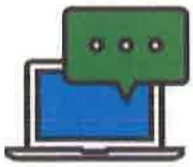
Like all ES&S tabulation equipment, the DS200 includes physical security features such as locking panels and security seals to secure sensitive components and election files, and a key-locked case for transport and shipping. The DS200 operating system controls, limits and detects unauthorized access to all critical data. The system also includes safeguards, such as data encryption and digital signatures, that help protect sensitive data and verify authenticity, including certification of all firmware.

RELIABLE



Having both battery backup and thermal paper means you never have to worry about power outages or printer ink. The DS200 includes redundant data storage.

COMPATIBLE



Works in conjunction with:

- ExpressVote® Universal Voting System
- DS450® High-Throughput Scanner & Tabulator
- DS850® High-Speed Scanner & Tabulator
- Electionware® Election Management Software
- AutoMARK® Ballot Marking Device
- Election Reporting Manager®

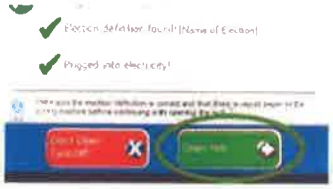
For more information visit ***www.essvote.com***

DS200 Open Procedures

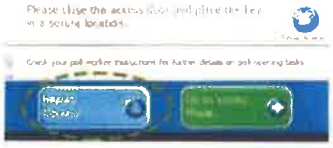
Before you begin, be sure you have the Election Code, barrel key and ballot box key.

1. Using the ballot box key, unlock the back door and plug in the power cord.
   Using the ballot box key, unlock and confirm the auxiliary and main ballot compartments are empty.
   Lock the auxiliary and main ballot compartments.

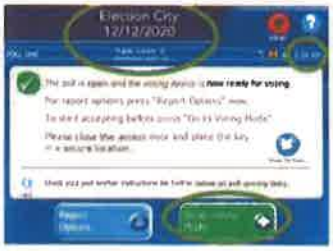
2. Using the ballot box key, unlock and open the ballot box lid.
   Using the barrel key, unlock and gently lift the screen. The DS200 will power up automatically.
   When prompted, enter the Election Code.
   Note: *If the DS200 does not power up upon lifting the screen, use the barrel key to unlock the left side access door and press the Power button.*



3. The Configuration Report will automatically print.
   Green check marks will confirm that the Election Definition is found, and that the unit is connected to power. Then touch **Open Poll.**
   Note: *If the Election Definition shows "not found" and doesn't have a green check mark, make sure the Election Definition flash drive is pushed in all the way.*



4. Status and Zero Totals reports will automatically print.
   If you need to print additional reports, or a report does not print correctly, touch **Report Options.**
   Note: *Follow your procedures for securely handling the Zero Totals report.*



5. Confirm the Public Count is zero.
   Note: *Call Election Central for assistance if Public Count is not zero.*
   Confirm the date, time, election and poll names are correct.
   Touch **Go to Voting Mode.**

The DS200 is now open.

******DISCLAIMER: These procedures are guidelines. Any requirements outlined by the jurisdiction must be followed.***

DS200 Close Procedures

Before you begin, be sure you have the Election Code, barrel key and ballot box key.
If applicable, check the auxiliary ballot compartment for ballots, and follow your jurisdiction's rules on handling those ballots.

1. Using the barrel key, unlock the left side access door and press the **Close Poll** button. It will blink red.
   On screen, touch **Close Poll.**
   Close and lock the left side access door.

2. Depending on the configuration of the Election Definition flash drive inserted, Voting and Write-In Results may automatically print.
   If you need to print additional reports, touch **Report Options.**
   Touch **Finished - Turn Off** after reports are done printing.

3. Using the barrel key, unlock the left side access door.
   The power button will change from green to red.
   When it is no longer lit, remove the Election Definition flash drive and lock left side access door.
   Note: *Do not remove the Election Definition flash drive when the power button is still lit.*

4. Follow your procedures to securely store the Election Definition flash drive and any printed reports.

5. Unplug and return the power cord.
   Using the ballot box key, close and lock the back door.
   Close the screen and using the ballot box key, lock the ballot box lid.

The DS200 is now closed.

****DISCLAIMER: These procedures are guidelines. Any requirements outlined by the jurisdiction must be followed.*

DS450®

High-Throughput Scanner and Tabulator

Touch Screen Display

Walks the operator through every step of the tabulation process.

Patented IMR® and PTRAC®

IMR® and PTRAC® technology provides unparalleled accuracy that reduces time-consuming manual ballot adjudication.

C-Curve

C-Curve efficiently transports ballots into the appropriate output bin.

Input Tray

Output Bins

Sorts ballots and vote summary cards into:

- Requires further review
- Write-ins
- Counted

Paper Path Jam Management

LED light tracking feature enables easy management of ballot jams – prevents need to rescan entire batch.

72

The number of 14-inch flat ballots processed per minute

DS450 Key Features

Customizable sorting is now more affordable than ever with the DS450 central scanner and tabulator. Process more ballots in less time, without stopping to sort overvotes, write-ins or blank ballots. ES&S sets the industry standard for high-speed scanners. The DS450 embodies the spirit of the DS850 while maintaining an efficient throughput along with affordability for jurisdictions.

SECURE

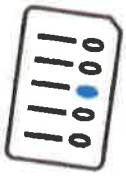
System integrity and electronic audits make the DS450 part of the most dependable family of central vote scanners and tabulators in its class. Safeguards, such as data encryption and digital signatures, help protect sensitive data and verify authenticity, including certification of firmware.

FLEXIBLE

With three separate output bins, you can determine whether to outstack specific types of ballots for further review. Let the DS450 handle separating write-in votes, overvotes and blank ballots – all without missing a beat.

ACCURATE

ES&S-patented IMR® and PTRAC® technology ensures ballots are read accurately and consistently, protecting voter intent and minimizing manual adjudication.



HIGH THROUGHPUT

Achieve faster sorts without stopping for each blank ballot with the DS450. It scans and sorts 14-inch double-sided ballots at 72 per minute into three output bins.

FOLDED BALLOT PROCESSING

The DS450 is designed with a series of TruGrip™ rollers, which maintain constant contact with the ballot surface, ensuring quality control throughout the entire tabulation process.

For more information visit ***www.essvote.com***

DS850®

High-Speed Scanner and Tabulator

Patented IMR® and PTRAC®

IMR® and PTRAC® technology provides unparalleled accuracy that reduces time-consuming manual ballot adjudication.

Touch Screen Display

Walks the operator through every step of the tabulation process.

TruGrip™ Rollers

Provides constant contact, ensuring each ballot - even those folded or damaged - are individually processed.

S-Curve

Patented design enables lightning quick scanning and smooth ballot flow.

Output Bins

Sorts ballots and vote summary cards into:

- Requires further review
- Write-ins
- Counted

300

The number of 14-inch flat ballots processed per minute

DS850 Key Features

Your elections require a centralized vote scanner and tabulator that is quick and accurate. With its high-speed digital image processing, the DS850 continuously scans ballots to save you valuable time when tabulating election results.

SECURE

System integrity and electronic audits make the DS850 part of the most dependable family of central vote scanners and tabulators on the market. Safeguards, such as data encryption and digital signatures, help protect sensitive data and verify authenticity, including certification of firmware.

USER-FRIENDLY

Designed specifically for the election process, the DS850 features a user-friendly software interface on a 15-inch LCD color touch screen. The S-shaped transporter allows for a natural flow, creating separation between individual ballots.

ACCURATE

ES&S' patented IMR® and PTRAC® technology ensures that ballots are read accurately and consistently, protecting voter intent and eliminating manual adjudication time.

FOLDED BALLOT PROCESSING

The DS850 is designed with a series of TruGrip™ rollers, which maintain constant contact with the ballot surface, ensuring quality control throughout the entire tabulation process.

HIGH-SPEED SORTING

The DS850 is the only high-speed scanner in the marketplace that can sort various ballot sizes at full speed. It scans and sorts 14-inch double-sided ballots at 300 per minute into three output bins, separating ballots into three categories: counted, requires further review, and write-ins.

For more information visit ***www.essvote.com***

Electionware®

Election Management Software

User Friendly

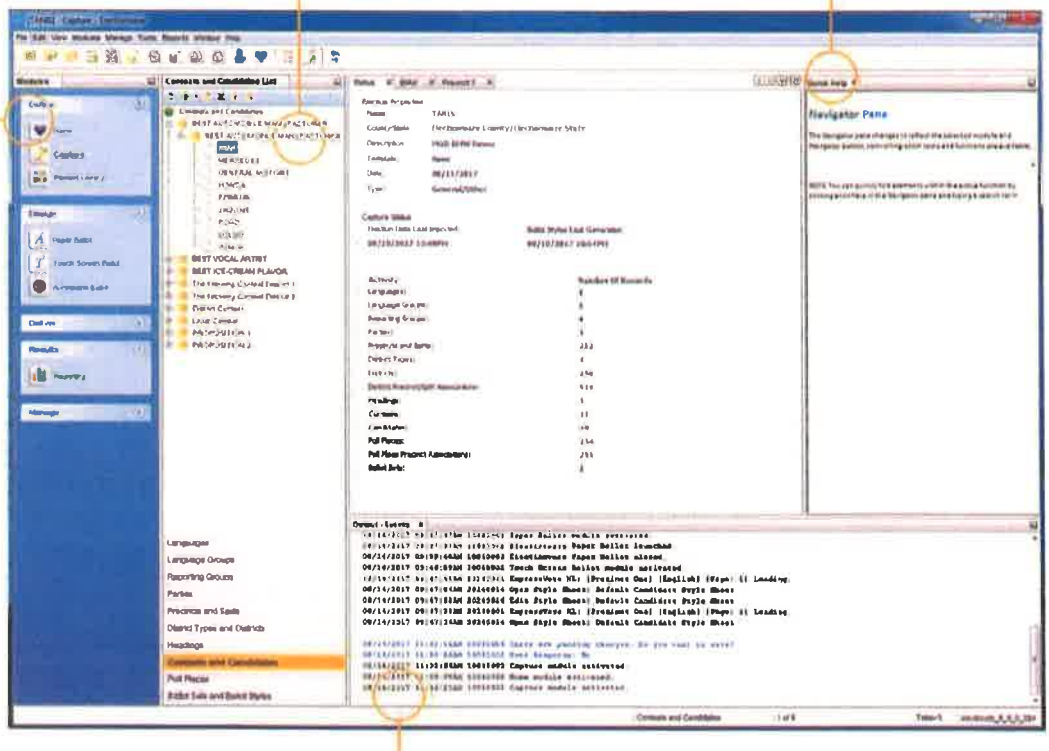
Navigator helps users access exactly what is needed in the current module.

Quick Help

Context-sensitive Quick Help is available in all areas of Electionware.

Easy End-to-End Workflow

Enables end-to-end election management, from data capture, ballot layout, and configuring equipment to loading and reporting results.



Feedback

Flexible, yet powerful election management software guides users through the creation of the election, ensuring that all election data, security codes, and machine settings are added correctly to the election definition.

ELECTION INTELLIGENCE

- Timely election data inquiries and reports
- Workflow management and error alerts
- Enforced data accuracy
- User customization
- Tracking of election media
- Live status indicators for incoming results

PRODUCTIVITY

- Fast data import
- Reusable election and ballot layout templates
- Simple translation and audio file management
- Multiple simultaneous users
- Ballot image filtering, viewing and printing

Electionware Key Features

Electionware is designed to accommodate the latest election trends, including early and overseas voting, ADA compliance, ballot adjudication, and Election Night reporting. Use Electionware to create an election information database, format ballots, program voting and ballot scanning equipment, consolidate results, review ballot images, and report results. This agile election management software is the result of our nearly 40 years of election product research and development.

SIMULTANEOUS MULTIUSER ACCESS

Electionware's multi-user functionality allows multiple authorized election personnel on a closed-network system to prepare precinct flash drives simultaneously, or load results while simultaneously running reports. Additionally, the multi-user functionality in Electionware allows multiple teams of election officials to work simultaneously on different elections.

DATA SECURITY

Electionware incorporates the latest in election security, including built-in audit controls, encrypted election data, and access level user credentials designed to keep election data safe and secure. Electionware is fully compliant with EAC guidelines for usability, accessibility and security requirements. The Equipment Security feature creates security codes that control access to voting equipment. All election media USB flash drives contain encryption specific to the current election and equipment type.

ROBUST

Electionware manages nearly 10,000 ballot styles and precincts; supports myriad languages; manages and deploys multiple levels of security. One database for multiple equipment types provides election-wide uniformity and compliance, as well as less room for human error.

For more information visit ***www.essvote.com***

ELECTION Systems & Software

Adjudication Solutions

Ensuring the Integrity of Elections

ES&S' systems provide election administrators with simple, proven and secure auto and electronic adjudication functionality, helping ensure timely election night results reporting. Our tabulators' auto-adjudication functionality increases the accuracy of mark recognition, and our election management software's electronic adjudication functionality streamlines the adjudication process while protecting voter intent.

AUTO ADJUDICATION: IMR® and PTRAC® Technology

ES&S' patented Intelligent Mark Recognition (IMR) and Positive Target Recognition & Alignment Compensation (PTRAC) technology is built into every ES&S DS200, DS450 and DS850 scanner and tabulator.

LIKE A HEAT-SEEKING MISSILE

Sophisticated image-processing algorithms use ballot timing marks to quickly create an evaluation window for each oval in a contest. Because ballots can skew, stretch, crumple, etc., PTRAC searches for the ovals containing voter selections, moving the ballot image as necessary.

LET THE SYSTEM DO THE WORK

IMR and PTRAC compensates for variations in ballot printing. The system leaves just the voter's marks visible — their intent now apparent for all.

PTRAC OVAL MASKING TECHNOLOGY

Finding the exact center of the oval and removing the oval outline is crucial in dealing with printed ballots. PTRAC "hides" the oval so the scanner only focuses on the voter's mark and determines intent with extraordinary accuracy.

1. PTRAC performs a series of "hunting" steps, locating the oval exactly for a contest in the scanning window.

2. It then detects the exact center of the oval and adjusts the image.

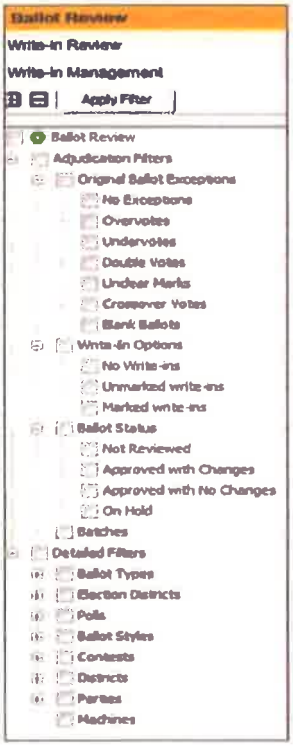
3. The oval perimeter line is then digitally removed, leaving just the voter's marks.

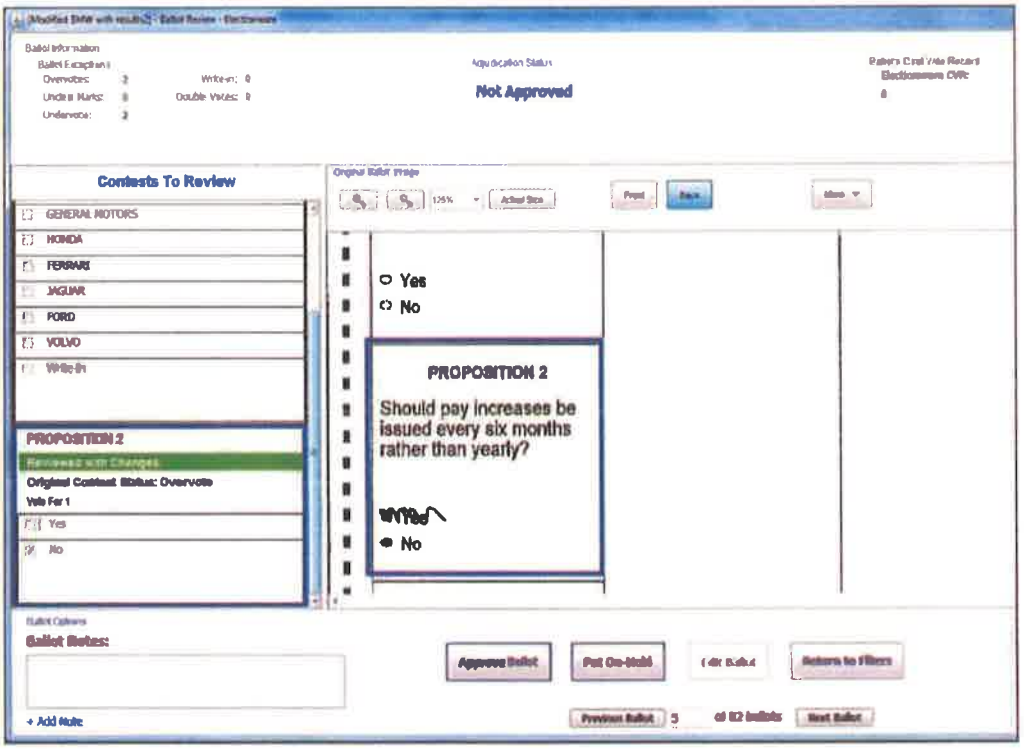
IMR RECOGNIZES REAL-WORLD VOTER MARKS

IMR recognizes the most common non-traditional voter marks (such as X's, checkmarks, diagonal slashes and horizontal slashes). Because it considers not just pixel count, but also the shape of each mark, it can determine a marking pattern and the voter's intent, and not get fooled by unclear marks such as smudges or stains.

ELECTRONIC ADJUDICATION: Electionware®

ES&S' election management software, Electionware, functions as an intuitive tool to make the ballot review and adjudication process streamlined — saving time and resources while accurately accessing and protecting voter intent. Electionware's Reporting module allows an adjudication team to review images of ballots including exceptions like overvotes, undervotes, unclear marks, blank ballots and write-ins. The functionality is so intuitive it requires minimal training.





ELECTIONWARE USERS CAN:

- View the ballot image side-by-side with the cast vote record (CVR).
- Easily find exceptions, move through contests, and determine what was changed compared to how the ballot was originally counted.
- Zoom into areas of ballot images, print and save them.
- Update a ballot's status during the adjudication process (not reviewed, reviewed with changes, reviewed with no changes, on hold).
- Easily match a physical ballot with the on-screen image.

REVIEW WRITE-INS MORE EASILY

Many of the Reporting module features are specifically aimed at simplifying the write-in review process. These features give users the ability to:

- View a digital image of write-ins to assign to write-in candidate names programmed in the system. This can be done individually or in batches using the Bulk Edit feature.
- Filter ballots by contest, precinct, poll, device type and ballot style.
- Use write-in candidate names set in the system and add write-in candidates on the fly.
- Run reports that summarize all write-in assignments. These reports include the digital image of the write-ins.

ExpressRunoff®

Ranked-choice Voting

WHAT IS RANKED-CHOICE VOTING?

Ranked-choice voting (RCV) is an electoral system that gives voters the power to rank candidates from favorite to least favorite. RCV ensures that the winning candidate(s) reflects the support of the majority of voters. It is often a preferred method of voting for those who wish to eliminate runoffs.

HOW DOES THE RANKED-CHOICE VOTING PROCESS WORK?

Voters rank the candidate choices by preference. (first choice, second choice, etc.)

The election management system tallies the first-choice votes.

If no candidate receives a majority of first-choice votes, ExpressRunoff applies an algorithm process based on the jurisdiction's ranked-choice voting rules to determine the winner.

If one candidate receives the majority of first-choice votes (>50 percent), that candidate wins.

SUMMARY REPORT

The ExpressRunoff reports are simplified to allow you to see exactly which candidates are eliminated in each round — the status of each candidate is indicated by the color:

- Blue = Round Winner
- Orange = Eliminated
- Asterisk (*) = Eliminated in event of a tie
- Bold = Transferred votes/ Totals

	Round 1			Round 2		
Candidate Names	**Votes**	**Percentage**	**Transfer**	**Votes**	**Percentage**	**Transfer**
Frank Smith	5	14.71%	-5	0	00.00%	0
Jane Doe	15	44.12%	1	16	47.06%	0
Jim Henson	1	00.00%	1	0	00.00%	0
John Hammond	10	29.41%	8	18	52.94%	0
Overvote	0	00.00%	0	0	00.00%	0
Tim Smith	3	02.94%	-1	0	00.00%	0
Undervote	0	00.00%	0	0	00.00%	0
Writein	0	00.00%	0	0	00.00%	0
Ballot Exhausted						
By Overvotes	0		0	0		0
By Undervotes	0		0	0		0
By Exhausted Choices	0		0	0		0
Continuing Ballots	34		0	34		0
TOTAL	34	100.00%	0	34	100.00%	0

Version 1

Ranked-Choice Voting

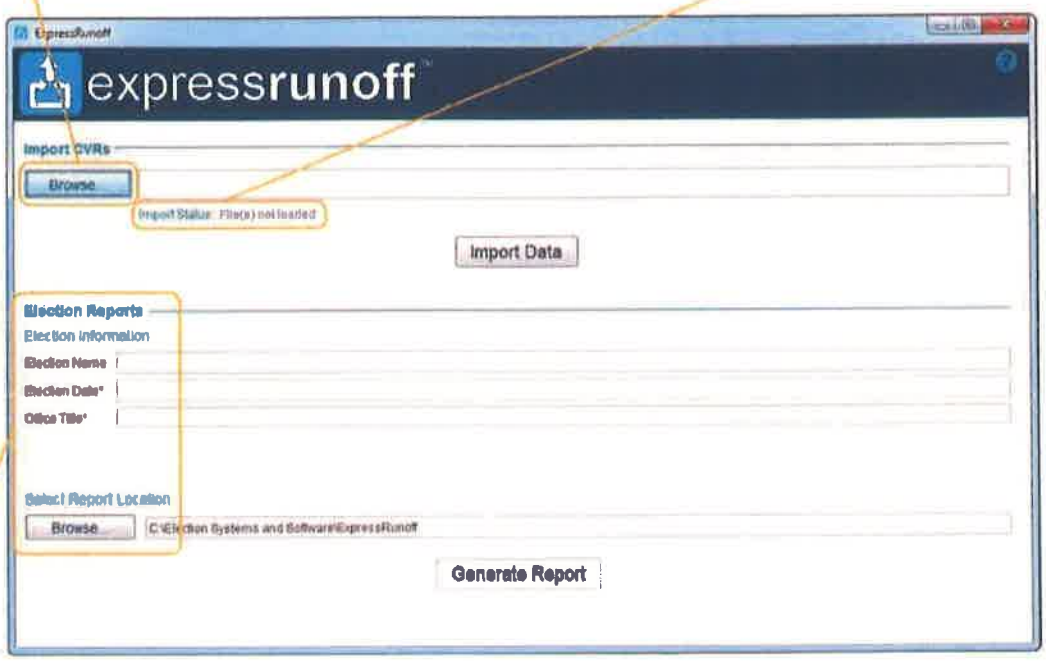
ExpressRunoff is a proven software utility available from ES&S that allows election officials a simple method for administering a ranked-choice voting (RCV) election.

Cast Vote Record (CVR) Spreadsheet

Select the CVR spreadsheet generated from Electionware. Shows each voter's selections for a ranked-choice voting contest.

Transparency

Once the import is successful, the import status changes to "File Loaded."



Customized Reports

Select where the report should be saved and customize the heading.

expressrunoff

ExpressRunoff has been used in multiple ranked-choice voting elections. The software works with ES&S' Electionware election management system. Election administrators simply set up each choice as a different contest during the ballot setup in Electionware. After the election, the Cast Vote Record (CVR) spreadsheet is exported from Electionware and used in the ExpressRunoff software to calculate the winner based on common procedures used in RCV elections.

ExpressRunoff generates easy-to-read Excel reports showing round-by-round results and how the ballot choices are allocated to the next round.

For more information visit ***www.essvote.com***

expressrunoff *Frequently Asked Questions*

Rank your candidates in order of preference.

Rank up to 6 candidates. Mark no more than 1 oval per column.

	1st Choice	2nd Choice	3rd Choice	4th Choice	5th Choice	6th Choice
Jack Black (D)	○	○	○	○	○	○
Dwight White (R)	○	○	○	○	○	○
Jow Brown (D)	○	○	○	○	○	○
Bobbi Green (D)	○	○	○	○	○	○
John Silver (R)	○	○	○	○	○	○
Dorlan Gray (L)	○	○	○	○	○	○
Mary Joe (L)	○	○	○	○	○	○

What is ranked-choice voting?

Ranked-choice voting (RCV) is an electoral system that gives voters the power to rank candidates from favorite to least favorite. RCV ensures that the winning candidate(s) reflects the support of the majority of voters. RCV is often a preferred method of voting for those who wish to eliminate runoffs.

How does the ranked-choice voting process work?

Voters rank the candidate choices by preference. (first choice, second choice, etc.)

The election management system tallies the first-choice votes.

If no candidate receives a majority of first-choice votes, ExpressRunoff applies an algorithm process based on the jurisdiction's ranked-choice voting rules to determine the winner.

If one candidate receives the majority of first-choice votes (>50 percent), that candidate wins.

Does ES&S support RCV?

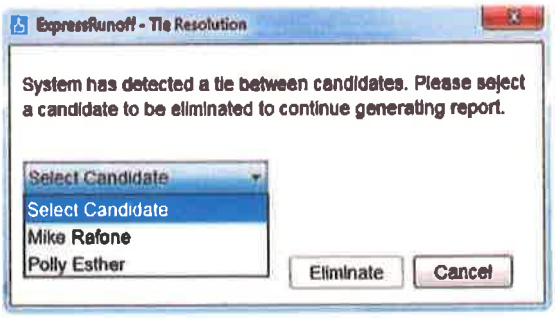
Yes, ES&S' ExpressRunoff software works with our Electionware election management software to administer an RCV election. Election administrators simply set up each choice as a different contest during the ballot setup in Electionware. After the election, the Cast Vote Record (CVR) spreadsheet is exported from Electionware and used in the ExpressRunoff software to calculate the winner based on common procedures used in RCV elections.

ExpressRunoff creates easy-to-read reports showing round-by-round results and how the ballot choices are allocated to the next round. The software can support a large number of candidates. ES&S can provide different configurations of ExpressRunoff.

Which jurisdiction rules does ES&S' ExpressRunoff software support?

ExpressRunoff supports the following rules -

- **Final round options** — Rounds may be configured to:
  - Stop once a candidate receives more than 50 percent of the votes, or
  - Continue until only two candidates remain at which point the candidate with the most votes is declared the winner (or tie resolution commences).
- **Batch elimination** — For the first round only, a batch elimination algorithm will eliminate any two or more candidates for whom winning is mathematically impossible. All other rounds use a single elimination method.
- **Tie Resolution** — If a round produces a tie between two or more candidates, ExpressRunoff will display the Tie Resolution dialog box, which prompts administrators, based on their jurisdiction's rules and processes (e.g., roll dice), to eliminate one of the candidates from the tied round. Each candidate eliminated from a tie will be displayed in the final report with an asterisk (*) for additional transparency.



- **Skipped choices** — If a single ranking position is skipped, the next marked continuing candidate is used for that round. ExpressRunoff provides an option to exhaust a ballot if two or more consecutive skipped rankings are encountered. (*Note: The term "exhaust" refers to ballot CVRs that are not included in further calculations because no valid choices remain.*)
- **Repeated choices** — If a voter marks the same candidate for more than one ranking position, and that candidate is eliminated before the next round, then the next ranked candidate is used for that round.
- **Overvoted ranking** — Upon the first instance of encountering an overvote in the round-by-round

STILL HAVE MORE QUESTIONS?

Are there additional costs for RCV elections?

Contact ES&S for specific pricing information.

Does ES&S have any customers that use RCV?

Yes, the State of Maine used ES&S's ExpressRunoff software to administer their 2018 primary and general elections.

Is a mixed ranked and non-ranked ballot style possible?

Yes, ballots can include a mix of voting styles.

Is there a limit to the number of choices for a contest?

The only limit is the ballot size; ES&S offers up to 19" ballots.

Does ExpressRunoff software support multi-winner contests where a group of people (of a set number) will win?

The current version of ExpressRunoff supports single-seat RCV contests.

Which tabulators support ExpressRunoff?

All ES&S EVS tabulators that produce a CVR, as the CVR is required by ExpressRunoff to calculate a winner.

What format are the ExpressRunoff reports?

ExpressRunoff generates reports in the form of an Excel Spreadsheet.

ELECTION Systems & Software

Extended Warranty & Preventative Maintenance Program

Peace of Mind is a Sound Investment

Give yourself peace of mind by protecting your voting system investment with the ES&S Extended Warranty Preventative Maintenance Program.

Why you NEED this protection?

An ES&S extended warranty provides additional years of service and support from the date you purchase your equipment.

Preventive and corrective maintenance involves regularly scheduled equipment upkeep to avoid sudden and unexpected equipment interruptions and to ensure peak performance for a smooth election. It also reduces the total cost of ownership of the equipment and extends its expected service life. Covered equipment is ...

With your ES&S Extended Warranty Preventative Maintenance Program:

- You receive priority service from a dedicated team of extensively trained Field Services Technicians who have intimate product knowledge and on average, 10-12 years of election experience — your equipment is repaired faster with no hassles.
- You are not charged a fee every time you make a claim. Our technicians will get your equipment up and running at no extra expense — parts, labor and travel expenses are included.
- You have 24/7 unlimited access to the myES&S Customer Portal — providing you with access to customer-specific documentation including training materials and product advisories and documentation.
- You receive one annual invoice — this makes for easier budgeting and assurance that you will not be affected by price fluctuations or rising travel costs.
- All of service history is tracked including documentation of what exactly was worked on — providing you with a reliable, verifiable source of information about all maintenance performed on your voting equipment.

There are two warranty options to choose from based on your jurisdiction's needs:

1 Extended warranty with annual maintenance service

2 Extended warranty with biennial maintenance service

Both warranties cover

Scheduled Preventative Maintenance

Free Certification of Replacement Parts

Technical Help Desk Support

Repair Services

Certified Software and Firmware Upgrades and Enhancements

Service by Trained and Certified ES&S Technicians

Exclusive ES&S-certified System Parts

Service History Tracking

At ES&S, we are committed to ensuring the long-term sustainability of our products.

No other election systems provider is more devoted to sourcing and maintaining a supply of replacement parts for deployed systems – regardless of age.

ES&S ensures replacement parts are tested and certified for use prior to installation at no additional charge.

Elections in America BY THE NUMBERS

More than 10,000 elections are held in an average year in the U.S.

On any given Tuesday — or other days of the week — there is an election being held somewhere in the U.S. And elections are not one-day events — they are processes that involve significant preparation by many dedicated people.

WHY SO MANY ELECTIONS?

There are more than half a million elected officials in the U.S.! Let's add it up...

2
President and Vice President

100
Senators

435
Representatives

50
State governors

~7,000
State legislators[1]

3,000+ counties and 19,000+ cities and towns[2]

All have some form of elected leadership, including:

- County executives
- County council members
- Mayors
- City council members
- Judges
- School board members

ELECTIONS ARE DIFFERENT FROM PLACE TO PLACE

There are more than 8,000 jurisdictions with different systems and methods of voting, including:

- In person at a polling place
- In person at a vote center
- Absentee & vote by mail
- Two-round runoff
- Ranked choice
- With a touch screen
- With a pen
- With assistive technology

ELECTIONS ARE LOCAL

Each state has a chief election authority

Elections are usually administered at the county level.

Election officials are responsible for:

- Overseeing voter registration
- **Preparing the ballots**
- **Managing polling locations**
- Distributing voting machines
- Ensuring the accessibility, **integrity** and efficiency of the voting process
- Many other tasks that help ensure elections run smoothly!

States are required to send absentee ballots to uniformed service members residing outside the U.S.

45 days prior to Election Day[3]

230,000+ polling places and 637,713 poll workers on Election Day 2018[4]

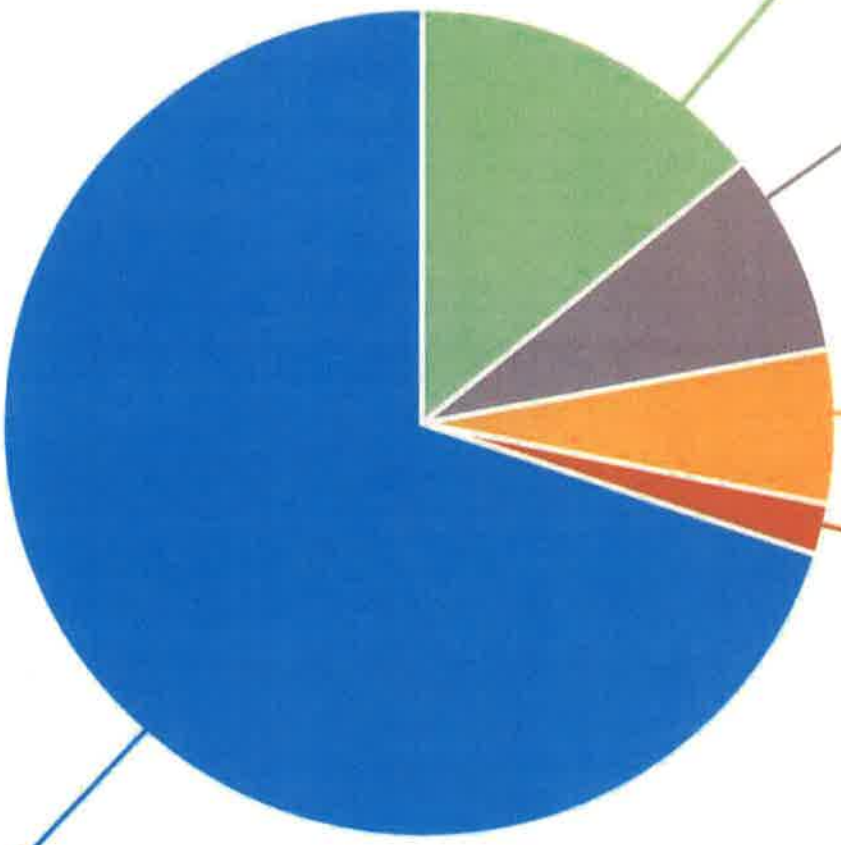
76% of states require audits[1] to ensure that established election procedures were followed in polling places

100% of states have a plan for conducting recounts[4] to ensure that ballots were counted correctly

State Certification Requirements

ELECTION Systems & Software

In addition to **Federal Standards Compliance testing at a VSTL and/or EAC Certification.**



7 states

Require no additional state certification testing or compliance review

(AK, DE, ME, MS, NE, RI, WY)

5 states

Require a compliance review of state code and rules. These unique states have their own testing staff to accomplish the 4-6+ month certification process.

(FL, IL, CA, NY, GA)

3 states

Require a compliance review of state code and rules

AND

In-state field test (See page 2 for details)

AND

Final state board or SOS approval

(MA, SC, VA)

1 state

Requires a compliance review of state code and rules

AND

Out-of-state field test (See page 2 for details)

AND

Final state board or SOS approval

(TN)

34 states

Require a compliance review of state code and rules

AND

Final state board or SOS approval

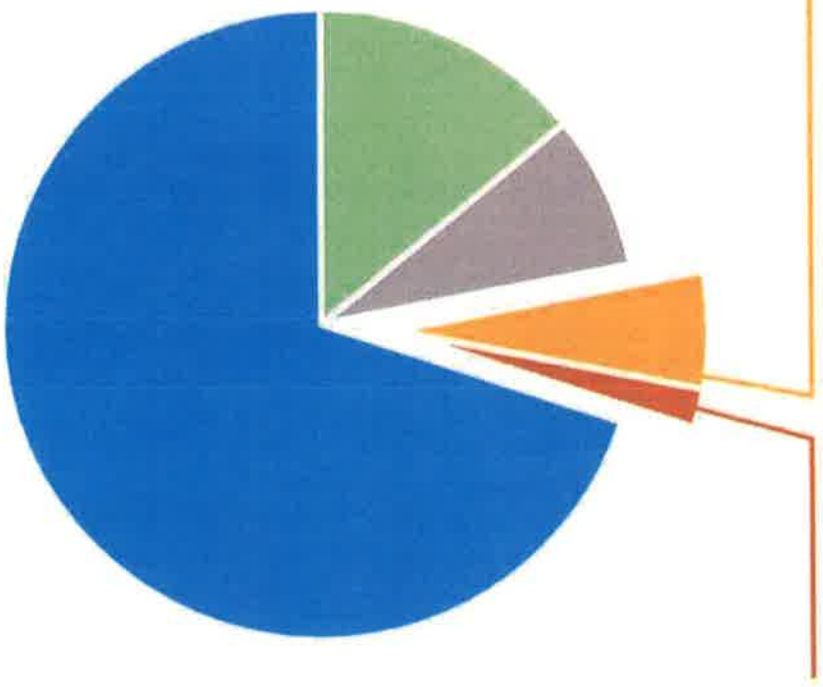
(AL, AR, AZ, CO, CT, HI, IA, ID, IN, KY, KS, LA, MD, MI, MN, MO, MT, NC, ND, NH, NJ, NM, NV, OH, OK, OR, PA, SD, TX, UT, VT, WA, WI, WV)

Acronyms Defined:

VSTL – Voting Systems Test Laboratory
EAC – U.S. Election Assistance Commission
SOS – Secretary of State

ELECTION Systems & Software

A closer look at the requirements of the 4 states that require field tests:



Massachusetts requires field tests to involve Massachusetts voters and election officials during two in-state elections in one or more jurisdictions.

South Carolina requires field tests to involve South Carolina voters and election officials during a scheduled primary, general or special election and involve a minimum of two precincts.

Virginia requires field tests to involve Virginia voters and election officials during a scheduled primary, general or special election and must involve one or more precincts.

Tennessee requires the Elections Director and State Election Commissioners to witness an election in an out-of-state jurisdiction with 25,000+ registered voters. The ballot must contain also two or more districted races with one race being an at-large race.

Product Testing

ELECTION Systems & Software

PRODUCT DEVELOPMENT

We work from federal testing guidelines, designing tabulation equipment to meet or exceed every requirement.

PRE-CERTIFICATION TESTING

We internally conduct every test described in the federal guidelines to ensure **zero defects** prior to applying for certification.

ADDITIONAL SECURITY TESTING

We voluntarily sent tabulation equipment to be tested by independent cybersecurity labs such as **Idaho National Laboratory**, which works to improve the security of nuclear power facilities, electrical grids and other U.S. critical infrastructure.

FEDERAL CERTIFICATION

The Federal Test Program reviews:

- ES&S' application
- The test plan
- The test report

Following review, the Election Assistance Commission makes a decision on certification.

Federally accredited labs test tabulation equipment as described in the Federal Test Program. These stringent tests require:

1.5 million consecutive ballot positions correctly read by tabulation equipment

48 hours of consecutive environmental tests with no issues; if any issues, the clock restarts

3+ million lines of source code reviewed

Full security audit of the election management software

ES&S has **25** federally certified voting systems

STATE CERTIFICATION

Most states require a state code compliance review and approval by Secretary of State or state board, in addition to federal certification. **Some states require field tests of the equipment before certifying.**

BOTTOM LINE: These strict guidelines and exacting series of tests are developed for one purpose: to make sure systems perform as designed and certified.

How It Works:

Supply Chain Security

ES&S works with leading security experts to create the most secure supply-chain possible — with rigorous inspections at every step — to provide accurate and reliable elections for our nation.

VETTING

Every partner in ES&S' global supply chain must regularly undergo a multi-point, in-depth check for security, safety, reliability and adherence to stringent operating procedures.

ES&S tabulation systems are purpose-built, which means we know and vet the manufacturer of 100% of the individual components.

PRODUCT AUTHENTICATION

All electronic components are certified to Electronic Components Industry Association standards. These standards, developed to fight counterfeiting, are upheld with a 76-point audit of manufacturer and distributor quality management systems.

PHYSICAL SECURITY: ACCESS BADGES, CAMERAS AND 24-HOUR MONITORING

ASSEMBLY

Trusted manufacturing partners inspect the components upon arrival; this includes using high-powered microscopes to look for irregularities.

- Security assessments are conducted on each of our manufacturing partners.
- Key manufacturing personnel have gone through federal background checks.
- All manufacturing partners are ISO-compliant, following highly regulated processes for quality management.

PHYSICAL SECURITY: LOCKED AND SEALED CONTAINERS, SEAL NUMBERS LOGGED AND VERIFIED DURING TRANSIT

IMPORTING

100% of our shipping partners are Customs Trade Partnership Against Terrorism (CTPAT) certified—which is the U.S. Customs and Border Protection's highest level of cargo security.

- CTPAT is the Authorized Economic Operator (AEO) program for the U.S.
- All CTPAT certified distributors are required to demonstrate that their supply chains are secure from the point of origin to the point of distribution.
- Other critical infrastructure sectors, including defense and healthcare, trust and use CTPAT certified distributors.

PHYSICAL SECURITY: ACCESS BADGES, CAMERAS AND 24-HOUR MONITORING

FINAL CONFIGURATION & VALIDATION

Before units are approved for delivery to customers, important steps take place:

- Our systems are tested by an independent, US-based laboratory that completely dismantles units to verify that the firmware on the programmable active components meets all specifications and is quality tested to our exacting standards.
- In Omaha, Nebraska, the final hardware is configured and the final end-to-end QA testing is conducted, which includes installing the certified software and firmware.

PHYSICAL SECURITY AT CUSTOMER LOCATIONS: ACCESS BADGES, CAMERAS AND 24-HOUR MONITORING

DELIVERY & INSTALLATION AT CUSTOMER LOCATIONS

- For transit, tamper-proof seals are placed on truckloads, and access to freight terminals is restricted.
- Upon delivery to customers, the firmware is verified once more.

7 Major Steps to Securing Elections

ES&S voting systems are secured along every step of the voting and vote recording process using the latest, tested, trusted technology.

PRE-ELECTION

1 Election officials prepare the election information, such as the ballot layout, using election management software (EMS) on a hardened computer.

The EMS generates digital signatures and encryption keys unique to each election.

EQC

Election Definition

2 Election information is completely cleared from the voting machine, and new encryption keys are loaded when an Election Qualification Code (EQC) USB flash drive is inserted.

3 Election Definition flash drive loads encrypted and signed election information onto the voting machine.

4 Each device stores the election-specific keys and election definition information encrypted with another key derived from information in the election definition. If any devices are compromised, the election keys and definition are protected since they are not stored in-the-clear.

ELECTION DAY

5 All vote data is encrypted and digitally-signed — and additional hash validations occur.

POST-ELECTION

Results

6 Unofficial results data is bundled and compressed for physical transport back to the election office.

7 The EMS performs file and signature validations before retrieving results from the flash drive.

SECURITY TOOLS

Hardened System

A locked-down system used for election tasks; loaded with only essential software, reducing the channels for unauthorized access to the system.

User Access Control

Systems only allow authorized users with login credentials to perform necessary actions. All user actions are logged for auditing and review purposes.

Digital Signature

A method of confirming the origin and integrity of election data.

Encryption Keys

Used to scramble data into unreadable text. The EMS generates unique encryption keys for each election.

Certified Media

Industrial-grade USB flash drives, made in the U.S., that have been certified for use with the voting system. The EMS and voting devices will not read non-certified media.

Hash Validation

A process of verifying the integrity of data.

ELECTION Systems & Software

Elections FAQ:

The Security and Accuracy of America's Vote

1. Have America's voting machines been hacked?

There's no evidence that any vote in a U.S. election has ever been compromised by a cybersecurity breach. To date, the totality of security measures—such as voting machines never being connected to the internet, tamper-resistant seals, audits, along with more advanced technology found in newer equipment—provides for an environment that would be difficult to compromise. Agreement of this fact is widespread:

- Jeh Johnson, Secretary of Homeland Security during the 2016 presidential election, testified before Congress that no vote tallies were altered or suppressed by Russian hacking. -- *Jeh Johnson: Cyberattacks 'are going to get worse before they get better*, CNBC, June 21, 2017 (https://cnb.cx/2N20tyM).
- "In its review of the 2016 elections, the Committee found no evidence that vote tallies were altered or that voter registry files were deleted or modified." -- *Report of the Select Committee on Intelligence United States Senate on Russian Active Measures Campaigns and Interference in the 2016 U.S. Election.*
- The Obama administration is on the record as stating there was no evidence of hackers tampering with the election, and that according to one senior administration official, the election results "accurately [reflected] the will of the American people." -- *White House insists hackers didn't sway election, even as recount begins*, Politico, Nov. 26, 2016 (https://politl.co/2jlBraO).
- The Trump administration is also on record stating the same. During a news conference with the Swedish Prime Minister, President Trump stated affirmatively that no votes were impacted by Russia during the 2016 presidential election. – *Trump says Russia had 'no impact' on 2016 election votes*, CNN, March 6, 2018 (https://cnn.it/2L1Pc4F).

As far as attempts at interference, U.S. investigations found that Russian hackers attempted to access the voter registration files or public election sites in several states. They were able to gain access to voter registration information in a single state and stole the username and password of a single election official in another state. The other states were targeted but not breached. The targeting was likened to somebody trying a door knob, but finding it locked. -- *What we know about the 21 states targeted by Russian hackers*, The Washington Post, Sept. 23, 2017 (https://wapo.st/2NIC7ee).

2. Can voting machines be hacked?

Voting machines have been easily hacked at conferences and demonstrations, but these environments do not reflect an actual election scenario where additional layers of physical and cyber security are always in place. Additionally, voting machines are never connected to the internet.

Vermont Secretary of State Jim Condos testified before the U.S. Senate Committee on Rules & Administration and reiterated the integrity of our vote counts. "If our protections to our voter registration system are breached, we can address that, and ***the vote count is not impacted.*** If our protections to our website posting election night reporting are breached, we can address that, and ***the vote count is not impacted.***" – *Statement from the Honorable Jim Condos*, U.S. Senate Committee on Rules & Administration, June 20, 2018 (https://bit.ly/2L0EJ9Q).

3. Can we trust voting machines?

It is an undeniable fact that the nations voting process is and has been under attack which easily leads to concern over whether voting machines and the election process can be trusted. In determining the level of threat to the actual voting unit there are several documented facts that should be considered:

- Voting machines provided by ES&S are certified by the federal Elections Assistance Commission and undergo robust testing for accuracy, reliability, usability and security.
- Voting machines are never connected to the internet
- There is no evidence of a voting machine being compromised by a cyber security incident in an election.
- Voting machines are used and deployed in a in a decentralized manner across the nation's 10,000 voting jurisdictions. This decentralization greatly diminishes the chance or impact of a large-scale attack.

While there is no evidence of any hacking of any voting machine currently in use as it is used in an election, as threats become more sophisticated, so must voting machines and the nation's entire voting infrastructure.

4. What about modeming of results?

Where used, modems are only used to transmit unofficial results; official voting reports can't be compromised through a modem.

The Election Assistance Commission's guidelines state that it is the use of modems on election night to transmit unofficial polling place results to the central office. The only results that are transmitted through a modem are unofficial results that have the same bearing on the actual results of an election as an exit poll.

The decision to use a modem to transmit unofficial results is a decision made by each jurisdiction. Some jurisdictions choose to use a modem to transmit the unofficial results as quickly as possible, and some choose to receive the unofficial votes once the machines are collected from the polling places.

5. Do any ES&S systems have remote access capability?

No ES&S product or system has remote access capability; ES&S does not provide this capability.

More than a decade ago, ES&S, along with others in this industry and many other industries, provided software upon customer request for customer workstations—not voting machines—for troubleshooting purposes. While no known issues arose with this practice, ES&S has not provided this capability since 2007 and never provided it for voting machines.

6. Does ES&S use independent testing of its voting equipment?

Yes, in multiple ways. ES&S voluntarily adheres to the Federal Testing Program conducted by the Election Assistance Commission (EAC), a Federal Agency created by the Bi-Partisan Help America Vote Act of 2002. Under the EAC, ES&S submits all its systems to Voting System Test Laboratories accredited by NIST. These labs perform tests in accordance with the federal security standards for voting systems.

Layered upon the reviews conducted under the Federal Test Program, several states –also engage independent firms to audit the security of voting machines as part of the certification examination process in their states.

In addition, over the past year, we have engaged cybersecurity firms to conduct independent third-party reviews, including penetration testing and source code reviews and we recently partnered with the Department of Homeland Security NCATS team to conduct additional independent penetration testing of our tabulation products.

7. Does ES&S support security enhancements to the nation's election infrastructure?

ES&S fully supports paper-based voting technology coupled with post-election audits. In addition, we support the creation or adoption of industry standards and guidelines which further strengthen the nation's critical election infrastructure.

SECURITY BULLETIN

Secure Data Protocols

Security Features Employed by ES&S to Protect Election Data

At ES&S, we understand and appreciate the importance of protecting all aspects of the election process – this includes adherence to secure practices that surround the creation, transfer, and storage of important election files and data. ES&S products employ encryption and digital signing for all data-in-transit using cryptographic modules that meet the Federal Information Processing Standard (FIPS).

DATA ACCESS CONTROLS

Customer data is entered into dedicated internal standalone servers. Specific permissions are required to access this data, including:

- Secure system controls that ensure only associates with specific permissions are allowed access
- Established security permission protocols and recurring reviews
- Required management approval for all system access requests and changes

All Tabulation Programming data is stored securely on an internal dedicated server, using the same permission controls noted above. Election definition media file access is tightly controlled and only distributed to the customer in one of two ways:

- **Physical media** is created from secure certified systems that are not connected to the internet. Although isolated from the internet, these systems are still protected with security patches and anti-virus definitions. Physical media is tested for accuracy in controlled environments only accessible to thoroughly screened employees with security clearance and is shipped to customers with tracking enabled. A test deck of ballots and expected results are provided to ensure the integrity of the physical media. It allows customers to validate those results on-site to confirm they are in sync with what was tested at ES&S.
- **File Transfer** of media files is provided to customers through an encrypted Secure File Transfer (SFT) site. As the files move through our processes, they are hash validated to ensure the files have not been altered. Customers retrieve the data from the SFT site and move it to a secure internal certified standalone (not connected to the internet) server. Customers create their own media in-house using this air-gapped environment.

SECURE FILE TRANSFER PROCESSES

Customers using SFT are afforded security through the following processes:

- All data is encrypted on all file transfers;
- Complex passwords are required for all accounts;
- Accounts are automatically locked after too many failed password attempts;
- All downloaded files are purged on an automatic basis;
- All accounts (both internal and external) are vetted routinely, and strict access approval is enforced;
- Intrusion detection monitoring is enabled.

The transfer of data is always verified and validated through internal and public testing to ensure the accuracy and integrity of every election.

ES&S Security Philosophy

Nothing is more important to ES&S than protecting America's democracy through secure and accurate elections. That's why every ES&S product reflects the company's three-part security philosophy:

- **Design:** All products are designed, without compromise, to meet the latest and ever-evolving standards in security, accuracy and reliability.

- **Testing:** In addition to ES&S testing protocols, all tabulation systems are rigorously tested and certified by the federal Election Assistance Commission (EAC), which reflects security and performance standards developed by scientists, academia and election officials. The ES&S testing protocol also involves testing by independent, accredited laboratories. ES&S submitted our end-to-end voting configuration for Cybersecurity and Infrastructure Security Agency (CISA) critical product evaluation (CPE) at Idaho National Labs.

- **Implementation:** The entire ES&S team is devoted to ensuring that each piece of technology performs as expected on election day, helping election officials uphold the laws of their state which mandate strict physical security and tight chain of custody of all voting machines.

Perhaps most importantly, ES&S' essence — its very being — is predicated on providing America with secure, accurate and accessible elections. Every person at ES&S holds themselves, and each other, accountable for this mandate, and is proud to serve a role in this noble purpose.

SECURITY BULLETIN

Security Management Practices

Every time voters head to the polls, they want to know their votes will be accurately counted and protected. At Election Systems & Software, we take extra precautions to ensure our software, hardware and data are well-insulated from harm.

100%
Every ES&S associate completes annual security awareness training.

0/1,000,000
Our EAC certified systems are required to complete testing with 0 errors in 1 million test ballots.

We don't just follow industry best practices; we help develop and distribute them through a partnership with the U.S. Department of Homeland Security. From internal protocols to training on every piece of equipment, we go above and beyond what's required to keep our elections safe.

HOW WE PROTECT OUR INFRASTRUCTURE

Physical Security

- All ES&S employees, contractors, temps and interns are required to wear an ES&S-issued photo ID badge on company grounds.
- All ES&S facilities are monitored by security cameras, alarms and door badge readers.
- ES&S employees are trained to manage all visitors to the facilities. Visitors are under constant supervision while on ES&S property.

Corporate IT Security

- All ES&S employees, contractors, interns and temps are required to use two-factor authentication when logging into corporate IT networks.
- ES&S uses internal and external security monitoring of our corporate IT environments, including five Albert sensors covering our voter registration environments.
- ES&S constantly prepares for malware attacks by using multiple systems to protect endpoints, servers, backup systems and software development.
- ES&S has DHS conduct cyber hygiene scans of our public-facing internet presence weekly.

PROTECTING ELECTIONS TOGETHER

- ES&S has close working partnerships with DHS, CIS, the FBI and others to share cyber threat information and best practices and prepare for cyber incidents.
- ES&S conducts free Secure the Vote™ training for our customers to develop cybersecurity awareness and the implementation of best practices to protect the equipment used for elections.
- ES&S participates in DHS election security tabletop exercises and has brought the DHS exercise team to our headquarters to conduct in-house tabletop exercises.
- ES&S conducts penetration testing of hardware, firmware and software using commercial third parties, and we have partnered with DHS and the Idaho National Lab to conduct penetration testing of our end-to-end voting systems.

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SECURITY BULLETIN

Voting System Security

Election Systems & Software (ES&S) is a proud provider of voting system technology across the United States. We have been in the business of providing tabulation systems to local and state jurisdictions for more than 40 years.

U.S. registered voters cast their ballots using several different methods. The types and kinds of technology in use across the nation vary from state to state and county to county, based on the election laws and preferred voting methods for a particular jurisdiction. Depending on the jurisdiction, voters can cast their ballots by mail in advance of Election Day or in a polling location on Election Day, and in some cases, in a polling location during an Early Voting period. Many voters cast their ballots on a voting device designed to ensure that those with disabilities can vote securely and independently. The most common way to vote, however, remains in-person at a polling location on the day of the election. Polling place ballots are then tabulated at the precinct, or in some cases, they are centrally counted at the elections office.

TESTING AND CERTIFICATION

ES&S submits our tabulation systems to rigorous and lengthy test campaigns as part of the Election Assistance Commission's (EAC) Voting System Certification Program. This important program details security and performance standards that were developed by scientists, academicians and election officials.

ES&S submits equipment to testing by independent third parties, including the Idaho National Lab for penetration and full security testing. All independent laboratories that test our systems have received federal accreditation.

ENCRYPTION AND DIGITAL SIGNATURES

In addition to adhering to the security and performance requirements of the EAC Certification Program, our voting equipment adheres to secure practices that surround the creation, transfer, and storage of important election files and data. Our products employ encryption and digital signing for data-in-transit and at rest using cryptographic modules that meet the Federal Information Processing Standard. Our systems allow Election Officials to easily adhere to the laws of their state, which mandates strict physical security and tight chain of custody of the voting machines.

ENSURING TRUSTED VOTING RESULTS

If a voting machine has a mechanical issue or a human makes an error in preparing or using a voting machine, every state in the nation has protocols for the use of back-up equipment, audits of voting results and publicly documented physical tests to ensure that issues can be corrected before Election Day or before the final certification of voting results.

SECURITY PARTNERSHIPS AND COLLABORATION

ES&S continues to strengthen our partnerships with various external entities, including the Department of Homeland Security (DHS) and Information Sharing and Analysis Centers (ISACs). We are also a member of the Elections Infrastructure Sector Coordinating Council (SCC), an organization in partnership with the Government Coordinating Council, designed to guide voting system manufacturers and other interested parties in election security and best practices.

Post-election Auditing and Paper Ballot Cards

ES&S fully supports the use of paper ballots and post-election audits as a way to ensure accuracy and increase confidence in our country's election process.

- ES&S' Electionware® election management software offers election officials the ability to conduct a wide range of post-election audits with improved effectiveness and efficiency. The system provides easy-to-read, side-by-side comparisons of the unaltered ballot image and its corresponding cast vote record, making it possible to audit any election in a fraction of the time.
- Electionware provides an export of cast vote records that are easily imported into the various risk-limiting audit systems in use today.

IS A PAPER BALLOT CARD AUDITABLE?

Yes. Just as hand-marked paper ballots can be inspected or audited by hand or by machine, so can paper ballot cards since they contain both human-readable selections and corresponding machine-readable barcodes. A ballot card contains the same data as a hand-marked ballot, displayed in different ways. During a post-election hand-count audit, selected candidate names are used to count the vote.

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SECURITY BULLETIN

Hardening of the Election Management System

Hardening of the Election Management System (EMS) is the process of configuring servers, workstations, and network equipment to minimize security vulnerabilities and provide a standard configuration of the EMS for each release. Configuration settings are based on security best practices and recommendations from Federal and Industry Standards that provide specific and actionable ways to prevent malicious activity and improve the collective security of EMS systems. This helps achieve acceptable levels of integrity and reliability of voting systems. When an ES&S EMS system or network is hardened, the cybersecurity posture of the network is improved, which lowers the risk of all threats.

EMS hardening configures the EMS systems and network to include only the services, applications, utilities, available ports and settings required to operate the EMS successfully. The hardening process turns the server into a single-use device, dedicated solely to creating and operating elections. By using certified scripts and updates, a standard configuration that has been developed, tested, and certified ensures a secure and reliable voting infrastructure. Moreover, hardening provides many benefits to an EMS system, including security, reliability, and standardization.

PURPOSE OF HARDENING

Federal Guidelines recommend that security standards of voting systems include the following objectives:

- Protect critical elements of the voting system
- Establish and maintain controls to minimize errors
- Protect the system from intentional manipulation, fraud, and malicious mischief
- Identify fraudulent or erroneous changes to the voting system
- Protect secrecy in the voting process
- Protects critical infrastructure

BEST PRACTICES

Hardening of the EMS helps conform to Federal and Industry Standards. Our latest systems follow the Defense Information Systems Agency (DISA) Security Technical Implementation Guide (STIG) for hardening of critical systems. This is accomplished by configuring and locking down multiple areas of the voting systems. Access and functionality are restricted to only that required to operate the voting systems. Examples of system hardening activities include:

- Modifying the Windows registry
- Configuring group policies
- Configuring software restriction policies
- Removing non-essential Windows components
- Setting permissions on application folders
- Configuring group-based security permissions
- Creating standard configuration of Windows network
- Restricting network traffic to dedicated appliances
- Implementing Encapsulating Security Payload (ESP)
- Deploying two-factor authentication
- Requiring server message block (SMB) signing

ES&S Security Philosophy

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SECURITY BULLETIN

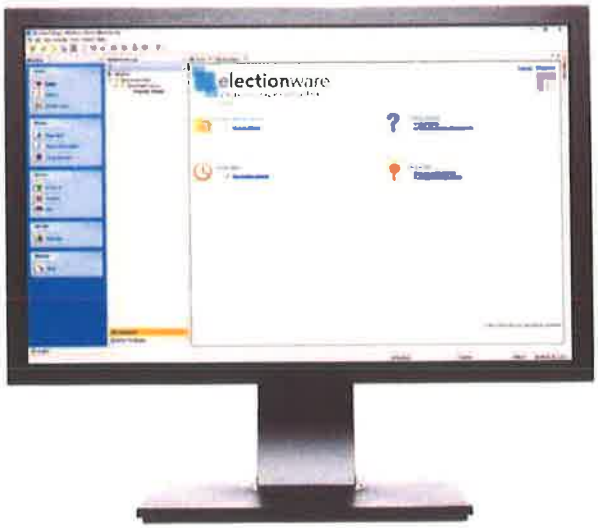
Electionware®

Election Management Software

Electionware incorporates the very latest in election security, including heightened audit controls and built in change management processes that ensure election data is safe and secure.

SYSTEM SECURITY

- The Election Management System running Electionware is a hardened server; configured to include only the services, applications, utilities and settings required to successfully operate the system. The hardening process turns the server into a single-use device, dedicated solely to creating and operating elections.
- Electionware is protected by two-factor authentication using Windows BitLocker.
- Electionware requires usernames and passwords to launch the EMS application. The restricted user roles segregate which features are accessible.
- The database server accesses data through a dedicated hardened EMS client on an air-gapped monitored network.



PHYSICAL ACCESS CONTROLS

- Officials are required to implement a strong physical and procedural security plan that limits access to Electionware to authorized personnel only.

AUDIT LOGS

- Electionware saves a record of all user actions with usernames to the system audit log. Electionware maintains an audit log that shows all system processes. This audit log can be filtered by date and type of event.
- The log can be printed, or saved in a variety of file formats, including .pdf, .rtf, .html, .xls, and .csv. The log operates during all processes, including results processing. Optionally, log events can be viewed in real-time in the output window, which displays errors in red text, warnings in blue text, and normal events in black text.
- Audit records created during the election definition and ballot preparation include records for all steps in the finalization of the ballot layout. These records are date/time stamped, include a description of the action and the module in which the action occurred. Audit reports can be filtered by date, event type, and sorted by ascending or descending timestamps.
- Audit logs on the EMS server either in Electionware or the database cannot be modified.

Post-election Auditing with Electionware

ES&S fully supports the use of paper ballots and post-election audits as a way to ensure accuracy and increase confidence in our country's election process.

- Electionware offers election officials the ability to conduct a wide range of post-election audits with improved effectiveness and efficiency. The system provides easy-to-read, side-by-side comparisons of the unaltered ballot image and its corresponding cast vote record, making it possible to audit any election in a fraction of the time.
- Electionware provides an export of cast vote records that are easily imported into the various risk-limiting audit systems in use today.

IS A PAPER BALLOT CARD AUDITABLE?

Yes. Just as hand-marked paper ballots can be inspected or audited by hand or by machine, so can paper ballot cards since they contain both human-readable selections and corresponding machine-readable barcodes. The ballot card contains the same data as a hand-marked ballot, displayed in different ways. During a post-election hand-count audit, selected candidate names are used to count the vote.

ES&S Security Philosophy

Nothing is more important to ES&S than protecting America's democracy through secure and accurate elections. That's why every ES&S product reflects the company's three-part security philosophy:

- **Design:** All products are designed, without compromise, to meet the latest and ever-evolving standards in security, accuracy and reliability.

- **Testing:** In addition to ES&S testing protocols, all tabulation systems are rigorously tested and certified by the federal Election Assistance Commission (EAC), which reflects security and performance standards developed by scientists, academia and election officials. The ES&S testing protocol also involves testing by independent, accredited laboratories. ES&S submitted our end-to-end voting configuration for Cybersecurity and Infrastructure Security Agency (CISA) critical product evaluation (CPE) at Idaho National Labs.

- **Implementation:** The entire ES&S team is devoted to ensuring that each piece of technology performs as expected on election day, helping election officials uphold the laws of their state which mandate strict physical security and tight chain of custody of all voting machines.

Perhaps most importantly, ES&S' essence — its very being — is predicated on providing America with secure, accurate and accessible elections. Every person at ES&S holds themselves, and each other, accountable for this mandate, and is proud to serve a role in this noble purpose.

SECURITY BULLETIN

DS200®

Precinct Scanner and Tabulator

Like all ES&S ballot tabulation equipment, the purpose-built DS200 precinct-based scanner and vote tabulator maintains the highest levels of physical and digital security controls. This paper-based system maintains paper vote records and takes digital images of each processed ballot.

PHYSICAL AND SYSTEM ACCESS CONTROLS

- The DS200 uses physical and system access controls, including lockable doors, tamper-evident seals and access codes to secure sensitive components and election files, and a key-locked case for transport and shipping.
- Each administrative function requires password authentication for completion, and units are configured to require a passcode before polls are opened.

SYSTEM APPLICATION CONTROLS

- The DS200 is paired with an encrypted card inside the unit containing the firmware. This technology ensures the card cannot be taken out of the machine and altered, viewed, or changed. The DS200 can detect a counterfeit card and will not even start.
- The unit only accepts approved and certified USB drives to prevent unauthorized data transfers or uploads.

ENCRYPTION, HASH VALIDATION AND DIGITAL SIGNATURES

- The unit allows election officials to validate that all resident firmware matches the firmware version certified for use in that jurisdiction.
- All data generated during the polls is digitally signed and encrypted at poll close.

AUDIT LOGS

- The DS200 generates a detailed audit log of all actions and events that occurred on the unit, which can be printed at any time. Every action and event, including access attempts, access of system functions and errors, is logged and timestamped.

Post-election Auditing and Paper Ballot Cards

ES&S fully supports the use of paper ballots and post-election audits to ensure accuracy and increase confidence in our country's election process. ES&S views paper records as critical for auditing. A physical paper record of the selected candidate names provides the means to a statistically valid post-election audit.

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SECURITY BULLETIN

ExpressVote®

Universal Voting System as a Marker

The purpose-built, paper-based ExpressVote Universal Voting System maintains the highest levels of physical and digital security controls. It provides voter confidence with onscreen, printed and audio playback options for vote selection verification. The unit's security features control access to critical components of the system.

PHYSICAL AND SYSTEM ACCESS CONTROLS

- The unit's hardware is designed to protect against tampering, including during system storage, transport and voting.
- The ExpressVote uses physical and system access controls including lockable doors, tamper-evident seals and access codes.
- The operating software provides security access controls to limit or detect access to critical system components, guarding against system integrity loss and availability.
- Only system certified components are recognized by the ExpressVote.

SYSTEM APPLICATION CONTROLS

- System functions are only executable during election events, in the manner and order intended by election officials performing their duties.
- The system performs a self-diagnostic test at startup, which provides status and alerts election officials of errors.

ENCRYPTION, HASH VALIDATION AND DIGITAL SIGNATURES

- Election programming is stored on the system as an encrypted and digitally signed data bundle. Each time data is used a hash validation is performed to ensure data integrity remains intact.

AUDIT LOGS

- The ExpressVote generates a detailed audit log of all actions and events that have occurred on the unit, which can be exported for review and analysis.
- Every action and event, including access attempts, access of system functions and errors, is logged and timestamped.
- The audit log file is digitally signed each time an event is written to it.

ExpressVote Auditing

PAPER BALLOT CARD

- Provides a verifiable paper vote record for every voter, containing both human-readable selections and corresponding machine-readable barcodes
- Can be read by any ExpressVote unit before tabulation to verify the voter's intent was captured accurately

IS THE PAPER FROM THE EXPRESSVOTE AUDITABLE?

Yes. Just as hand-marked paper ballots can be inspected or audited by hand or by machine, so can ballot cards. A ballot card contains the same data as a hand-marked ballot, displayed in different ways. During a post-election hand-count audit, selected candidate names are used to count the vote.

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SECURITY BULLETIN

DS450® High-Throughput Scanner and Tabulator

DS850® High-Speed Central Scanner and Tabulator

PHYSICAL AND SYSTEM ACCESS CONTROLS

- Both the DS450 & DS850 use key-locks and security seals to protect the units against tampering or intervention in system operations.
- All data ports and the power switch are secured behind clear plastic lockable and sealable access doors to protect access and allow election officials to detect unauthorized access easily.
- All critical hardware components can be locked and sealed, as well. It also provides additional alerts and logs access to the back service door.

SYSTEM APPLICATION CONTROLS

- Both tabulators have no capability to write or otherwise change the election program once installed. The contents of the DS450/DS850 election media are digitally signed and verifiable using the application.
- No options exist on the DS450/DS850 to change any ballot information.
- All administrative functions are limited to the controls allowed through the touch screen interface for machine operation only.

ENCRYPTION, HASH VALIDATION AND DIGITAL SIGNATURES

- The units use digital encryption and signing of key configuration and data files for complete integrity of the election and results. All DS450/DS850 data is signed with FIPS-compliant digital signature algorithms. All data generated is also signed, so the program receiving the data can validate it.

AUDIT LOGS

- The tabulators provide options for both real-time printed and electronic logging of all activity performed, with the ability to reprint logs on demand or export electronic logs for complete review.
- The DS450/DS850 logs all passcode attempts, whether successful or failed, to the digitally signed audit log. In addition, all user actions (such as administrative selections and open and close poll events), whether successful or failed, are written to the audit log.
- Only the system can create, read, modify and delete the audit log content as the user interface is locked out of this functionality.

Post-election Auditing and Paper Ballot Cards

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How It Works: Election Auditing

ES&S is a strong supporter of post-election audits — a way for election officials to verify that votes were counted accurately.

Audits help ensure a correct election outcome and instill trust in a fair, accurate election process. There are many types of audits, and the way audits are performed is determined by state or local election officials. ES&S systems support all types of audits. Here are three of the most common types:

1. RISK-LIMITING AUDIT

A risk-limiting audit (RLA) is a post-election audit that provides statistical evidence that the election outcome is correct and has a high probability of validating the outcome. These statistics are calculated based on the number of votes cast, the margin of victory, and the accepted risk limit. Random ballots are chosen using proven methods and checked manually until there is enough evidence that the reported outcome is correct (the risk limit is met or exceeded). RLAs typically require fewer ballots be audited than other types of audits.

EXAMPLE 1	**Total votes:** 3 million	**Candidate 1 votes:** 1.8 million (60%)
	State-required risk-limit: 5%	**Candidate 2 votes:** 1.2 million (40%)

Election officials calculate an initial sample size of 34 ballots.

Election officials randomly select 34 ballots.

Selected ballots compared to cast vote record.

More than 32 ballots (95% of the sample) match cast vote record, providing statistical confidence of a correct outcome.

EXAMPLE 2	**Total votes:** 3 million	**Candidate 1 votes:** 1.53 million (51%)
	State-required risk-limit: 5%	**Candidate 2 votes:** 1.47 million (49%)

Election officials calculate an initial sample size of 339 ballots.

Election officials randomly select 339 ballots.

Selected ballots compared to cast vote record.

More than 322 ballots (95% of the sample) match cast vote record, providing statistical confidence of a correct outcome.

Comparing Risk-Limiting Audit Methods

RLA Method	Description
Ballot-level comparison	**Individual ballots are randomly selected, counted and compared to the voting system's cast vote record for each ballot.**
Batch-level comparison	Batches of ballots are randomly selected, counted and compared to batch subtotals produced by the voting system.
Ballot-polling	**A random sample of ballots are selected and the results for the selected contest(s) are tallied; the audit stops when it produces strong enough evidence to support the reported outcome.**
Batch-polling	A random sample of batches are selected and the results for the audit stops when it produces strong enough evidence to support the outcome.

2. FIXED-PERCENTAGE AUDIT

Fixed-percentage audits of voting districts or voting machines compare the paper record to the tabulated cast vote record produced by the election management system. Post-election audits can be completed by hand counting; however some states choose to re-scan ballots electronically, on central tabulators.

While most states performing traditional audits count the same percentage of ballots no matter the outcome, some states use a "tiered" system, meaning they change the number of ballots reviewed depending on the margin of victory. If the margin is larger, fewer ballots need to be counted. If the race is tighter, more ballots are audited.

EXAMPLE			
	Total votes: 3 million	**Total precincts:** 2,000	**Candidate 1 votes:** 1.59 million (53%)
	State-required precinct sample: 3%	**Sample size of precincts:** 60	**Candidate 2 votes:** 1.41 million (47%)

Election officials select 3% of precincts at random → **Manual count of paper ballots at selected precincts** → **Manual count compared to equipment count** → **Less than 1% discrepancy between manual count and equipment count, providing statistical confidence of a correct outcome.**

If the manual count differs by more than 1 percent from the automated equipment count, or if the outcome of the election would change due to the discrepancy, then additional auditing is performed until the election results can be verified.

3. THIRD-PARTY AUDIT

Third-party audits of ballot images are performed by a third-party vendor. These extensive audits are done independently from the election management software to verify the election results.

HOW DOES ES&S SUPPORT AUDITS?

ES&S fully supports the use of paper ballots and post-election audits as a way to ensure accuracy and increase confidence in our country's election process.

- ES&S Electionware® election management system offers election officials the ability to conduct a wide range of post-election audits with improved effectiveness and efficiency. The system offers easy-to-read, side-by-side comparisons of the unaltered ballot image and its corresponding cast vote record making it possible to audit any election in a fraction of the time.
- Electionware maintains a detailed audit log of all actions and events that have occurred on the voting system, including log-in attempts, election definition, ballot preparation and results processing. This includes a record of all user actions, with username and timestamp to the system audit log. This audit log can be filtered by date and type of event and printed or saved in a variety of file formats.
- Electionware provides an export of cast vote records that are easily imported into the various RLA systems in use today.

HOW ES&S VOTING SYSTEMS ARE AUDITED

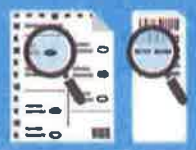
To ensure all votes are counted as cast, a post-election audit measures the performance and accuracy of voting equipment. Audits are conducted by checking paper ballots and records against originally recorded election results.

AUDITABLE PAPER

All voter-verified paper records are auditable – including hand-marked paper ballots and ballot cards like the ExpressVote card.

Audits can be conducted manually (by hand), or via scanners.

From the moment a voter marks their ballot to the moment they cast their vote, **patented mark-recognition technology built into every ES&S scanner and tabulator helps ensure voter intent is accurately captured.**



AUDITING PROCESS

Hand-marked or ExpressVote card, the process is the same. During a manual audit, **the name next to the marked oval** on a hand-marked ballot and **the name printed on the ballot card** are checked against election results.

HOW DO POST-ELECTION AUDITS WORK?

Audits happen all over the U.S. Each state has its own laws and requirements regarding the frequency, type and extent of its post-election audits.

FIXED-PERCENTAGE AUDIT

Traditionally, a fixed-percentage audit **samples the same percentage of precincts or batches regardless of the election outcome**, but some states sample more or fewer depending on the margin of victory.

If the audit count differs from the election outcome by more than an acceptable percentage, additional precincts or batches are audited.

RISK-LIMITING AUDIT

A risk-limiting audit is a **review of ballots randomly selected from all ballots cast and compared to their tabulation records**.

Auditors use a pre-set risk limit, the total number of ballots cast, the contest's margin of victory and other factors to determine how many ballots to include in the audit sample.

Ballots are checked manually until the election results are confirmed.

PROCEDURAL AUDIT

Some states perform procedural audits, or **checks of election processes.**

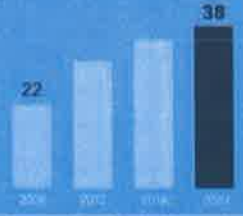
Procedural audits can include a review of chain of custody for equipment and paper, ballot accounting and reconciliation and confirmation of adherence to procedures.

WHY DO AUDITS MATTER?

Above all, post-election audits confirm the election outcome, increasing voter confidence in election results. They're an important part of election processes nationwide.

- ✔ TIMELY
- ✔ TRANSPARENT
- ✔ INDEPENDENT
- ✔ COMPREHENSIVE

A good post-election audit takes steps to ensure the audit results are accurate and trustworthy.



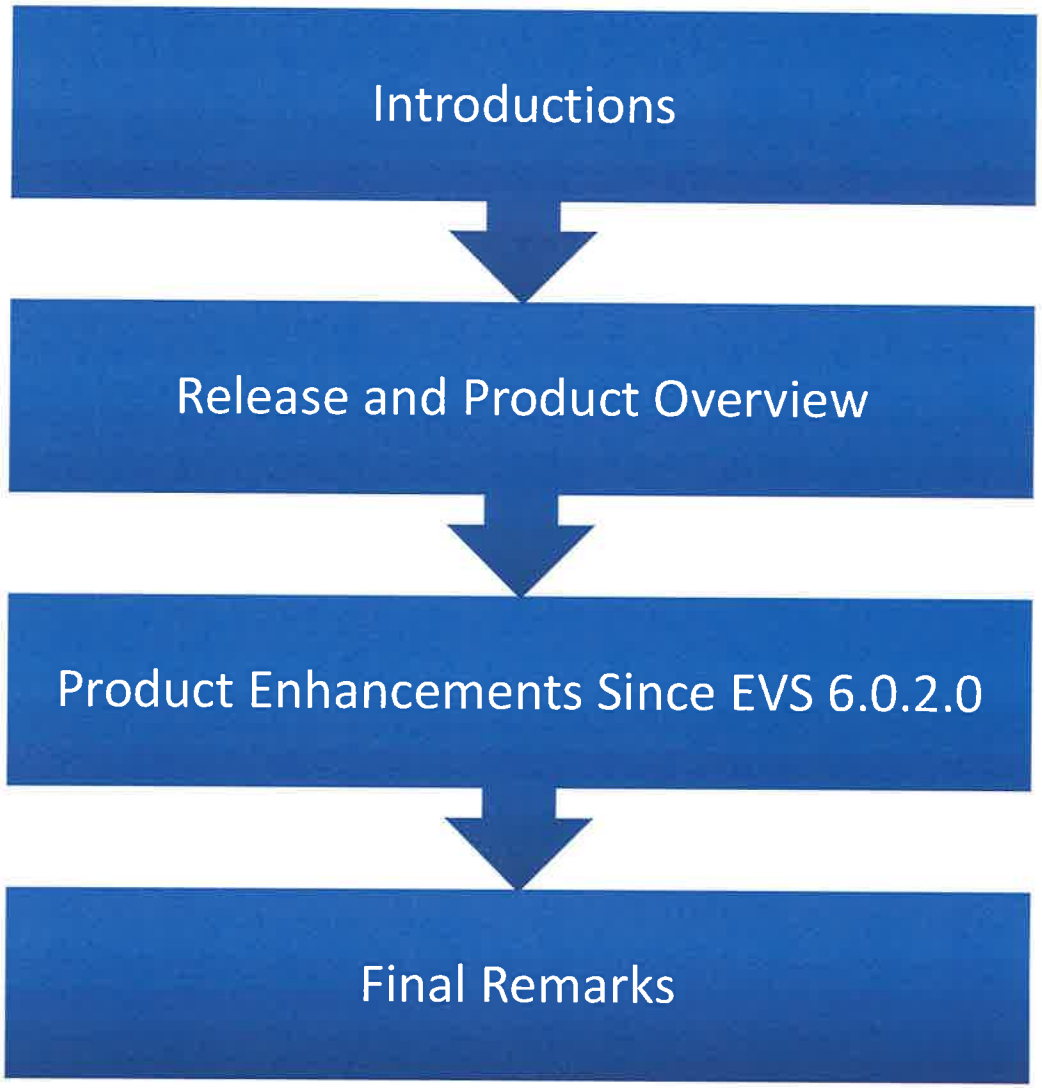
The number of states* requiring post-election audits has nearly doubled since 2008.

ELECTION Systems & Software

Tennessee State Election Commission

July 12, 2021

Agenda


Introductions
Release and Product Overview
Product Enhancements Since EVS 6.0.2.0
Final Remarks

Introductions

Ben Swartz

Sr. State Certification Manager

Tim Hallett

Vice President, Certification

Guy Riner

Sr. Regional Manager, Account Management

Staci Jackson

Account Manager

EVS 6.1.1.0
Release Overview

Federal Certification:

- EAC Certified on July 27, 2020
- Modification to the EAC and State Certified EVS 6.0.2.0 release (Tennessee certified: 7/22/2019)

Release Key Objectives:

- Windows 10/Server 2016
- Expanded ExpressVote Ballot Layout options
- Firmware/Hardware security updates

State Certification

- Certified in AR, DE, IA, KS, MO, MS, OH, OR, PA, TX, WA, WV, VA
- Pending in NE
- Optional Upgrade for all customers

	EVS 6.0.2.0	EVS 6.1.1.0
Electionware	5.0.1.0	**6.0.1.0**
ExpressVote **Marker Mode** **(HW 1.0/HW 2.1)**	1.5.0.0 2.4.0.0	**4.0.0.0**
DS200	2.17.0.0	**2.30.0.0**
DS450	3.1.0.0	**3.4.0.0**
DS850	3.1.0.0	**3.4.0.0**
Optional Utilities		
ExpressLink	1.4.0.0	**2.0.0.0**
Toolbox	3.4.0.0	**4.0.0.0**

CERTIFIED
EAC
CERTIFIED

Product Overview

EVS 6.1.1.0 Products

DS200®
SCANNER & TABULATOR

ExpressVote

DS450®
High-Throughput Scanner & Tabulator

DS850®
High-Speed Scanner & Tabulator

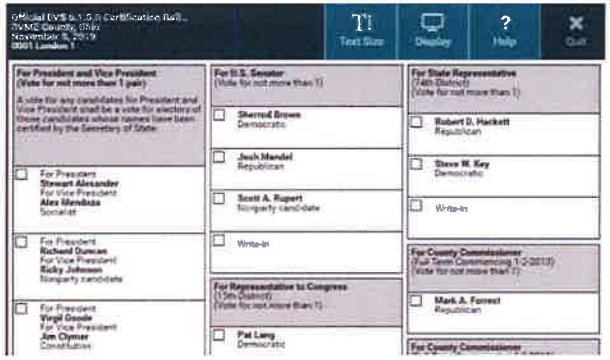
Product Enhancements

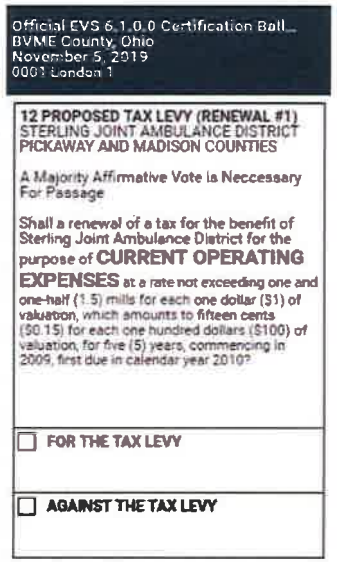
ExpressVote Universal Voting Device

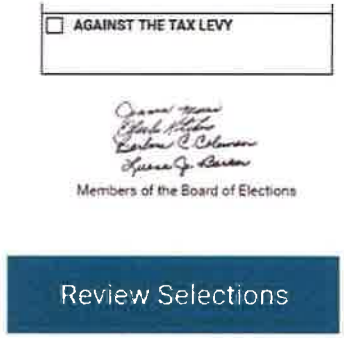
ExpressVote

EVS 6.1.1.0 Product Enhancements:

- Ability to brighten/dim ExpressVote screen
- Expanded ExpressVote Ballot Layout Options
  - Updated Screens and flexible layout options of the ExpressVote touch screen – 1-4 columns
  - More attributes – color, strikethrough, or different font size of a word(s) within a paragraph







Product Enhancements

DS200 Precinct Tabulator

DS200
SCANNER & TABULATOR

EVS 6.1.1.0 Product Enhancements:

- Optional Locking Compact Flash card (CF Card)
  - Safeguards the operating system against unauthorized modification
  - Links the installed CF Card to the DS200 unit – unable to swap the CF card to another unit or introduce a new CF card
- Write-in Review Report now groups write-ins by precinct not by poll

Product Enhancements

DS450/DS850 Central Tabulators

EVS 6.1.1.0 Product Enhancements:

- Optional read-only Compact Flash card (CF card)
  - Safeguards the operating system against unauthorized modification

Product Enhancements

Election Management System

electionware
election management system

EVS 6.1.1.0 Product Enhancements:

- Microsoft Windows 10 Enterprise LTSC and Windows Server 2016
  - ***Optional BitLocker*** – Microsoft's proprietary disk encryption utility for whole disk encryption
    - Local C: drive or networked Q: drive is encrypted during EMS hardening process
    - Encryption keys that are stored on the TPM chip are copied to the *Security Key* (right) during EMS hardening process. Insertion of the *Security Key* is required prior to the computer booting up or having the ability to log into the system.

  - ***Optional AppLocker*** – controls which apps and files users can run

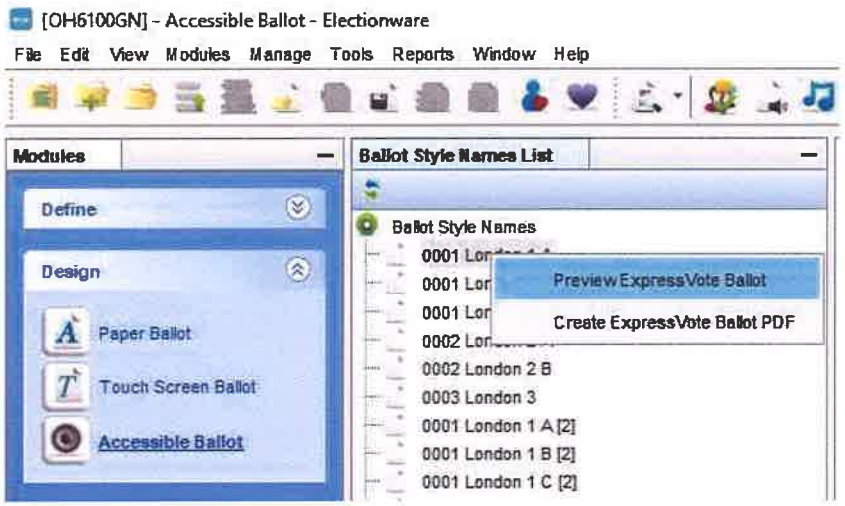
Product Enhancements

Election Management System

electionware®
election management system

EVS 6.1.1.0 Product Enhancements:

- Ability to generate ExpressVote screen pdfs (streamlines ballot proofing)
  - Preview each polling location manually (ExpressVote Previewer)
  - Create ExpressVote Ballot PDFs (individual polling locations or all polling locations)



Agenda Revisted