

**Minutes**  
**State Election Commission Meeting**  
**October 12, 2015**

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The State Election Commission meeting was called to order by Chairman Kent Younce at 12:15 p.m., Central Standard Time, October 12, 2015. The following members and staff were present: Chairman Younce; Commissioners Barrett, Blackburn, McDonald, Wallace and Wheeler; Coordinator of Elections Mark Goins, Beth Henry-Robertson, Assistant Coordinator of Elections; Wayne Pruet, HAVA Coordinator and Kathy Summers, Elections Specialist.

Commissioner McDonald made a motion to adopt the minutes from July 13, 2015, Commissioner Blackburn seconded the motion and the minutes were unanimously approved. (Aye votes: Barrett, Blackburn, McDonald, Wallace, Wheeler and Younce; No votes: None; Abstention: None.)

Commissioner Barrett made a motion to adopt the Voting Machine Committee minutes from August 19, 2015, Commissioner McDonald seconded the motion and the minutes were unanimously approved. (Aye votes: Barrett, Blackburn, McDonald, Wallace, Wheeler and Younce; No votes: None; Abstention: None.)

**No Republican appointments made.**

Commissioner McDonald made a motion pursuant to T.C.A. § § 2-12-101 and 2-12-106, seconded by Commissioner Wheeler and unanimously approved by the Democratic members to accept the Democratic nomination(s) for county election commission appointments as submitted, and to leave the nomination process open until 4:30 p.m. Central Standard Time Monday, October 12, 2015. (Aye votes: McDonald and Wheeler; No votes: None; Abstention: None.) **(See attached list of Democratic appointments made.)**

**Old Business**

- **ES&S – EVS 5.2.0.0 – Request for certification of voting machine reviewed in Pottawattamie County, Iowa on September 8, 2015.** Steve Pearson spoke on the behalf of ES&S. Commissioner Barrett, Commissioner McDonald and Coordinator Goins reviewed the election in Pottawattamie County, Iowa. Commissioner Barrett discussed the review and indicated the machine should have a ballot box and pre-numbered ballot stubs.

Commissioner McDonald made a motion to approve the EVS 5.2.0.0 voting machine, seconded by Commissioner Blackburn and unanimously approved

by all commissioners present. (Aye votes: Barrett, Blackburn, McDonald, Wallace, Wheeler and Younce; No votes: None; Abstention: None.)

- **ES&S – Express Vote 5.2.0.0 – Ballot on Demand – Request for Approval.** Steve Pearson, Ben Swartz and Mac Beeson of ES&S demonstrated the ballot on demand feature for the EVS 5.2.0.0. Commissioner Barrett indicated the ballot on demand machine should have pre-numbered ballot stubs.

Commissioner McDonald made a motion to approve the ballot on demand feature for the EVS 5.2.0.0 voting machine, seconded by Commissioner Barrett and unanimously approved by all commissioners present. (Aye votes: Barrett, Blackburn, McDonald, Wallace, Wheeler and Younce; No votes: None; Abstention: None.)

- **MicroVote Voting Machine – Infinity 4.1 – Request for approval and use of firmware upgrade.** – Bill Whitehead of MicroVote discussed EAC certification of their Infinity 4.1 voting machine and requests the State Election Commission view this machine in Gibson County, TN on November 3, 2015, in order to provide voting machines to VanBuren County or to have an end to end regression test conducted to certify their machine. MicroVote does not have an election to show the State Election Commission until May 2016. VanBuren County Election Commission is seeking to replace their voting machines destroyed by fire and MicroVote would like to provide the most recent machine as there are no other machines available.

Coordinator Goins indicated MicroVote is only certified in Tennessee and Indiana and they have met one of the state requirements for certification which is being federally certified. Coordinator Goins suggests conditional approval for the Infinity 4.1 for use in VanBuren. If the commission allows this request the policy would need to be amended to allow this procedure for all vendors in cases of an Act of God.

Commissioner Blackburn discussed the conditional use in Gibson County provided Election staff and State Election Commissioners were available on November 3. Commissioner Barrett suggested if there was an Act of God situation which destroys a county's voting equipment, to allow conditional certification of an in-state field election provided the equipment was the same voting equipment.

Commissioner Blackburn made a motion to approve conducting an in-state field test of the Infinity 4.1 in Gibson County, on November 3, 2015, seconded by Commissioner Wheeler and unanimously approved by all commissioners present. (Aye votes: Barrett, Blackburn, McDonald, Wallace, Wheeler and Younce; No votes: None; Abstention: None.)

- **Hamilton County Election Commission – Request for permanent approval of their ballot bag.** – Kerry Steelman, Administrator of Elections for Hamilton County and Scott Allen, Assistant Administrator of Elections addressed the commission. Hamilton County Election Commission was given conditional approval in 2006, by then Coordinator Brook Thompson and State Election Commission, to use a provisional ballot bag designed by A. Rifkin Co as a pilot program. The State Election Commission has extended the use temporarily and the Hamilton County Election Commission is seeking permanent approval. Mr. Steelman and Mr. Allen demonstrated the Rifkin provisional ballot bag. The provisional ballot bag includes locking mechanisms and seals as required by state law. The Rifkin bag has a heavy duty master lock, along with a third security seal and a baffle inside the deposit slot.

Commissioner McDonald made a motion to approve the use of the Rifkin bags by the Hamilton County Election Commission for provisional ballots only, seconded by Commissioner Wallace and unanimously approved by all commissioners present. (Aye votes: Barrett, Blackburn, McDonald, Wallace, Wheeler and Younce; No votes: None; Abstention: None.)

- **Voting Machine Committee Report – Given by Committee Chair Donna Barrett.** – Committee Chair Donna Barrett gave the Voting Machine Committee report. Tennessee is the only state which requires an out of state field test. Commissioner Barrett plans on additional meetings of the Voting Machines Commission and to potentially attend a testing laboratory. The complete Voting Machine Committee report is attached to the minutes.

### New Business

- **Voting Machine Demonstration – Hart InterCivic – Verity Voting 1.0** – Mr. Eddie Perez of Hart InterCivic gave the presentation and overview of the Verity Voting 1.0, which received EAC certification in May 2015. State Election Commission members and Elections Division staff will be viewing the Verity Voting system in Prince William County, VA on November 3, 2015.
- **ES&S - Ballot on Demand – Balotar on Demand Printer-Demonstration – Request for Approval** – Mac Beeson and Val Guyette gave the demonstration of Balotar.

Commissioner McDonald made a motion to approve the use of the Balotar, ballot on demand printer, seconded by Commissioner Wheeler and unanimously approved by all commissioners present. (Aye votes: Blackburn, McDonald, Wallace, Wheeler and Younce; No votes: None;

Abstention: None.) Commissioner Barrett left the meeting before the vote was taken because of a prior commitment.

- **Certify Administrators who passed the Certification Test Given on September 25, 2015** - Counties passing the test were:

County	Administrator
Blount	Susan Hughes
Cannon	Matt Tepley
Carroll	Peg Hamlett
Cumberland	Jill Davis
Gibson	Julianne Hart
Williamson	Chad Gray

A motion was made by Commissioner McDonald and seconded by Commissioner Wallace to certify those passing the certification test given on September 25, 2015. The motion was unanimously approved. (Aye votes: Blackburn, McDonald, Wallace, Wheeler and Younce; No votes: None; Abstention: None.)

- **PrintElect – Provisional Ballot Bags Review of Redesign** – Assistant Coordinator of Elections, Beth Henry-Robertson presented the redesigned provisional ballot bag by PrintElect. In June 2015, Coordinator Goins advised county election commissions this bag had security compromises and he decertified the bag. The vendor has redesigned the provisional ballot bag and has added additional security features which secure the zipper from being compromised.

A motion was made by Commissioner Blackburn and seconded by Commissioner Wheeler to certify the redesigned ballot bag for provisional ballots. The motion was unanimously approved. (Aye votes: Blackburn, McDonald, Wallace, Wheeler and Younce; No votes: None; Abstention: None.)

- **Wayne Pruett – HAVA Coordinator – Retirement Presentation** - The State Election Commission presented Wayne Pruett, HAVA Coordinator with a certificate of recognition for his service and dedication to the State of Tennessee, Elections Division and to the County Election Officials across the state. Commissioner McDonald spoke on behalf of the State Election Commission and presented the certificate to Mr. Pruett. A copy of the certificate presented is attached to the minutes.
- **Mariann Ott - League of Women Voters – Request to speak** – Mrs. Ott spoke with the State Election Commission and thanked the Commission for how they discharge their duties; specifically, their recent review of the voting machine certification process. Mrs. Ott encourages the commission to develop an updated process for

certifying voting machines that will satisfy both the State Election Commission and allow county election commissions to buy and maintain the most up to date voting technology.

### Coordinator Update

- **No update Given**

The next scheduled meeting is set for December 1, 2015, and will be held in the William R. Snodgrass – Tennessee Tower, Nashville Room - 3<sup>rd</sup> floor at 12:00 Noon Central Standard Time. The Secretary of State will submit a list of the United States Presidential candidates for the Presidential Preference Primary which will be held on March 1, 2016.

The next regularly scheduled meeting is set for January 11, 2016, and will be held in the William R. Snodgrass – Tennessee Tower, Nashville Room - 3<sup>rd</sup> floor at 12:00 Noon Central Standard Time.

Chairman Younce adjourned the meeting.

Respectfully submitted,



Tom Wheeler, Secretary  
State Election Commission

# Holdover Status

12-Oct-15

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		Appointment	Reappointment
<b>Fentress</b>			
D	Tom Wheeler		
R	Kent Younce		
D	Rodney W. Foy	9/17/2002	5/13/2013
D	Yvonne McDaniel Gernt	5/9/2011	5/13/2013
<b>White</b>			
D	Mike McDonald		
R	Kent Younce		
D	James Allen Simpson	2/17/2004	4/1/2013
<b>Total Holdovers: 3</b>			

# Vacant Status

12-Oct-15

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## Cocke

D Tom Wheeler  
R Judy Blackburn

D

## Dekalb

D Mike McDonald  
R Kent Younce

D

## Henry

D Greg Duckett  
R Jimmy Wallace

D

## Lewis

D Greg Duckett  
R Donna Barrett

D

## Warren

D Mike McDonald  
R Kent Younce

D

**Total Vacancies: 5**

# New Appointment Status

12-Oct-15

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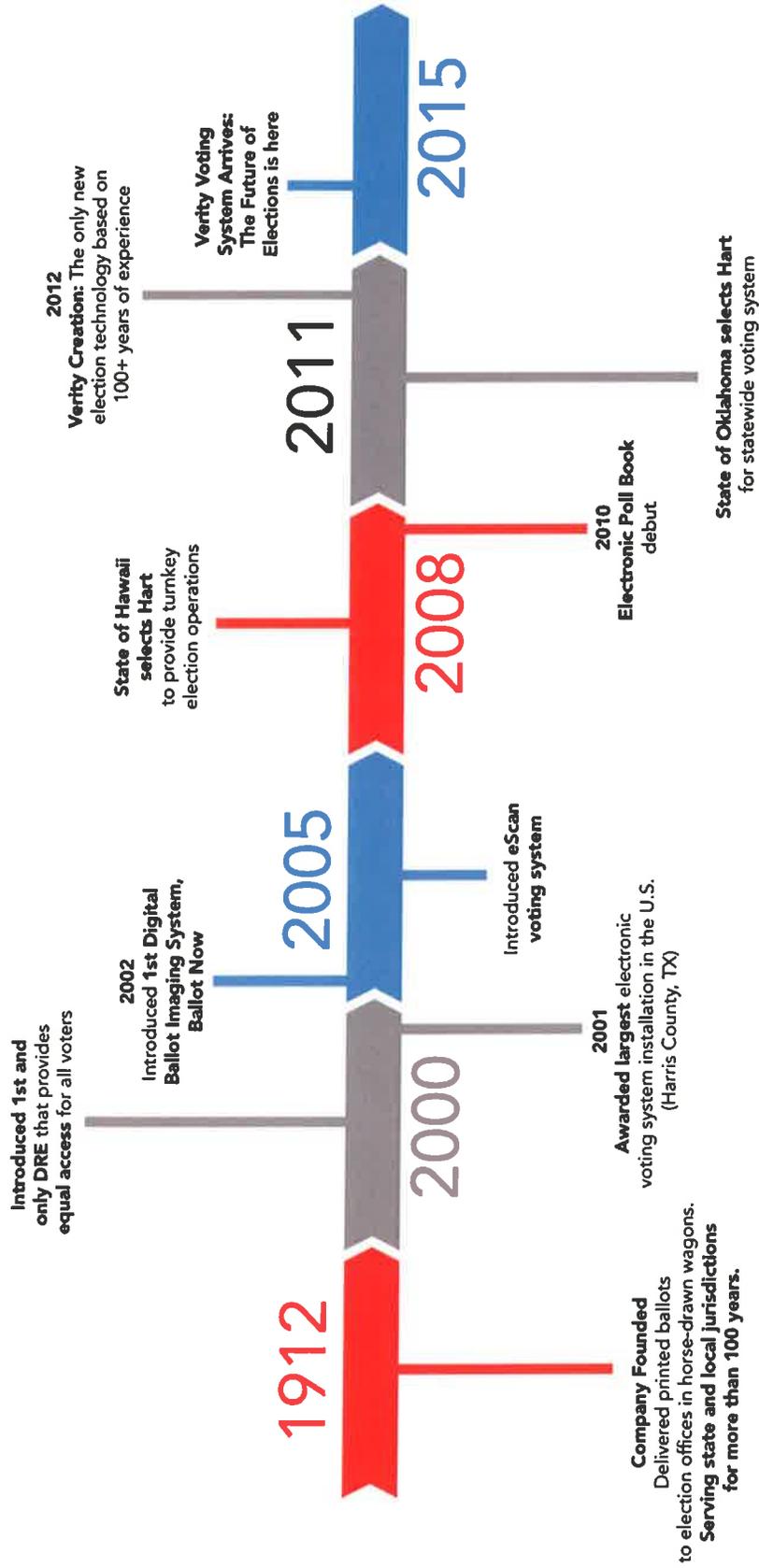
		Appointment
<b>Cocke</b>	D Tom Wheeler / R Judy Blackburn D Vickie Moore	10/12/2015
<b>Dekalb</b>	D Mike McDonald / R Kent Younce D Jackie Smith	10/12/2015
<b>Warren</b>	D Mike McDonald / R Kent Younce D Charles Yancey	10/12/2015
<b>White</b>	D Mike McDonald / R Kent Younce D Waymon Haston	10/12/2015
<b>Total New Commissioners: 4</b>		

# State of Tennessee Verity Voting 1.0

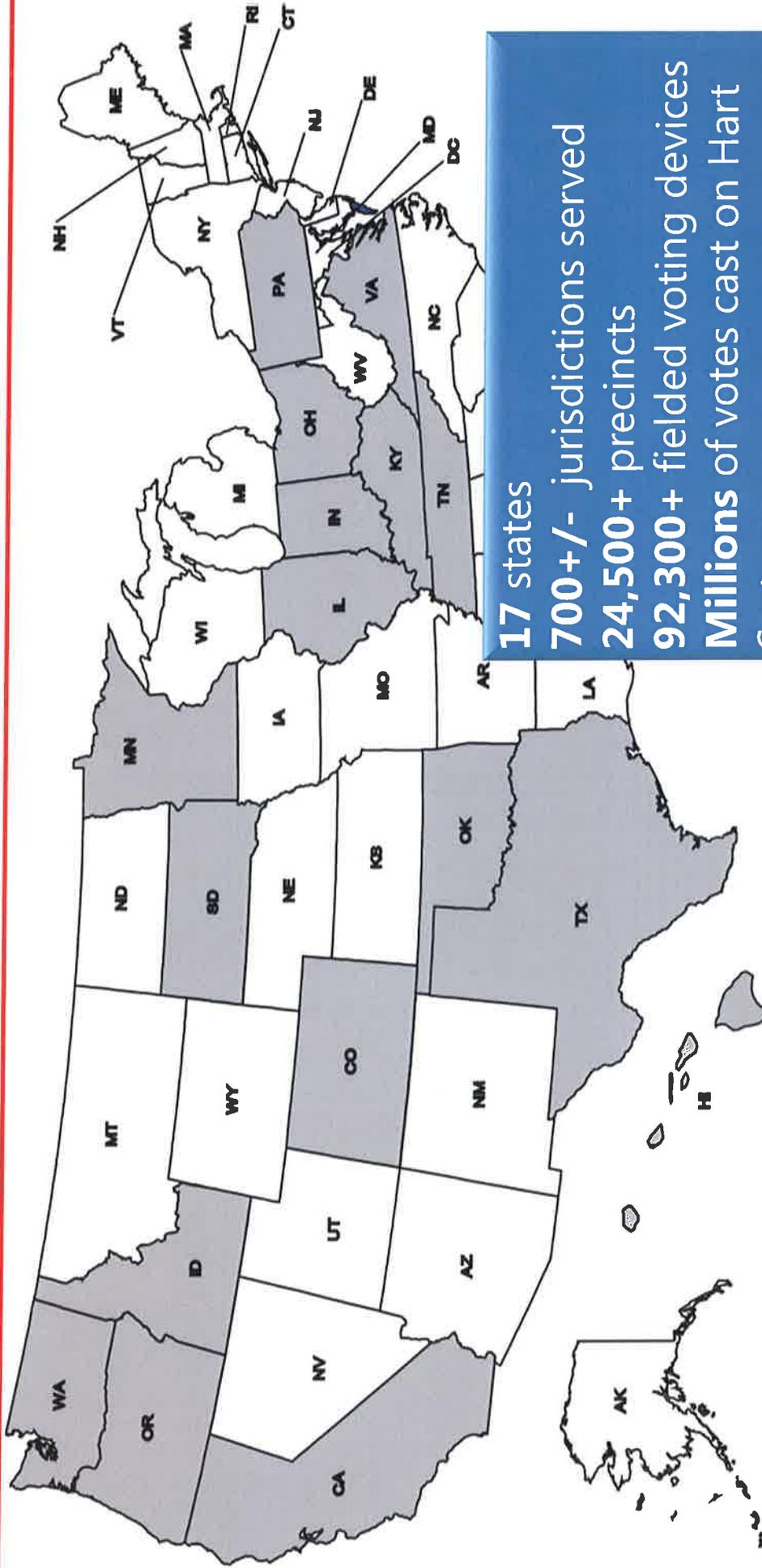
October 12, 2015



# Hart InterCivic - Over 100 Years

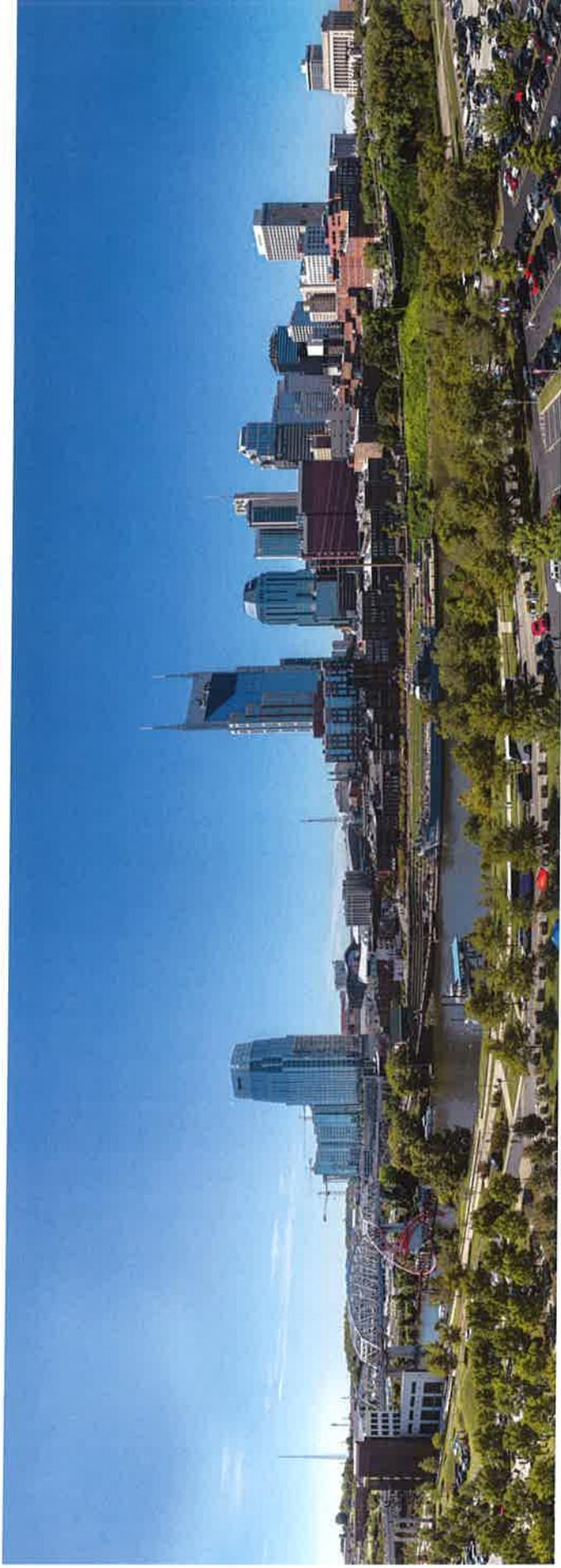


# Hart Customers - 2015



# Hart in Tennessee

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Prior product: Hart Voting System, since 2006  
Direct customers, and through our partner reseller, Harp Enterprises



# Voting Machines

# Verity Voting 1.0

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**Shared, common platform for Scan and Touch Writer**

**Ease of learning for voters, staff**

**All voters vote on the same universal platform - equal access**

**One system for all. Period.**



**Verity Scan**



**Verity Touch Writer**



# EAC Federal Certification – May 12, 2015




United States Election Assistance Commission

Certificate of Conformance

**Hart Verity 1.0**

The voting system identified on this certificate has been evaluated at an accredited voting system testing laboratory for conformance to the 2005 *Voluntary Voting System Guidelines (2005 VVSG)*. 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
Model or Version:	1.0
Name of VSTL:	SLI Global Solutions
EAC Certification Number:	HRT-Verity-1.0
Date Issued:	05/12/2015



Chief Operating Officer & Acting Executive Director  
U.S. Election Assistance Commission

**Scope of Certification Attached**

# Verity Voting 1.0 Certification Status

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- Certified by EAC to 2005 VVSG (*May, 2015*)
- State Certifications Completed
  - Virginia (*April, 2015*)
  - Oregon (*June, 2015*)
  - Washington (*June, 2015*)
  - Minnesota (*June, 2015*)
  - Colorado (*Temporary Certification*) (*August, 2015*)
  - Idaho (*September, 2015*)

# Verity Scan

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- Digital ballot imaging
- Images capture voter intent
- Accommodates commercial-off-the-shelf paper stock
- Design for Democracy, intuitive voting experience
- Prints Tally results in the polling place
- Post-election access to scanned images for transparency & auditability



# Verity Touch Writer with Access

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- Prints a full marked ballot from blank stock, providing equality of access for all voters
- No pre-printing of ballots required
- No loading of ballots required
- Manages multiple ballot styles on a single device, including multi-language





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

May 12, 2015

Tom Farley  
Hart InterCivic  
15500 Wells Port Drive  
Austin, TX 78728

Sent via e-mail

**Re: Agency Decision- Grant of Certification**

Dear Tom Farley,

As required under §5.9 of the EAC's Voting System Testing and Certification Program Manual, Hart InterCivic and SLI Global Solutions have provided the necessary documentation for the Verity 1.0 voting system verifying that 1) the trusted build has been performed, 2) software has been deposited in an approved repository, 3) system identification tools are available to election officials, and 4) signed a letter stating, under penalty of law, that you have:

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.

Based on the review of the documentation above and the fact that Hart InterCivic Verity 1.0 successfully completed conformance testing to the 2005 Voluntary Voting System Guidelines (2005 VVSG), the Voting System Testing & Certification Program Director has recommended EAC certification of this system.

I have reviewed all of the documentation and concur with the Program Director's recommendation. As such, I hereby grant EAC Certification to Hart InterCivic Verity 1.0 to the 2005 Voluntary Voting System Guidelines.

The EAC certification number issued for this system is: HRT-Verity-1.0. In addition, a Certificate of Conformance shall be provided to Hart InterCivic as evidence of the EAC certification of the Verity 1.0. The Certificate of Conformance shall be provided to Hart

InterCivic no later than five business days from the date of this letter, and it shall be posted on the EAC's Web site.

As stated in §5.11 of the EAC's Certification Manual, the EAC certification and certificate apply only to the specific voting system configuration(s) identified, submitted, and evaluated under the Certification Program. Any modification to the system not authorized by the EAC shall void the certificate.

If you have any questions or need further information, please do not hesitate to contact Brian Hancock or Jessica Myers at your earliest convenience. I thank you in advance for your time and attention to this matter and congratulate on this achievement.

Sincerely,

A handwritten signature in cursive script, appearing to read "Alice Miller".

Alice Miller  
Chief Operating Officer and Acting Executive Director  
Decision Authority

Cc: Brian Hancock, U.S. Election Assistance Commission  
Traci Mapps, SLI Global Solutions



United States Election Assistance Commission

Certificate of Conformance

**Hart Verity 1.0**



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Product Name: Verity \_\_\_\_\_

Model or Version: 1.0 \_\_\_\_\_

Name of VSTL: SLI Global Solutions \_\_\_\_\_

EAC Certification Number: HRT-Verity-1.0 \_\_\_\_\_

Date Issued: 05/12/2015 \_\_\_\_\_

Chief Operating Officer & Acting Executive Director  
U.S. Election Assistance Commission

Scope of Certification Attached



RECEIVED  
2015 SEP 11 AM 10:02  
SECRETARY OF  
ELECTIONS

September 10, 2015

Mark Goins  
Coordinator of Elections  
Division of Elections, Office of Tennessee Secretary of State Tre Hargett  
312 Rosa L. Parks Avenue, 7<sup>th</sup> Floor - William R. Snodgrass Tower  
Nashville, TN 37243

Via: Federal Express  
RE: Application for Certification of Verity Voting 1.0

Dear Mr. Goins,

Hart InterCivic, Inc. is seeking certification of Verity Voting 1.0 for use in the State of Tennessee. Verity Voting 1.0 is a new voting system that is certified by the EAC as conformant with the federal *Voluntary Voting System Guidelines* (VVSG), Version 1.0 (2005). We would also like to request the opportunity to demonstrate Verity at the October 12, 2015 meeting of the State Election Commission.

Verity Voting includes the following components:

- Verity Build - Election definition software application
- Verity Central - Central scanning software application
- Verity Count - Tabulation and reporting software application
- Verity User Management - User management software application
- Verity Election Management - Data management software application
- Verity Scan - Digital scanning voting device
- Verity Touch Writer with Access – Ballot marking device, with audio tactile interface

Testing and Deployment Status:

- Verity Voting 1.0 was certified to the 2005 *Voluntary Voting System Guidelines* by the Election Assistance Commission on May 12, 2015. The Certification of Conformance and Scope of Certification are included with this application.
- Verity Voting 1.0 concluded testing at an EAC-accredited Voting System Test Laboratory (SLI Global Solutions, Inc. Denver, Colorado) in February, 2015. The SLI test report is included with this application.
- Verity Voting 1.0 has been certified in the States of Oregon and Washington and has received temporary approval for use in the 2015 pilot elections in the State of Colorado.
- Verity Scan and Verity Touch Writer voting devices (Version 1.0) have been approved for use in the State of Arkansas.
- Verity Voting 1.0 is currently in the approval process for the States of Idaho, North Carolina, Michigan, and Texas.
- Verity Voting 1.1, a mildly modified version of Verity Voting 1.0, is certified in the Commonwealth of Virginia.
- Verity Voting 1.2, another mildly modified version of Verity Voting 1.0, has been certified in the State of Minnesota.

## Overview of the Verity Voting system

The Verity Voting system includes software, hardware, devices, and peripheral components that allow election professionals to accomplish the following high-level tasks:

- Election definition
- Ballot production
- Flash media production
- Voting machine configuration and use
- Central scanning and adjudication of ballots
- Counting of votes
- Consolidation and reporting of results and audit logs

## Identification of the Verity Voting system

### *Software Applications*

- **Verity Build** enables election officials to define ballot styles and generate election definitions. In addition to producing paper and electronic ballot styles, Build allows users to program voting device behavior in a variety of ways. After ballot generation, Build electronically writes the election data file (including all ballot styles) to portable flash media known as vDrives, which can then be deployed for a variety of different voting types, such as central scanning, with Verity Central, or in-person voting with Verity Scan and Verity Touch Writer. After generating election definitions, Verity Build can also print ballots or output them electronically, for third-party printers.
- **Verity Central** enables election officials to scan paper ballots at a central location using a commercial-off-the-shelf (COTS) scanner, adjudicate voter selection marks as necessary, and convert voter selection marks to electronic Cast Vote Records (CVRs). Verity Central is especially well-suited for scanning and adjudicating by-mail ballots. When all ballots have been scanned and adjudicated, Central writes Cast Vote Records to vDrive portable flash media, which can be tabulated in Verity Count tabulation software. It is important to note that Verity Central does not tabulate votes; because it simply scans and records Cast Vote Records, this allows jurisdictions to begin scanning before the close of polls, thereby greatly accelerating the scanning workflow. While Central does produce a variety of reports, because it does not tabulate, it does not produce reports containing results totals.
- **Verity Count** allows election officials to tabulate and report the results of Cast Vote Records stored on vDrives. vDrives inserted into the tabulation workstation can contain by-mail votes from Central, or in-person votes from Scan devices. Once the CVRs have been read and tabulated, Count can produce a variety of standard and customized reports. Verity Count also allows officials to adjudicate write-in votes from Verity Scan or Verity Central. Finally, Count also collects and stores audit logs from Verity voting devices, allowing for post-election audit and/or analysis.
- **Verity User Management** enables users with administrative permissions to create and manage user accounts within the Verity Voting system. Depending on the component for which the accounts are created, permissions may be managed by various roles. Depending on the role, each user has access to different features of the Verity software applications and other components.

- **Verity Election Management** enables users with administrative permissions to add, copy, delete, import, export, archive, restore, and manage election definitions in the Verity system.

#### *Voting Devices and Peripheral Equipment*

- **Verity Scan** is a digital scanner for paper ballots. Scan is paired with a purpose-built ballot box to ensure accurate, secure, and private ballot scanning and vote casting for each voter. Poll workers perform a minimal number of steps to open the polls and activate the Verity Scan device so that it can receive paper ballots. Once the polls are open, to vote, voters simply insert their ballots when Scan indicates it is appropriate, and then voters wait for Scan to indicate that the ballot has been successfully cast. Scan also supports “second chance” voting for mismarked ballots. During the election definition process in Verity Build, election officials may specify the types of mismarks for which Verity Scan should reject ballots and present voter instruction messages for “second chance voting;” officials can choose to flag undervotes, overvotes, and blank ballots, and they can also specify whether voters are required to have poll worker assistance to cast a mismarked ballot, or not. After scanning, each ballot’s Cast Vote Record is stored on vDrive portable flash media, which can be tabulated by the Verity Count software application. Verity Scan is capable of printing reports with ballot count totals or unofficial Tally results in the polling place. Verity Scan includes a compact and durable integrated storage case, for secure, easy transportation and storage.
- **Verity Touch Writer** is a ballot marking device for paper ballots. Touch Writer’s electronic interface is paired with a commercial-off-the-shelf (COTS) printer, so that voters can mark selections electronically, review their selections, and then print a marked ballot that is the same format as ballots produced for voters who hand-mark their ballots. Because Verity Touch Writer prints a complete ballot from blank stock, including voter selections, it provides true equality of access for all voters. Poll workers perform a minimal number of steps to open the polls and activate the Verity Touch Writer device so that it is ready to receive a voter’s activation code; this allows voters to activate their ballot session by entering an anonymous Access Code, privately. The removable vDrive election media on Verity Touch Writer allows its audit logs to be transferred to the Verity Count workstation for review. It is important to note that Touch Writer is a ballot marking device only, and as such it does not store electronic cast vote records, nor does it produce reports with results totals. Ballots marked with Verity Touch Writer are cast by inserting them into a Verity Scan device. Like Verity Scan, Touch Writer includes a compact and durable integrated storage case, for secure, easy transportation and storage.
- **Verity Access** is an audio tactile interface (ATI) controller that is connected to Verity Touch Writer ballot marking devices, as a complement to the touchscreen display, in order to provide additional options for accessible voting. Verity Touch Writer is normally deployed with the Access controller. Access has three tactile buttons, one audio port, and one port for two-switch adaptive devices (such as “jelly switches” or sip-and-puff devices). Jacks for headphones and adaptive devices are located on the top edge of the device, and the device has gripping surfaces on either side.
- **Ballot Box.** Designed to work seamlessly with the Verity Scan device, the Verity Ballot Box is designed for security, light weight, and ease of deployment. Using an innovative folding design, the durable ballot box includes separate secure compartments for scanned and un-scanned ballots, and it folds to just 5” thin, for easy transportation and storage.
- **Voting booth.** Like the Verity Ballot Box, the specially designed voting booth for Verity Touch Writer is designed for light weight and easy set up. The booth includes only three parts to assemble, and it also

includes durable nylon privacy screens. The Verity voting booth is also designed to comply with VVSG requirements for accessibility and controls within reach.

- **Verity vDrive.** vDrives are flash memory media devices that carry the election definition from Verity Build to Verity devices, including Scan and Touch Writer. vDrives also store Cast Vote Records (CVRs) and audit information. After polls are closed, vDrives can be removed from Scan or Touch Writer to transfer CVRs and/or audit logs to Verity Count. vDrives are also used to store CVRs associated with scanned ballots in Verity Central. vDrives from Scan and Central are read into Count, which tabulates votes and reports results.
- **Verity Key** is a two-factor authentication device used to secure access to critical functions throughout the election. Two-factor authentication means that users must have the physical Key device, which is similar to a USB token, as well as knowing the passcode associated with the physical security device. This electronic device is required for access to secure functions in the Build, Central, and Count applications, including tasks such as accepting ballot styles, opening new election functions, and tabulating votes.

### **Additional Materials**

Hart is including the following items with this application submission:

- Certificate of Conformance and Scope of Certification Document from the U.S. Election Assistance Commission.
- Test report by an independent testing authority indicating conformance to standard for voting equipment issued by the U.S. Election Assistance Commission.
- Financial report
- List of all jurisdictions that have already purchased Verity Voting.

Hart InterCivic looks forward to your favorable review of this application and the opportunity to demonstrate Verity Voting 1.0 before the State Election Commission at its October 12<sup>th</sup> meeting. For questions or additional information, please feel free to contact me.

Respectfully submitted,



Pam Cardenas  
Certification Manager  
Hart InterCivic  
(512) 252-6813  
[pcardenas@hartic.com](mailto:pcardenas@hartic.com)



United States Election Assistance Commission



Certificate of Conformance

**Hart Verity 1.0**

The voting system identified on this certificate has been evaluated at an accredited voting system testing laboratory for conformance to the 2005 *Voluntary Voting System Guidelines (2005 VVSG)*. 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:	<u>Verity</u>
Model or Version:	<u>1.0</u>
Name of VSTL:	<u>SLI Global Solutions</u>
EAC Certification Number:	<u>HRT-Verity-1.0</u>
Date Issued:	<u>05/12/2015</u>

Chief Operating Officer & Acting Executive Director  
U.S. Election Assistance Commission

**Scope of Certification Attached**

**Manufacturer:** Hart InterCivic  
**System Name:** Verity 1.0  
**Certificate:** HRT-Verity-1.0

**Laboratory:** SLI Global  
**Standard:** 2005 VVSG  
**Date:** 05/12/2015



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## Scope of Certification

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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 Hart Verity Voting 1.0 voting system represents a set of hardware and software applications for pre-voting, voting and post-voting election project activities for jurisdictions of various sizes and political division complexities. Verity Voting 1.0 functions include:

- o Defining the political divisions of the jurisdiction and organizing the election with its hierarchical structure, attributes and associations.
- o 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.
- o Preparing and producing ballots.

- o Preparing media for voting devices
- o Configuring and programming the Verity Scan digital scanners
- o Configuring and programming the Verity Touch Writer BMD devices
- o Producing the election definition and auditing reports.
- o Providing administrative management functions for user, database, networking and system management.
- o Tabulation of the Cast Vote Records from Verity Scan devices and Verity Central.
- o Preview and validation of the election results. o Producing election results tally according to voting variations and election system rules.
- o Producing a variety of reports of the election results in the desired format.
- o Auditing of election results including ballot images, cast vote records, and log files.

The **Verity Scan** is a digital scanning device that is used in conjunction with an external ballot box. The unit is designed to scan marked paper ballots, interpret and record voter marks on the paper ballot and deposit the ballots into the secure ballot box. Verity Scan is capable of tabulating votes, or producing a ballot count report which includes quantities of ballots scanned.

The **Verity Touch Writer** is a standalone 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 ballot, based on vote selections made.

**Verity Election Management** allows users to import and manage election data. Imported election data sets are available through the “Elections” chevron in Verity workstation applications. Users can also delete, archive, restore, and rename 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 workstation’s date and time, gather Verity application hash codes (in order to validate the correctness of the installed applications), and access to Windows desktop.

**Verity Build** allows users to proof data, view reports, print ballots, and create election media. Build also allows users to configure settings for the Verity Scan digital scanners and Verity Touch Writer BMD devices.

**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 the custom Hart developed ballot processing application software.

**Verity Count** is an application that tabulates election results and generates reports. Verity Count can also 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.

**Mark definition:**

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

**Tested Marking Devices:**

System supports Black and Blue ball point pens; testing was performed with black, blue, orange, and red pens.

**Language capability:**

System supports English and Spanish; system is capable of supporting other languages, including ideographic languages.

**Components Included:**

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

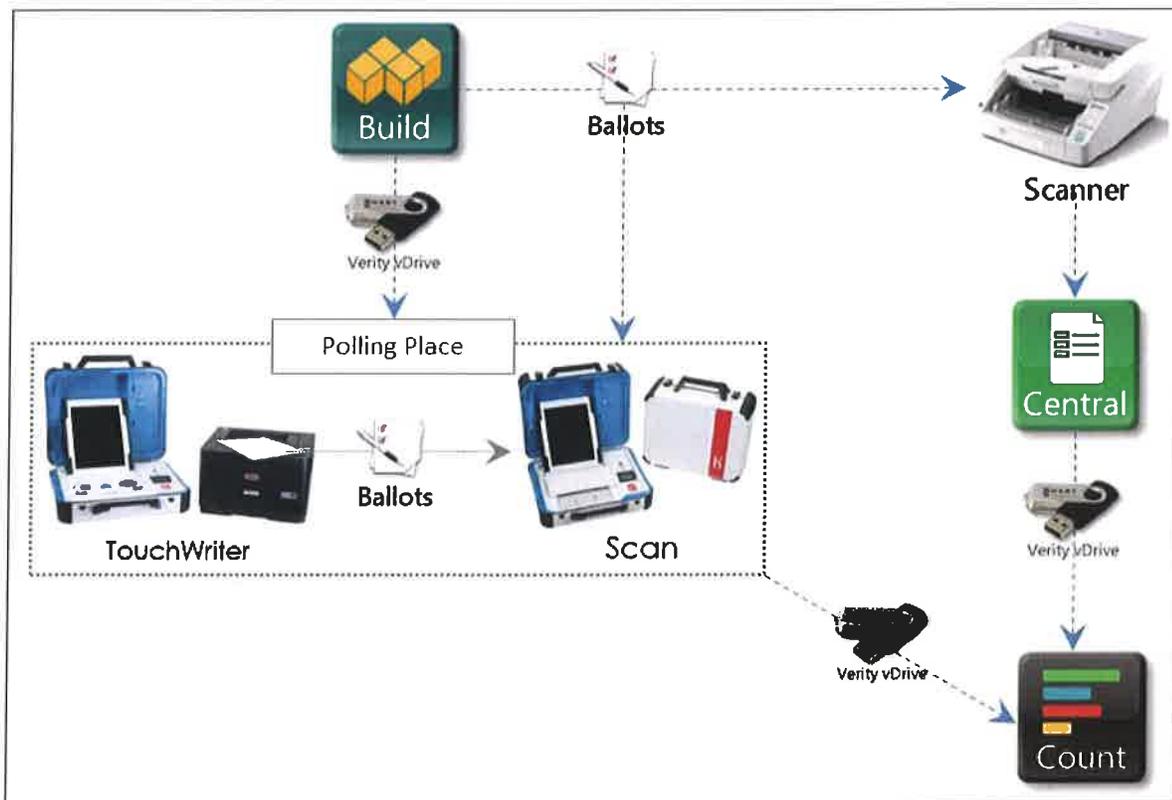


Figure 1 - Verity Voting System Diagram

System Component	Software or Firmware Version	Hardware Version	Operating System or COTS	Comments
Verity Build	1.0.3			Election definition software
Verity Central	1.0.3			High speed digital scanning software
Verity Count	1.0.3			Tabulation and reporting software
Verity Scan	1.0.3			Digital scanning device
Verity Touch Writer	1.0.3			Acessible BMD device
Verity Device Microcontroller	V17			Firmware for Verity devices
VerityWorkstation Operating System– Build, Central & Count	6.1.7601		Microsoft Operating System	Windows Embedded Standard 7 w/ service pack 1, 64 bit
Application control – Build, Central, Scan, Touch Writer, & Count	6.1.2		COTS: McAfee Application Control	Configured for Verity workstations and devices
Framework – Build, Central, Scan, Touch Writer, & Count	4.0.30319; 4.5.50709		COTS: Microsoft .NET 4.x Framework	Unmodified
Database – Build, Central & Count	11.0.2100		COTS: Microsoft SQL Server 2012	Unmodified
Runtime Libraries – Build, Central, Scan, Touch Writer, & Count	8.0.56336		COTS: Microsoft Visual Studio C++ 2005	Unmodified
Runtime Libraries – Build, Central, Scan, Touch Writer, & Count	10.0.40219		COTS: Microsoft Visual Studio C++ 2010	Unmodified
Verity Device Operating System – Scan, Touch Writer	6.1.7601		Microsoft Operating System	Windows Embedded Standard 7 w/ service pack 1, 32 bit
Database – Scan, Touch Writer	11.0.2100		COTS: Microsoft SQL Server Compact	Unmodified
Verity Scan		Revision B		
Verity Touch Writer		Revision B		
Verity Key		N/A	COTS: Dallas iButton	Security key used with voting system
Verity vDrive		N/A	COTS: Apacer	4GB USB flash drive, portable electronic media used for transportation of voting system data

System Component	Software or Firmware Version	Hardware Version	Operating System or COTS	Comments
Ballot/Report Printer - Build, Central, Touch Writer, & Count		B431d	COTS: Okidata	
Ballot Printer - Build		C911	COTS: Okidata	
Ballot Printer - Build		C831	COTS: Okidata	
Scanner - Central		i5600	COTS: Kodak	
Scanner - Central		DR-G1100	COTS: Canon	
Scanner - Central		DR-G1130	COTS: Canon	
Workstation – Build, Central & count			COTS: Intel – Windows Workstation	<p>Recommended specs:</p> <p>Processor – x86-compatible, 3.0GHz, Quad Core</p> <p>Memory – 8GB</p> <p>Hard Drive –RAID-Level 1</p> <p>Ethernet Port – 100Mb/1Gb</p> <p>USB Ports</p> <p>Video Card - Integrated Graphics</p> <p>Keyboard - USB Keyboard</p> <p>Mouse - USB Mouse</p> <p>Wireless telecommunications not configured or implemented.</p>
Monitor – Build, Central & Count				<p>Recommended specs:</p> <p>Aspect Ratio - Widescreen (16:9)</p> <p>Minimum resolution: 1366 x 768</p>

## System Limitations

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

Element	Limit Requirement
Precincts	1,000
Splits per Precinct	20
Total Precincts + Splits in an election	6,000
Districts For voting devices and applications	100
Parties in a General Election	24
Parties in a Primary Election	10
Contests and Propositions combined	200
Contest Choices in a Contest	75
Total Contest Choices (voting positions) in an election	600
Maximum length of contestant name	100 characters
Maximum write-in length	25 characters
Ballot Styles	N/A
Voting Types	5
Maximum Polling Places per election	1200
Maximum devices per election	2400
Maximum number of central count devices	N/A
Media Device – Scan voting device	9999 sheets per vDrive
Media Device – Central application	60000 sheets per vDrive
Number of voters definable per election	1000000
Max. sheets per ballot	4 sheets
Scan - single sheet ballot	9999 Ballots
Scan - two sheet ballot	4999 Ballots
Scan - three sheet ballot	3333 Ballots
Scan – four sheet ballot	2499 Ballots
Central	1000000 Ballots
Count	4000000 CVRs 1200 vDrives

## Functionality

### 2005 VVSG Supported Functionality Declaration

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

Feature/Characteristic	Yes/No	Comment
Parallel (Side) Approach	Yes	
Closed Primary		
Primary: Closed	Yes	
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.	No	
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	Not a DRE system
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:		

Feature/Characteristic	Yes/No	Comment
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 2 <sup>nd</sup> 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 2 <sup>nd</sup> 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		
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	

# Certification Test Report

Report Number *HRT-3026-CTR-01*

## Hart InterCivic and Verity Voting 1.0

Certification Test Report Rev 02

March 27<sup>th</sup> 2015

Prepared for:

<b>Vendor Name</b>	<i>Hart InterCivic Inc.</i>
<b>Vendor System</b>	<i>Verity Voting 1.0</i>
<b>EAC Application No.</b>	HRT-Verity-1.0
<b>Vendor Address</b>	<i>15500 Wells Port Drive Austin, TX 78728</i>

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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

Release	Author	Revisions
Rev 01	M. Santos	Initial Release; submitted to EAC for approval
Rev 02	M. Santos	Updates in response to EAC review comments

### 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.

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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 SLI opinions or interpretations included in this report beyond the final recommendation.

## Other Labs Performing Hardware Testing

SLI Global Solutions is responsible for all core voting system tests as identified in NIST NVLAP Handbook 150-22 (2008). Regarding non-core hardware testing for this certification test campaign, this report contains data that were produced under subcontract by the following lab(s):

**Table 1 – Labs Performing Hardware Testing**

Laboratory	Address	Test(s)	Date(s)
EMC Integrity, Inc. (NVLAP certified for electromagnetic compatibility and telecommunications)	1736 Vista View Drive Longmont, CO 80504	<b>EMC / EMI Tests:</b> Radiated Emissions, Conducted Emissions, ESD, Electromagnetic Susceptibility, Electrical Fast Transient, Lightning Surge, Conducted RF	10/1/14 - 11/4/14



Laboratory	Address	Test(s)	Date(s)
		Immunity, Magnetic Fields Immunity, Electrical Power Disturbance	
PTI Professional Testing (EMI), Inc.	1601 N. A. W. Grimes, Suite B  Round Rock, TX 78665, USA	<b><u>Information technology equipment Safety Test:</u></b>  EN 60950-1:2006 + A12:2011	<b>11/4/14 - 11/17/14</b>
Cascade TEK – Front Range  (A2LA certified for mechanical including MIL STD 810)	1530 Vista View Drive Longmont, CO 80504	<b><u>MIL-STD-810D Tests:</u></b> Bench Handling, Vibration, Low Temperature, High Temperature, Humidity, Temperature/Power Variation, and Reliability	<b>10/13/14 - 11/17/14</b>



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## 1 Introduction

SLI Global Solutions is submitting this report as a summary of the certification testing efforts for the **Hart InterCivic Verity 1.0** voting system, as detailed in the section System Identification. The purpose of this document is to provide an overview of the certification testing effort and the findings of the testing effort for **Hart InterCivic Verity 1.0** voting system.

This effort included documentation review of the Technical Data Package, source code review, and testing of the **Hart InterCivic Verity 1.0** voting system. Testing consisted of the development of a test plan, managing system configurations, executing a subset of test cases based on the Hart testing performed, component and system level tests prepared by SLI, and analysis of results. The review and testing was performed at SLI's Denver, Colorado facility.

### 1.1 References

1. Election Assistance Commission Voluntary Voting System Guidelines (EAC VVSG), 2005 Version 1.0. Volumes I and II
2. NIST NVLAP Handbook 150: 2006.
3. NIST NVLAP Handbook and 150-22: 2008.
4. EAC Voting System Testing and Certification Program Manual, United States Election Assistance Commission, v 1.0, June 1, 2011
5. EAC Voting System Test Laboratory Program Manual, Version 1.0, expires 7/2017
6. SLI VSTL Quality System Manual, 1.16, prepared by SLI, dated December 3, 2013

### 1.2 Document Overview

This document contains:

- The Introduction which discusses the application tested/reviewed
- The Certification Test Background which discusses the testing process
- The System Identification which identifies hardware and software for the Hart InterCivic Verity 1.0 voting system
- The System Overview which discusses the functionality of Hart InterCivic Verity 1.0 voting system software and firmware
- The Certification Tests which are a summary of the testing effort
- The Recommendations section which contains the final analysis of the testing effort
- EAC Certification & Voting System Configuration summarizes the voting system configuration
- Attachments which contain:
  - Attachment A – Warrant of Change Control for Verity 1.0
  - Attachment B1 - Record of Trusted Build1 12-16-2014
  - Attachment B2 -Record of Trusted Build2 02-02-2015
  - Attachment B3 -Record of Trusted Build3 02-11-2015



- Attachment B4 - Record of Trusted Build4 02-16-2015
- Attachment C – List of Source Code Reviewed and Results
- Attachment D1 - EMCI\_200737\_CERT\_ISO-IEC 17025-2005
- Attachment D2 - EMCI\_Scope\_Of\_ACCREDIT\_ISO-IEC 17025-2005
- Attachment D3 - CASCADE\_ENV\_A2LA\_Scope\_Of\_ACCREDIT\_ISO-IEC 17025-2005
- Attachment D4 - TUV audit report of TS3
- Attachment D5 - Verity\_Safety\_Report\_NRTL\_Certificate\_72101270\_CERT
- Attachment E1 - PCA Doc - System Security Spec Rev04
- Attachment E2 - PCA Doc - System Overview Rev03
- Attachment E3 - PCA Doc - System Operations Procs Rev04
- Attachment E4 - PCA Doc - System Maintenance Procs Rev04
- Attachment E5 - PCA Doc - System Hardware Spec Rev03
- Attachment E6 - PCA Doc - System Functionality Desc Rev02
- Attachment E7 - PCA Doc - Software Design\_Spec Rev02
- Attachment E8 - PCA Doc - Quality Assurance Rev04
- Attachment E9 - PCA Doc - Personnel Deployment\_Training Reqs Rev03
- Attachment E10 - PCA Doc - Configuration Management Plan Rev04
- Attachment E11 - PCA Doc - System Test\_Verification Spec Rev03
- Attachment F1 - Hart InterCivic Verity VVSG EMC EMI Test Plan v6 0
- Attachment F2 - Hart InterCivic Verity VVSG Hardware ENV Test Plan v4 0
- Attachment F3 – EMC-EMI-Env-Safety Test Plan4005516 A03
- Attachment G1 - Cascade Tek\_Bench Handling\_Vibration\_Low Temp\_High Temp\_Humidity\_Temp Power Variation Test Report for Verity Scan TW
- Attachment G2 - Verity\_Safety\_Report\_PTI-1411085-000\_TRF\_iec60950\_ALL from PTI
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- Attachment G5 - EMCI\_ESD\_Electro Susceptibility\_EFT\_Lightning Surge\_CON RF\_Magnetic Fields RF\_ELEC Power DIST\_Immunity Test Report for Verity Scan
- Attachment G6 - EMCI\_ESD\_Electro Susceptibility\_EFT\_Lightning Surge\_CON RF\_Magnetic Fields RF\_ELEC Power DIST\_Immunity Test Report for Verity TW



- o Attachment H – Discrepancies
- o Attachment I - Hart Verity 1.0 EAC Certification Test Plan v1.3.doc

## 2 Certification Test Background

This section provides a brief overview of the EAC Certification Program and the activities involved in order for a voting system to be considered for certification against the 2005 VVSG and the EAC program manual.

### 2.1 PCA - Document and Source Code Reviews

The Physical Configuration Audit (PCA) review of the Hart InterCivic Verity 1.0 documentation, submitted in the requisite Technical Data Package (TDP), was performed in order to verify conformance with the Election Assistance Commission Voluntary Voting System Guidelines (EAC VVSG) 2005. Source code was reviewed for each software and firmware application declared within the Verity 1.0 voting system.

All PCA reviews were conducted in accordance with *Volume 2 Section 2* of the EAC VVSG 2005, to demonstrate that the system meets the requirements. Results of the PCA documentation review can be found in section 5.2 of this Certification Test Report. Inconsistencies or errors in documentation were identified to Hart for resolution or comment. Additional details of the PCA documentation review can be found in "Attachments E1-E11".

All PCA source code reviews were conducted in accordance with *Volume 1 Section 5.2 and Volume 2 Section 5* of the EAC VVSG 2005, to demonstrate that the system meets the requirements. Results of the PCA source code reviews can be found in "Attachment C – List of Source Code Reviewed and Results". Inconsistencies or errors in the source code were identified to Hart for resolution or comment.

### 2.2 FCA - Functional & System Testing and Sampling

The Functional Configuration Audit (FCA) review of the test documentation submitted by Hart in the TDP was executed in order to verify testing of the voting system requirements defined in *Volume 1 Sections 2, 6, 7, and 9* of the EAC VVSG 2005.

SLI's standard Test Suites were customized for the **Hart InterCivic Verity 1.0** voting system and conducted in accordance with *Volume 2 Section 6*, in conjunction with the functional testing. Simulations of elections were conducted to demonstrate a beginning-to-end business use case process for the **Hart InterCivic Verity 1.0** voting system.



### 2.2.1 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 2 – Test Methods**

SLI VSTL Test Method Name	Version Date
TM_Accessibility v1.0.doc	1/14/2014
TM_Accuracy v1.1.doc	12/16/2014
TM_Audit_Record_Data v1.0.doc	1/13/2014
TM_Ballot_and_Program_Installation_and_Control v1.0.doc	1/13/2014
TM_Ballot_Box v1.1.doc	3/28/2014
TM_Ballot_Counter v1.0.doc	1/13/2014
TM_Ballot_Formatting_and_Production v1.0.doc	1/13/2014
TM_Ballot_Rotation v 1.0.doc	1/13/2014
TM_Basic_Election_Components v1.0.doc	1/13/2014
TM_Blanket_Open_Primary_Creation v 1.0.doc	1/13/2014
TM_Closed_Primary_Election_Creation v 1.0.doc	1/13/2014
TM_Closing_the_Polls v 1.0.doc	2/19/2014
TM_Error Message and Recovery v1.2.doc	12/16/2014
TM_HW_Integrity v1.0.doc	1/13/2014
TM_Maintainability v1.0.doc	1/13/2014
TM_Non-Partisan v1.0.doc	1/13/2014
TM_Partisan Offices v1.0.doc	1/13/2014
TM_Performance v1.0.doc	2/21/2014
TM_Pre-Voting_Capabilities v1.0.doc	1/13/2014
TM_Provisional or Challenged Ballots v1.0.doc	1/13/2014
TM_Ranked_Order_Voting v1.0.doc	2/7/2014
TM_Readiness v1.0.doc	1/13/2014
TM_Security_Access_Control v1.0.doc	2/19/2014
TM_Security_Access_Control_Measures v1.0.doc	2/19/2014
TM_Security_Physical_Security_Measures v1.0.doc	2/19/2014
TM_Security_Software_Security v1.0.doc	2/19/2014
TM_Split_Precincts v1.0.doc	1/13/2014
TM_Standard Open Primary Creation v1.0.doc	1/13/2014
TM_Straight_Party_Voting v1.0.doc	1/13/2014
TM_Stress v1.0.doc	2/7/2014
TM_System_Audit v1.0.doc	2/7/2014
TM_Tally_and_Reporting v1.0.doc	2/7/2014



SLI VSTL Test Method Name	Version Date
TM_Usability v1.1.doc	12/16/2014
TM_Volume v1.0.doc	2/7/2014
TM_Vote_for_N_of_M v1.0.doc	2/7/2014
TM_Voting_Ballot_Rotation v1.0.doc	2/7/2014
TM_Voting_Capabilities v1 1.doc	12/16/2014
TM_Voting_Non-Partisan v1.0.doc	2/10/2014
TM_Voting_Partisan_Offices v1.0.doc	2/10/2014
TM_Voting_Precincts_and_Districts v1.0.doc	2/10/2014
TM_Voting_Straight_Party v1.0.doc	2/10/2014
TM_Voting_Vote_for_N_of_M v1.0.doc	2/19/2014
TM_Voting_Write-In v1.0.doc	2/10/2014
TM_Write-In v1.0.doc	2/10/2014

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. Please see the Terms and Abbreviations table for additional information about Test Modules and Test Suites.

#### Deviations from, additions to, or exclusions from the test methods

There were no deviations from, additions to, or exclusions from any of the test methods used in this certification test campaign.

### 2.2.2 Sampling of Manufacturer tests

SLI selected a subset of the Hart InterCivic Verity 1.0 functionality for verification of Hart's internal functional test execution. SLI performed a sampling of the Hart internally implemented test cases based on the following guideline:

- Review Hart InterCivic Verity 1.0 test cases and selected tests from high-risk areas for sampling, including:
  - Security
  - Error and Recovery
  - Audit log
  - Tabulating (This would include verifying Accuracy of the vote totals of the tabulation process)



### 2.2.3 Terms and Abbreviations

This section details pertinent terms applicable within this report.

**Table 3 – Terms and Abbreviations**

Term	Abbreviation	Description
American Association for Laboratory Accreditation	A2LA	A nonprofit, non-governmental, public service, membership society whose mission is to provide comprehensive services in laboratory accreditation and laboratory-related training.
Ballot Marking Device	BMD	An accessible computer-based voting system that produces a marked ballot (usually paper) that is the result of voter interaction with visual or audio prompts.
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	<i>Verity software applications are organized around easy-to-follow workflows, with specific activities associated with "chevrons" or "arrows" in the application user interface.</i>
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 CompactFlash
Commercial Off the Shelf	COTS	Commercial, readily available hardware devices (such as card readers, printers or personal computers) or software products (such as 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.



Term	Abbreviation	Description
Election Management System	EMS	Typically a database management system used 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 layout 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.
Independent Test Authority	ITA	This is a test lab that is not connected with the vendor or manufacturer of the voting system.
(Verity) Chevron	No Abbreviation	Verity components use workflow chevrons. Workflow chevrons, arranged along the top of the screen, identify the function the user is currently viewing.
Institute of Electrical and Electronics Engineers	IEEE	A non-profit organization, IEEE is the world's leading professional association for the advancement of technology.
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.).

Managing technology risk



Term	Abbreviation	Description
Primary – Blanket		The Blanket Primary election combines all candidates for a given contest, regardless of political affiliation, into the same contest. This is done with the same presentation as in a general election with the one difference being that there may be multiple candidates from each party listed. From the <b>Verity 1.0</b> perspective, this election is treated as if it were a general election.
Primary – Closed		The Closed Primary election segregates each political party onto its own ballot, along with all pertinent non-political contests and referendums.
Primary - Open		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.

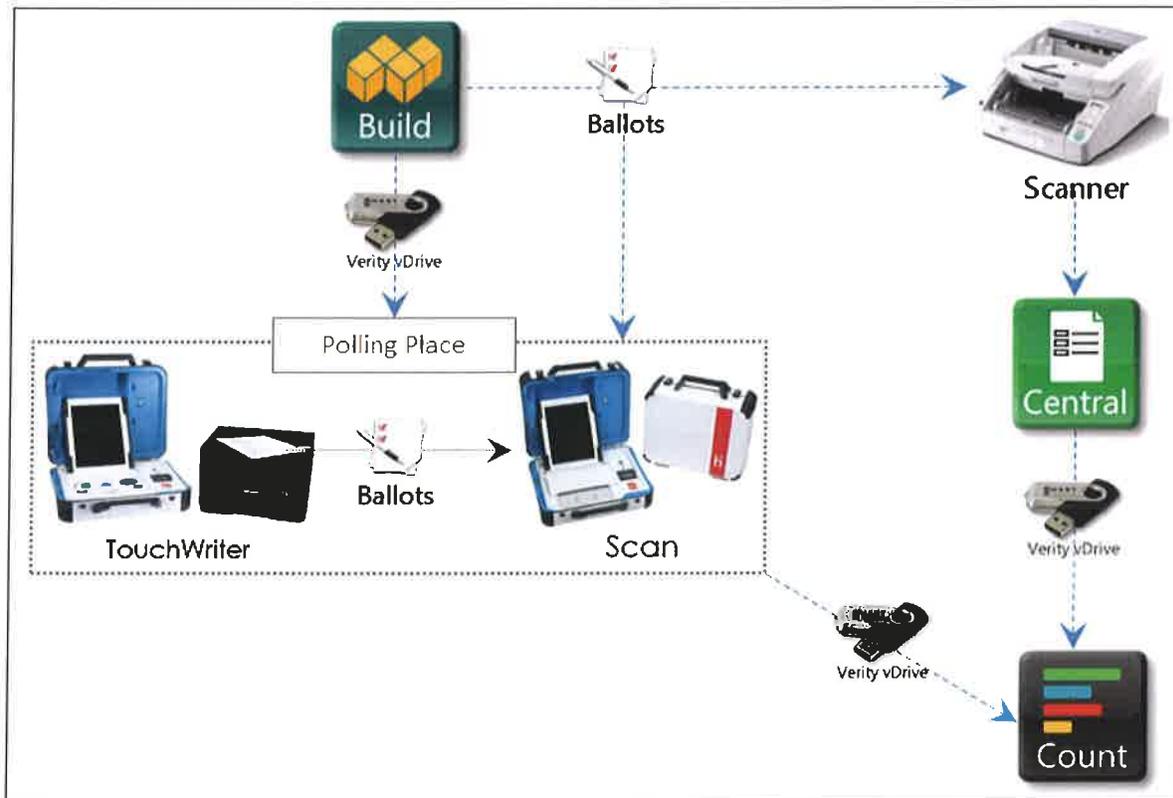


Term	Abbreviation	Description
Test Method	No Abbreviation	SLI proprietary documents which are designed to group sets of EAC VVSG requirements in a logical manner that can be utilized to efficiently validate where and how requirements, or portions of a requirement, are met.
Test Module	No Abbreviation	The actionable components 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 1 & 2	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	This is the 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 employee within the Compliance division that has been qualified to perform EAC voting system certification testing.

### 3 System Identification

The **Hart InterCivic Verity 1.0** voting system was submitted for certification testing with the documentation, hardware and software listed below. No other Hart product was included in this test effort.

#### 3.1 System Topology 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.
- The **Verity TouchWriter** and **Verity Scan** components are part of the Polling Place setup.
- **Verity Key** (not shown) is required for user access into components to load elections, use features, and generate reports. Feature access depends on the roles applied to user accounts.



### 3.2 Documentation

The TDP User/Owner manuals that would be part of the certified system delivered to a purchaser of the system are as follows:

- Verity Build Technical Reference Manual 6600-002 A05.pdf
- Verity Central Technical Reference Manual 6600-003 A04.pdf
- Verity Count Technical Reference Manual 6600-004 A04.pdf
- Verity Build Quick Reference Manual 6620-002 A05.pdf
- Verity Central Quick Reference Manual 6620-003 A04.pdf
- Verity Count Quick Reference Manual 6620-004 A04.pdf
- Verity Polling Place Operations Technical Reference Manual 6610-100-A04.pdf
- Verity Service and Maintenance Operations Technical Reference Manual 6610-001 A05.pdf
- Verity XML Guide Package.zip (this includes Verity XML Import Guide 6600-006 A06.pdf)
- Verity Operational Guide 66400001 A13.pdf

### 3.3 Software and Firmware

Any and all software/firmware that is to be used by the declared voting system whether directly or indirectly, in a production environment, must be validated during the certification process.

The software and firmware employed by **Hart InterCivic Verity 1.0** 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. For Software, the software was either obtained directly from the 3<sup>rd</sup> party manufacturer, or was verified against digital signatures obtained from the 3<sup>rd</sup> party manufacturer. For Hardware, the hardware was either shipped directly from the 3<sup>rd</sup> party manufacturer, or the equipment was inspected to verify conformance to the 3<sup>rd</sup> party manufacturer's specifications.

Tables 4, 5 and 6 below detail each application employed by the Hart InterCivic Verity 1.0 voting system.



**Table 4 – Hart Verity 1.0 Software and Firmware**

Manufacturer	Application(s)	Version
Verity Build	EMS software	1.0.3
Verity Central	High speed digital scanner software	1.0.3
Verity Count	Central count location accumulation and tallying software	1.0.3
Verity Scan	Digital scanner firmware	1.0.3
Verity Touch Writer	BMD firmware	1.0.3
Verity Device Microcontroller	Firmware for Verity Devices	V17

**Table 5 – COTS Software for Workstations**

Manufacturer	Application	Version	Verity Voting 1.0 Component
<b>Operating system</b>			
<b>Microsoft</b>	<i>Windows Embedded Standard with Service Pack 1, 64-bit</i> Configured for Verity Kiosk Operations	6.1.7601	Build, Central, Count
<b>Supporting Software</b>			
<b>McAfee</b>	Application Control Configured for Verity Kiosk	6.1.2	Build, Central, Count
<b>Microsoft</b>	.NET 4.x Framework Unmodified	4.0.30319 4.5.50709	Build, Central, Count
<b>Microsoft</b>	<i>SQL Server 2012</i> Unmodified	11.0.2100	Build, Central, Count
<b>Microsoft</b>	Visual Studio C++ 2005 redistributables Unmodified	8.0.56336	Build, Central, Count
<b>Microsoft</b>	Visual Studio C++ 2010 redistributables/runtime/shell Unmodified	10.0.40219	Build, Central, Count



**Table 6 – COTS Software and Firmware for Devices**

Manufacturer	Application	Version	Verity Voting 1.0 Component
<b>Operating system</b>			
<b>Microsoft</b>	<i>Windows Embedded Standard 7 with Service Pack 1, 32-bit</i>  Configured for Verity Kiosk Operations	6.1.7601	Scan, Touch Writer
<b>Supporting Software</b>			
<b>McAfee</b>	Application Control  Configured for Verity Kiosk	6.1.2	Scan, Touch Writer
<b>Microsoft</b>	.NET 4.x Framework  Unmodified	4.0.30319 4.5.50709	Scan, Touch Writer
<b>Microsoft</b>	<i>SQL Server Compact Unmodified</i>	11.0.2100	Scan, Touch Writer
<b>Microsoft</b>	Visual Studio C++ 2005 redistributables  Unmodified	8.0.56336	Scan, Touch Writer
<b>Microsoft</b>	Visual Studio C++ 2010 redistributables/runtime/shell/tools  Unmodified	10.0.40219	Scan, Touch Writer



### 3.4 Equipment (Hardware)

The hardware employed by **Hart InterCivic Verity 1.0** 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.

Tables 7 and 8 below detail each device employed by the **Hart InterCivic Verity 1.0** voting system.

**Table 7 – Hart Verity 1.0 Voting Equipment**

Hardware	Use	Model
Verity Scan	Precinct polling place digital scanner	Revision B
Verity Touch Writer	Precinct polling place Ballot Marking Device	Revision B
Verity Key	Security key used within the voting system	N/A
Verity vDrive	Media used for transportation of voting system data	N/A

**Table 8 – COTS Equipment**

Manufacturer	Hardware	Model
OKIDATA (for <b>Verity Build, Verity Central, Verity Touch Writer and Verity Count</b> )	Ballot/Report Printer	B431d
OKIDATA (for <b>Verity Build</b> )	Ballot Printer	C911
OKIDATA (for <b>Verity Build</b> )	Ballot Printer	C831
Kodak (for <b>Verity Central</b> )	Ballot Scanner	i5600
Canon (for <b>Verity Central</b> )	Ballot Scanner	DR-G1100
Canon (for <b>Verity Central</b> )	Ballot Scanner	DR-G1130



Manufacturer	Hardware	Model
Various (for <b>Verity Build, Verity Central and Verity Count</b> )	<b>Intel-Windows Workstation (Recommended Requirements)</b> Processor – x86-compatible, 3.0GHz, Quad Core Memory – 8GB Hard Drive – 2 x 1 TB RAID-Level 1, Removable w/ key lock Ethernet Port – 100Mb/1Gb USB Ports – 4 ports Video Card - Integrated Graphics Keyboard - USB Keyboard Mouse - USB Mouse NO Wireless technologies allowed: WiFi, Bluetooth, Aircard, etc.	
Various (for <b>Verity Build, Verity Central and Verity Count</b> )	<b>Monitor (Recommended Requirements)</b> Panel Size - 50.8 cm Aspect Ratio - Widescreen (16:9) Optimal Resolution - 1600 x 900 at 60 Hz Contrast Ratio - 1000: 1 Brightness - 250 cd/m <sup>2</sup> (typical)	

### 3.5 Materials

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
- Ballot marking pens
- Printer paper rolls



### 3.6 TDP Documents Used to Support Testing

The vendor documents used to support Certification Testing are listed below:

#### Verity - System Functionality

- Verity 1.0 Technical Data Package Overview
- Airgap Interface for Portable Electronic Media Technical Reference
- Verity XML Import Guide (plus 8 Templates and 3 Sample Elections)
- Verity Voting Verity Operational Environment
- Verity Software Architecture & Design Technical Documentation
- System Description Technical Document
- Verity Voting Performance Characteristics
- File Manifests for Validation:
  - Build-Client, BuildCount-Client, BuildCount-Server, Build-Server, Central-Client, Central-Server, Count-Client, Count-Server, Scan-Device, Touch-Device
- Voting Systems Acronyms
- Voting Systems Glossary

#### Verity - System Hardware Specifications

- Test Reports
  - Verity\_Safety\_Report\_PTI-1411085-000\_TRF\_iec60950\_ALL
  - Verity\_Safety\_Report\_NRTL\_Certificate\_72101270\_CERT
  - TUV audit report of TS3
  - Hart InterCivic Verity Scan Environmental Test Report - Professional Testing (EMI), Inc.
  - Hart InterCivic Verity Touch Writer Environmental Test Report - Professional Testing (EMI), Inc.
  - Hart InterCivic Verity Scan, Verity Touch Writer, Ballot Box, Booth Standard, Booth Accessible Environmental Test Report - Professional Testing (EMI), Inc.
  - Verity\_Scan\_FCCB\_Conducted\_Emissions\_16Sept2014
  - Verity\_Scan\_FCCB\_Radiated\_Emissions\_15Sept2014
  - Verity\_Writer\_FCCB\_Conducted\_Emissions\_16Sept2014
  - Verity\_Writer\_FCCB\_Radiated\_Emissions\_17Sept2014
- Bill of Materials
  - Scan BOM - file name 3005350B-Scan\_Indented\_BOM+AVL\_Pre-EAC
  - TouchWriter BOM - file name 3005352B-TouchWriter-Indented\_BOM+AVL\_Pre-EAC
  - BallotBox BOM - file name 3005357A-Ballot-Box\_Indented\_BOM+AVL
  - Standard Booth BOM - file name 3005358A-Standard-Booth\_Indented\_BOM+AVL
  - Accessible Booth BOM - file name 3005359A-Accessible-Booth\_Indented\_BOM+AVL



- Drawings and Schematics: 3005210 - Verity Access (2 files)
- Drawings, Schematics, Review Dispositions: 3005350 - Verity Scan (19 files)
- Drawings, Schematics, Review Dispositions: 3005352 - Verity Touch Writer (20 files)
- Drawings: 3005357-BallotBox (2 files)
- Drawings and Review Dispositions: 3005358-Standard-Booth (5 files)
- Drawings and Review Dispositions: 3005359-Accessible-Booth (5 files)
- Verity System Design Specification (file name Verity Base Station Microcontroller Specification 4005462)

#### Verity System Design Verity Electronics Specification

- COTS Equipment
  - Verity 1.0.0 COTS Baseline and Plan
  - QuickSpecs HP Z230 Tower Workstation
  - QuickSpecs HP ProDisplay P231 23-inch LED Backlit Monitor
  - Canon imageFORMULA DR-G1130 DR-G1100 User Manual
  - Kodak i5000 Series Scanners User's Guide
  - OKI\_B411-B431\_Manual
  - OKI User's Manual Advanced C831n/dn, C841n/dn, ES8431/8441
  - OKI User's Manual Advanced C911dn, C931dn, C941dn, ES9411dn, ES9431dn, ES9541dn
  - Eaton 5P 1500 Tower UPS User Guide
  - HART 3S2P NCR18650A Battery Pack Preliminary Specification - Totex
  - CERTIFICATE OF COMPLIANCE UL 20130910-MH29443 TOTEX MFG INC Rechargeable Battery Packs, Models: U80327 and 1005015
  - AC-DC 85-250 Watts AHM Series Specification - filename XP\_Power\_AHM85PS24
  - Certification of Conformity CE AC/DC adaptor XP Power AHM85PS12, AHM85PS24, Test Rpt # CE990712C14A
  - CE EMS Test Report CE990712C14A XP Power AHM85PS12, AHM85PS24
- Hart Secure Ballot Stock Specification
- Verity Voting System Limits

#### Verity - Software Design & Spec

- All-In-One Code Framework Coding Standards [Microsoft]
- Software Design and Development Procedure
- Software Verification and Validation Process
- Verity Coding Standard Standards Document
- Verity Application Programming Interface Specification Technical Document
- Pre-voting EMS Technical Requirements Document
- Verity Central Technical Requirements Document
- Verity Count Technical Requirements Document
- Election Management Technical Requirements Document



- Electronic Voting Devices Technical Requirements Document
- Polling Place Device Suite Technical Requirements Document
- Verity Precinct Scanner Technical Requirements Document
- Verity Security Requirements Document
- Verity Key Design Technical Document
- Verity Logging Design Technical Document
- Verity Logging Technical Requirements Document
- Verity vDrive Design Technical Document
- Workflow, Design and Wireframe docs:
  - Election Management UI workflow
  - ElectionOfficeUIWorkflow
  - PCApplicationSuiteWorkflow
  - PrecinctScannerUIWorkflow
  - Shared Device Wireframes
  - TouchWriterUIWorkflow
  - User Management UI workflow
  - Verity Desktop UI Workflow
  - VerityBuildUIWorkflow
  - VerityCentralUIWorkflow
  - VerityCountUIWorkflow
- Verity Database
  - Verity Desktop Database Schema
  - Verity Device Database Schema
  - Verity Workstation Datastore Filelist
  - Verity Database Attributes
- Verity TrustedWitness Build Process
  - The Creation And Configuration Of The Trusted Build Environment
  - The Verity Access Firmware Build Procedure
  - The Verity MCU Firmware Build Procedure
  - Device WES7 Creation Process Document
  - Device OS Creation And Configuration Process Document
  - Device Configuration Process Document
  - Workstation WES7 Creation Process Document
  - Workstation Manufacturing Process Document
  - Workstation Configuration Process Document
- License
  - Microsoft Software License Terms Microsoft SQL Server 2012 Standard For Embedded Systems
  - Indirect Authorized OEM License Agreement [filename McAfee & Hart Indirect OEM License 6\_24\_14 rev 1]



- Neodynamic End User License Agreement [filename Barcode Professional OEM License EULA-v7]

Verity - System Security Specification

- Verity Risk Assessment
- Verity Security Requirements Document

Verity - System Operations Procedures

- Verity Build Technical Reference Manual
- Verity Build Quick Reference Manual
- Verity Central Technical Reference Manual
- Verity Central Quick Reference Manual
- Verity Count Technical Reference Manual
- Verity Count Quick Reference Manual
- Verity Service and Maintenance Manual
- Verity Polling Place Operations Manual
- Verity Operational Guide

Verity - System Maintenance

- Verity Service and Maintenance Manual

Verity - Personnel Deployment-Training

- Assisting Persons With Disabilities Training Agenda
- Verity Build Training Agenda
- Verity Central Training Agenda
- Verity Count Training Agenda
- Management and Best Practices Training Agenda
- Polling Place Operations Training Agenda
- Support Procedures Training Agenda
- Train-the-Trainer Training Agenda
- Assisting Persons With Disabilities [Presentation]
- Verity Build [Presentation]
- Verity Central [Presentation]
- Verity Count [Presentation]
- Verity Management & Best Practices [Presentation]
- Polling Place Operations [Presentation]
- Verity Support Procedures [Presentation]
- Verity Train the Trainer [Presentation]



#### Verity - Configuration Management Plan

- Verity - Operations PRD Ops/Services/Supply Chain Planning Document
- Configuration Management Processes
- Document Control Procedure
- Software Versioning Procedure
- Voting System Implementation And Maintenance Process Document

#### Verity - Quality Assurance

- Classification & Signature Matrix for CCB PLM Process
- Continual Improvement Process
- Control of Nonconforming Product Procedure
- Hardware Design and Development Procedure
- Hardware Verification and Validation Process
- Product Requirements Procedure
- Quality Manual
- Records Retention Matrix
- Software Production Procedure
- Software Test Design and Development Procedure
- Supplier Qualification and Management Procedure
- TDP Document Control Guide
- VSTL Product Submission Procedure

#### Verity - System Test-Verification Specification

- Hart Requirements Management Requirements Management Process
- Verity Voting Summative Usability Test Plan
- Usability Test Report of Verity Touch/Touch Writer and Verity Scan
- Security Test Cases
- Verity Voting National Certification Test Specification



### 3.6.1 Excluded Requirements

In this section we identify VVSG requirements that do not pertain to the declared system being certified. For this certification project Hart has elected to not support their **Verity Touch** (DRE) implementation, **Verity Controller** which is used for linking multiple **Verity Touch** devices in a chain, **Verity Print** which is a ballot on demand device, nor **Verity Relay** transmission capabilities. As such, the table below enumerates the requirements that are not subject to verification for this project.

Table 9 – Excluded Requirements

DRE Related Requirements Not Under Test	Transmission Related Requirements Not Under Test	Other Requirements Not Under Test
1.5.2.2	2.1.9	3.2.1.c Biometrics not utilized
1.5.2.3	2.3.3.1.f	
2.1.2.f	2.4.4	
2.1.4.k,l	4.1.2.15	
2.3.1.3	6.1	
2.3.2	6.2	
2.3.3.3	7.5	
3.1.2.f,g	7.6	
4.1.1.b	7.7	
4.1.4.3		
4.1.6.2		
4.3.5.b		
5.4.3.b.iv		
5.5		
7.8 (Pertains to DRE with VVPAT)		
7.9 (VVPAT is a DRE unique feature)		
Vol. 2 , 4.7.4.b		



### 3.6.2 Additional Functionality/Requirements

As per 2005 VVSG, volume 2 section 3.2.2, review of the Hart Technical Requirements Documentation (TRDs) resulted in SLI's determination that **Hart** has some functionality/requirements that are considered beyond the scope of the VVSG, but since they are in the declared system, will require review and verification. Additional functionality/requirements that were audited within the scope of this certification are detailed below.

#### Verity Security Requirements 4005464 A05 (document)

- 3.2.4 Verity Desktop Systems that store critical election data shall be connectable to an Uninterruptable Power Supply that will provide sufficient power to allow the user to shutdown the system gracefully.
- 3.3.3.4 Verity shall not allow simultaneous access by the same user.
- 3.3.7.1 The secure BIOS shall verify the chain of trust before allowing the system to boot.
  - 3.3.7.1.1 BIOS Verification
    - 3.3.7.1.1.1 The BIOS shall store a hash computed over the entire BIOS executable stored in persistent memory.
- 3.4.1 Electronic keys shall work for one and only one election
- 3.10.1 The user must not be able to open multiple Verity Voting applications at the same time on a single computer.
- 3.10.2 The following requirements shall apply to Verity Count. These requirements may be applied to other desktop applications.
  - 3.10.2.1 The user must not be able to start, open, or access any other applications on the computer while the Verity application is open.
  - 3.10.2.2 The user must not be able to access Operating System functionality while the Verity application is open.

#### Verity Central TRD 4005453 A05

- 5.3.2.2.1.2.1 The application shall NOT allow two users to access an individual ballot simultaneously [VCS PRD 4.4.5.9.1].
- 5.3.2.2.2 The application shall support up to 4 simultaneous client workstations per server.
- 5.3.2.3 Each workstation connected to the server shall be required to have a unique Workstation Name [VCS PRD 4.4.2.2.4].
- 5.11.7.2.1 Before initiating scanning, the system shall verify that there is sufficient free space available to save and process all ballot images from the scan batch.
- 5.17.1.8.5 The application shall allow the user to protect a contest, which when protected does not allow manual or automatic resolution actions to be performed on the contest during the adjudication process [VCS PRD 4.4.5.6.8.2].



- 5.17.1.8.5.1 Protected contests shall not allow manual resolution actions.
- 5.17.1.8.5.2 Protected contests shall not be affected by the automatic resolution feature.
- 5.17.1.8.6 The application shall allow the user to remove protection from a contest.
- 5.19.2 The application shall include an interface for creating Recovery Media.

*Note that the protected contest feature is protecting the contest from being adjudicated. Ballot adjudication is only possible in Central*

### Verity Polling Place Device Suite TRD 4005457 A03

- 4.12.3.1.1 The title of the report shall be “Configuration Readiness Report”.
- 4.12.3.1.7 The report shall include a barcode.
- 4.12.3.1.7.1 The barcode shall contain the following data:
  - 4.12.3.1.7.1.1 The assigned polling place.
  - 4.12.3.1.7.1.2 The device serial number.
  - 4.12.3.1.7.1.3 The Election Media Device identifier.

## 4 System Overview

### 4.1 Scope of the Hart InterCivic Verity Voting 1.0 Voting System

This section provides a description of the scope of **Hart InterCivic Verity Voting 1.0** voting system components:

- The **Hart Verity Voting 1.0** voting 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 1.0** functions include:
  - Defining the political divisioning 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 ballot for polling place and absentee voting.
  - Preparing media for precinct voting devices and central count devices
  - Configuring and programming the Verity Scan digital scanners
  - Configuring and programming the Verity Touch Writer BMD devices
  - Producing the election definition and auditing reports.
  - Providing administrative management functions for user, database, networking and system management.



- Import or manual data entry 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.
- 
- The **Verity Scan** is a digital scan ballot counter (tabulator) that is used in conjunction with an external ballot box. The unit is designed to scan marked paper ballots, interpret and record voter marks on the paper ballot and deposit the ballots into the secure ballot box.
  - The **Verity Touch Writer** is a standalone precinct level Ballot Marker 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 ballot, based on vote selections made, using the ATI.
  - **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 Election Manager** enables users, with the correct roles, to import election defining import files into the Verity voting system. This application also supports archiving, restoring and deleting elections.
  - **Verity Desktop** enables user, 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 Build** opens the election to proof data, view reports, print ballots, configuring and programming the **Verity Scan** digital scanners, **Verity Touch Writer** BMD 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 the custom **Hart** developed ballot processing application software.
  - **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.



## 4.2 System Review

This section provides a more in-depth description of the workings of the **Hart Verity Voting 1.0** voting system and will assist the reader with understanding the flow of the voting system.

### 4.2.1 Verity Build

**Verity Voting 1.0** is initially entered through the **Verity Build** application. New election data is imported into the system, the sub-application **Election Manager**, via an XML file that is populated outside of the certified system. Existing election data (previously imported) can be re-used within the Build application.

Once the **Verity Build** application is entered, and an election is imported, via the sub-application **Election Manager**, the normal path will take the user through the workflow (denoted by the chevrons along the top of the screen), which includes the **Proof, Configure and Create chevrons**.

#### 4.2.1.1 Proof Chevron

The Proof chevron has four tab functions within it, Data Validation, Ballot Preview, Reports, and Proof Audio.

The Data Validation tab is where the imported data is validated. This allows the user to review all aspects of an election data set.

Once the data is validated, the ballots are previewed, in the Ballot Preview tab, where users can preview the details for any selected ballot. Details that can be previewed include: ballot by language, ballot by type, sorted precinct and style lists, as well as filtered precinct and style lists.

The Reports tab enables users to generate and print reports. The Reports screen contains a list of all of the reports available in **Verity Build**. From the Reports screen, users can generate, view, customize, and print selected reports.

The Proof Audio tab provides users with a way to proof audio items for their ballots. Audio items are those recordings used to create accessible audio ballots. Users proof audio items for each language in the election.

#### 4.2.1.2 Configure Chevron

The Configure chevron and its tabs of functionality follow the Proof chevron in the **Verity Voting 1.0** system of election definition creation. The Configure workflow chevron contains two tabs: Election Settings, and Accept Election.

The Election Settings tab has six sub-tabs, Printed Ballots, Voting Type Setup, Device Reports, Device Passcodes, Scan and Touch Writer.

The Printed Ballots sub-tab allows the user to set printed ballot settings.

The Voting Type Setup sub-tab allows users to set rules for specific voting, such as early voting, absentee voting as well as Election Day voting types, and associated parameters for each.



The Device Reports sub-tab allows users to control the sort order for choices on device reports, such as: Report results at the [select level] which allows users to control the level of detail on device reports; Zero report, which allows users to control whether the Zero Report shows only totals for the device or totals by precinct and precinct split; and Ballot count report, which allows users to control whether the Ballot Count Report shows only totals for the device or totals by precinct and precinct split.

The Device Passcodes sub-tab is where passcodes are defined and maintained. Passcodes are defined for **Verity** user types and for opening, suspending, and closing the polls by voting type.

The Scan sub-tab is where users can configure the ballot processing rules for scanning ballots. The four scanning exceptions are Undervote, Overvote, Invalid Vote, and Blank Ballot. In Build, each jurisdiction defines how these exceptions are to be treated.

The Touch Writer sub-tab is where the BMD can be configured to specify the number of minutes the voter access code is active.

The Accept Election tab represents the final step in the proofing process. On the Accept Election screen, users can do one of two things: accept the election, or navigate away from this screen.

Elections must be secured for security and consistency purposes. In Build, the Accept function locks election data against further edits. This step effectively defines all of the ballot styles for the election. After that, the entire formatted election definition is transferred to **Verity vDrives**. The election definition is then carried forward on **Verity vDrives** throughout the election process.

#### 4.2.1.3 Create Chevron

The Create chevron is dimmed, indicating that it is unavailable, until the election has been accepted in the **Configure** workflow. The Create chevron has three tabs: Ballots, **Verity vDrives**, and **Verity Keys**. The Ballots tab is used to configure ballots for printing.

Printing options available for each ballot include: Quantity, where users can type or use the dial to select a quantity of ballots; Type, where users can click to select either the Official, Test, or Sample ballot; Ballot serial numbers, which can be enabled; and Include ballot stub, where users can click to select the check box to include ballot stubs on printed ballots.

A **Verity vDrive** is a removable media device that carries election data throughout the election process.

The vDrives tab, which is used to create and read **Verity vDrives**, allows users to choose a Device Type, specify the quantity of **Verity vDrives** to write, write the **Verity vDrives**, print a report of **Verity vDrives** written, and then read **Verity vDrives** statistics.

The Keys tab allows the Election Official Key to be written. **Verity Keys** are made for, and utilized by, the entire system, including **Scan**, **Touch Writer**, **Central** and **Count**.

#### 4.2.1.4 Exporting Signed Elections

The final step in the Verity Build workflow is to export the SHA-1 digitally signed election definition; only a digitally signed election definition is allowed to be imported and utilized by Verity Central can Count applications.



#### 4.2.2 Verity Touch Writer

**Verity Touch Writer** is a standalone precinct level ballot marking device solution for paper ballots. It assists voters in marking their ballot and prints it out for them. Once the ballot is printed, **Verity Touch Writer** erases all memory components of that session. **Verity Touch Writer** is paired with a commercial off the shelf printer to allow the voter to mark then print their vote selections. **Verity Touch Writer** provides input via the **Verity Access** (ATI), utilizing the wheel/button panel, paddles, or sip and puff accessories. **Verity Touch Writer** is used in conjunction with **Verity Scan** to provide the voter with a reviewable paper ballot. **Verity Touch Writer** is enabled for a given election via a **Verity Build** created **Verity vDrive** and **Verity Key**.

#### 4.2.3 Verity Scan

**Verity Scan** records Cast Vote Records (CVRs) and audit log data in redundant, secure storage locations. The storage locations include the **Verity vDrive**, CFAST and the ballot box for scanned paper ballots. Paper ballots can be scanned and transferred into digital CVRs. **Verity vDrive** storage allows for the CVRs and device logs to be transferred into the **Verity Central** ballot resolution system or the **Verity Count** tabulation system. **Verity Scan** is enabled for a given election via a **Verity Build** created **Verity vDrive** and **Verity Key**.

#### 4.2.4 Verity Central

**Verity Central** is a high volume scanning and ballot review system within the **Verity Voting 1.0** system. This application acts as a centralized compilation and processing site for ballot handling, reading and processing before tabulation.

**Verity Central** allows for ballots to be scanned in bulk for users to review during scanning and through resolution for voter intent. Each ballot has the front and back pages scanned simultaneously to capture all voter marks, supporting duplex ballots. Users with proper training can review the ballots for write-ins and ballots flagged as having voter intent issues (such as overvotes, undervotes, and write-in candidates). Once all votes have been reviewed as indicated by flagging, the ballots are then written as Cast Vote Records (CVRs) to vDrives. The final CVR records on **Verity vDrives** are then sent to a **Verity Count** workstation for official tabulation.

**Verity Central** is enabled for a given election via a **Verity Build** created exported signed election and **Verity Key**. The election is imported via the application's **Election Manager**.

Within the **Verity Central** application, the workflow follows the path of chevrons Election, Scan, Review, Write Ballots, and Reports.

##### 4.2.4.1 Elections Chevron

The Elections chevron has three tab options: Elections, Tasks and Preferences.

The Elections tab allows a user to open a loaded election.

The Tasks tab creates and manages tasks and the closing of polls for scanning ballots, resolving voter intent issues, and writing vDrives.

Additionally the option to "Defer write-in resolution to **Verity Count**" is presented, which when selected defers resolutions of voted write-ins to be handled through a **Verity Count** workstation, instead of **Verity Central**. Default is to resolve in **Verity Central**.



The Preferences tab provides configuration settings for maintaining and interacting with election results within Central.

No other chevrons will become active and accessible until an election is opened from the Elections tab and at least one task is created and opened from the Tasks screen.

#### 4.2.4.2 Scan Chevron

The Scan chevron includes the tabs, Scan, Manage Batches, Search Ballots and Settings.

The Settings tab should be accessed prior to scanning. Scanner Setup opens a scanner driver setup window and sets the scanner to be used.

Test Scan is used to run a ballot through the selected scanner in order to verify proper operation.

**Allow unique identifiers:** when option is selected, each ballot may have a unique serial number (per the election definition). When this option is not selected, the system allows for the same serial number to be reused and not rejected during ballot scanning.

**Allow incomplete multi-sheet ballots option:** When option is selected and scanning multi-page ballots, any incomplete ballots, that is a ballot missing one or more pages, are allowed to be scanned and not be rejected.

The Scan tab enables users to scan large amounts of ballots, front and back at the same time, when sent through one of the supported COTS scanners. As the ballots are scanned, the ballot images are analyzed and accepted or rejected. If rejected, the system alerts the user to review the ballot for issues.

The Manage Batches tab displays all scanned and saved batches of ballots. Users can generate and view a report on a batch, delete the batch entirely, change the type, and edit the notes.

The Search Ballots tab provides a screen for searching out specific ballots within scanned batches of ballots. These ballots can be viewed or deleted from the batch. Search criteria can be a serial number, batch ID number or scan order.

#### 4.2.4.3 Review Chevron

The Review chevron has two tabs, Review Images, and Write-in Candidates.

The Review Images tab allows the user to filter and review ballots to resolve voter intent issues.

The Write-in Candidates tab allows the user to manage write-in candidate choices for contests. All possible candidate options are listed on the screen, separated by election contest.

#### 4.2.4.4 Write Ballots Chevron

The Write Ballots chevron provides an interface for writing ballots to **Verity vDrives**. All ballots must be written to **Verity vDrives** prior to closing polls for a task. If the **Verity vDrive** is damaged or is lost, the previously written batches can be rewritten to a new



**Verity vDrive** as “recovery media” which replaces the initial vDrive that was lost or damaged.

The Write ballots chevron contains 2 tabs, Write Ballots and Recovery vDrive tabs.

The Write Ballots tab allows the user to write ballots to **Verity vDrives**. The screen displays a list of batches available for writing to **Verity vDrives**. Every written **Verity vDrive** has a backup restoration copy saved. Once ballot batches are written to a **Verity vDrive**, the batches cannot be selected and written to other **Verity vDrives**.

The Recovery vDrive tab allows the user to create new **Verity vDrives** to replace damaged or lost **Verity vDrives**. If the **Verity vDrive** is damaged or lost, the previously written batches can be rewritten to a new **Verity vDrive** as “recovery media” which replaces the initial vDrive that was damaged or lost.

#### 4.2.4.5 Reports Chevron

Reports chevron is the final chevron used in **Verity Central**. The Reports chevron has 2 tabs, Reports and Exports.

The Reports tab provides detailed information on the database at the time of generation. User are allowed to generate, view, and print reports. A set of standard reports is provided to the user in order to generate and review against the loaded task and election.

The Exports tab provides export options against the database. This data is exported to CSV files.

### 4.2.5 Verity Count

**Verity Count** allows users to tabulate all voted ballots with updates of the election. Users can generate standard and custom reports for the entire election or specific precincts and polling places. **CVR's are imported from Verity vDrives and read by Verity Central**. As CVR's are read, **Verity Count** can tabulate automatically or as manually selected, updating all reporting polling places and precincts, to give an at-a-glance view into the election.

**Verity Count** is enabled for a given election via a **Verity Build** created exported signed election and **Verity Key**. The election is imported via the application's **Election Manager**.

**Verity Count** has the following chevrons: Elections, Read, Resolve, Results, and Import/Export.

#### 4.2.5.1 Elections Chevron

The Elections chevron has 3 tabs, Elections, Tasks and Preferences.

The Elections tab allows a user to open an election.

The Tasks tab manages tabulation tasks, used to tabulate election results. A task is required to begin working with election data and generating results and reports.

The Preferences tab provides configuration settings for maintaining and interacting with election results within **Verity Count**.



#### 4.2.5.2 Read Chevron

The Read chevron has 2 tabs: Dashboard and Media Reading.

The Dashboard tab provides an overview of the entire election, options for viewing further details, reading additional **Verity vDrives**, and an option for tabulating results.

The Media Reading tab provides extensive details for **Verity vDrives** read into the system, including the amount of successful and failure reads and the current status of the **Verity vDrive** reading. If ready to insert, a new **Verity vDrive** can be inserted for CVR loading.

#### 4.2.5.3 Resolve Chevron

The Resolve chevron has 1 tab: Write-in Votes.

The Write-In Votes tab allows review and resolution of ballots with write-in votes of candidates.

#### 4.2.5.4 Results Chevron

The Results chevron has the following tabs: Options, Reports, Precincts, Polling Places, Registered Voters, Vote Recording and Auditing Dashboard.

The Options tab provides preferences and configuration settings for all generated reports.

The Reports tab provides option for generating standard and custom reports.

The Precincts tab provides details reports and information for all precincts and precinct-splits.

The Polling Places tab details reports and information for polling places as they receive and report voting data.

The Registered Voters tab provides details information regarding all registered voters for a precinct/precinct split with options to configure and update totals.

The Vote Recording tab provides options for recording manual votes, changing voting totals through adding or subtracting ballots based on reviews.

The Auditing Dashboard tab provides an interface for generating filtered reports and exports of raw CVR data.

#### 4.2.5.5 Import/Export Chevron

The Import/Export chevron has 2 tabs, Import and Export.

The Import tab provides options for importing data from CSV files.

The Export tab provides options for exporting data into CSV files.

Each of the software based portions of the **Verity Voting 1.0** voting system (**Verity Build**, **Verity Central** and **Verity Count**) provide the ability to be utilized in either a single application implementation or a networked configuration, of like components, utilizing a centralized database implementation.



#### 4.2.6 Supported Languages

The **Hart Verity Voting 1.0** voting system supports the English and Spanish languages.

#### 4.2.7 Supported Functionality

##### 4.2.7.1 Voting Variations

**Verity Voting 1.0** supports the following voting variations:

- Closed primary elections
- Blanket primary elections
- Open primary elections
- General elections
- Partisan offices
- Non-partisan offices
- Write-in voting
- Primary presidential delegation nominations
- Ballot rotation
- Straight party voting
- Split precincts
- Vote for N of M

Note that **Verity Voting 1.0** does not include Ranked Choice Voting as a fully implemented voting variation. **Verity Build** will build a ballot to Ranked Choice voting, the voting devices **Verity Scan** and **Verity Touch Writer**, as well as **Verity Central** will allow RCV selections by the voter and record them. **Verity Count** does not perform ranked choice processing, instead it will treat the 1<sup>st</sup> candidate selected as the candidate chosen. While the full functionality is not in place, SLI tested the implemented functional portions in their respective areas as listed.



#### 4.2.8 Ballot Standards

Verity Build employs and supports the ballot standards as follows:

- Supports the following paper sizes:
  - 8.5" x 11"
  - 8.5" x 11" w/ 3" stub (8.5" x 14")
  - 8.5" x 14"
  - 8.5" x 14" w/ 3" stub (8.5" x 17")
  - 8.5" x 17"
  - 8.5" x 17" w/ 2" stub (8.5" x 19")
  - 11" x 17"
- Supports ballot layouts in portrait orientation.
- Supports duplex ballot layouts.
- Supports the inclusion of ballot stubs on paper ballots.
- Supports layouts for a variety of ballot types, including Test mode, Official mode, and Sample ballots.
- Compatible with the production of ballots on standard, commercially available white paper stock.

## 5 Certification Test Results Summary

### 5.1 Source Code Review Summary

SLI has reviewed the software source code for each application in the **Hart InterCivic Verity 1.0** voting system to determine the code's compliance with The EAC VVSG 2005, Volume 1 Sections 5, 9 and Volume 2 Section 5.4 and for compliance with **Hart InterCivic's** internally developed coding standards. **Verity 1.0** is implemented with the C, C++ and C# languages. Results of the source code review are detailed in "Attachment C. – List of Source Code Reviewed and Results".

The review was conducted for:

- **Software Integrity:** The module contains no self-modifying code. Software remains unchanged and retains its integrity. The module has defined array dimensions, which are positive constant integers.
- **Modularity:** The modules have a specific testable function; performing a single function; is uniquely named; follows a standard format, has a single entry point; has a single exit point (or deviates in an acceptable manner); has error handling; and acceptable module size



- **Control Constructs:** Logic flow utilizes standard constructs of the development language used; constructs are used consistently throughout the code; logic structure is not overly complex, and acceptable use of error handlers.
- **Naming Conventions:** Variable and Function names that clearly define the purpose of the variable or function. Use of standard notation for variables by type. Use of names that are unique for both global and local variables. Use of names that are unique for functions (except where it deviates in an accepted manner).
- **Coding Conventions:** Use of a standard methodology for the construction of a code module. This includes uniform calling sequences, parameter validation, a single executable statement per line, and status or error messages.
- **Comments Conventions:** Comment Header blocks for the module / function follows a standard format in its layout and content. In code comments are clearly delineated and readable.

### Evaluation of Source Code

The source code was reviewed for compliance per the guidelines defined in EAC VVSG 2002 *Volume 2, Section 5.4*. The source code was written adequately in terms of the EAC VVSG 2005. The code is modular and contains sufficient error handling. Readability is sufficient and supports maintainability.

The reviewer's assessment is based on the following observations:

- Software Integrity
  - There were no unbounded arrays. This follows the 2005 EAC VVSG requirements for software integrity.
  - No instances of self-modifying or dynamically loaded code were observed.
- Modularity
  - The code is modular and self-contained.
  - Modules perform only the specified functionality.
  - The requirement of single entry and exit points are complied with.
  - Modules are small enough to facilitate ease of reading and understanding.
- Control Constructs
  - Control Constructs used are in accordance with those allowed by the VVSG.
  - Loop control constructs have been appropriately chosen for the logical tasks to be accomplished. (There are, however, instances of loop constructs written to include early termination logic other than by the normal loop exit condition specification. The interpretation of the currently written VVSG requirement is that this early loop termination logic is not disallowed by the VVSG but it is a variation of the construct other than that described by the standard and was accepted. As the code is currently written there will be no problems caused by those loop controls however, future changes to the



- code should be performed with some caution to ensure that the system state is stable.)
- Modules have fewer than 6 levels of indented scope.
  - Array boundaries are checked.
  - Naming Conventions
    - Function and variable names are in accordance with the requirements of the VVSG.
    - Names differ by more than a single character and have been chosen as to enhance the readability of the code.
    - There are no instances of language keywords being used as a name for procedures or variables.
  - Coding Conventions
    - Coding conventions employed are in compliance with the requirements of the VVSG.
    - Code is well structured and was written appropriately to the standards.
  - Comments
    - Module headers are in compliance with the requirements of the VVSG.
    - In-line comments are sufficient in number and placement to facilitate a reasonable understanding of the code.
    - Variables have appropriate comments at the point of declaration.
  - On the Application level, no more than 50% of the modules can exceed 60 lines, no more than 5% can exceed 120 lines, and none can exceed 240 lines without justification.
    - Functions/modules were within the EAC VVSG tolerances;

## 5.2 Technical Data Package Review Summary

SLI reviewed the *Hart InterCivic Verity 1.0* TDP, as detailed in sections 3.1 and 3.4, for compliance with the EAC VVSG 2005 according to *Volume 2 Section 2*.

The review was conducted for the required content and format of:

- **System Security Specification:** (Attachment E1) Access control policy and measures, equipment and data security, software installation, telecommunications and data transmission security, elements of an effective security program.
- **System Overview:** (Attachment E2) System description and performance are adequately described.



- **System Operations Procedures:** (Attachment E3) Operation environment, system installation and test specifications, operational features, operating procedures, operations support.
- **System Maintenance Procedures:** (Attachment E4) Preventative and corrective maintenance procedures, maintenance equipment, facilities and support.
- **System Hardware Specification:** (Attachment E5) System Hardware Characteristics, Design and Construction
- **System Functionality Description:** (Attachment E6) System functional processing capabilities, encompassing capabilities required by the Standards and any additional capabilities provided by the system, including a simple description of each capability.
- **Software Design and Specification:** (Attachment E7) Purpose and scope, applicable documents, software overview, software standards and conventions, software operating environment, software functional specification, programming specifications, system database, interfaces and appendices.
- **Quality Assurance Program:** (Attachment E8) Quality assurance policy, parts and materials special testing and examination, quality conformance inspections
- **Personnel Deployment and Training Requirements:** (Attachment E9) Personnel resources and training required to operate and maintain the system
- **Configuration Management:** (Attachment E10) Configuration management policy, configuration identification, procedures for baseline, promotion, demotion and configuration control, release process, configuration audits and management resources,
- **System Test and Verification Specifications:** (Attachment E11) Development and certification test specifications that Hart applied to their testing efforts
- **System Change Notes:** Changes to a previously certified system (N/A)

## Evaluation of TDP

Once initially identified discrepancies were resolved, the Technical Data Package for the Hart InterCivic Verity 1.0 voting system was found to sufficiently comply with the standards such that a jurisdiction would be able appropriately deploy the Hart InterCivic Verity 1.0 voting system. Results of the PCA documentation review are detailed in "Attachments E1-E11".



### 5.3 Hardware Testing

SLI and their third-party certified hardware test laboratories, EMC Integrity, and Cascade TEK, performed an analysis and review of the **Verity 1.0** voting system hardware components, namely **Verity Scan**, **Verity Touch Writer** and **Verity Central** (with the Kodak i5600, Canon DR-G1100 and Cannon DR-G1130 high speed ballot scanners)

During execution of testing performed at EMC Integrity and Cascade TEK, an SLI representative was present to oversee the testing.

The test methodologies for all tests are identified in the following hardware test plans and hardware test reports:

- Attachment F1 - Hart InterCivic Verity VVSG EMC EMI Test Plan v6 0 - SLI
- Attachment F2 - Hart InterCivic Verity VVSG Hardware ENV Test Plan v4 0 – SLI
- Attachment F3 – EMC-EMI-Env-Safety Test Plan4005516 A03
- Attachment G1 - Cascade Tek\_Bench Handling\_Vibration\_Low Temp\_High Temp\_Humidity\_Temp Power VariationTest Report for Verity Scan TW
- Attachment G3 - EMCI\_Radiated\_Conducted\_Emissions\_Test Report for Verity Scan
- Attachment G4 - EMCI\_Radiated\_Conducted\_Emissions\_Test Report for Verity TW
- Attachment G5 - EMCI\_ESD\_Electro Susceptibility\_EFT\_Lightning Surge\_CON RF\_Magnetic Fields RF\_ELEC Power DIST\_Immunity Test Report for Verity Scan
- Attachment G6 - EMCI\_ESD\_Electro Susceptibility\_EFT\_Lightning Surge\_CON RF\_Magnetic Fields RF\_ELEC Power DIST\_Immunity Test Report for Verity TW

Additionally SLI conducted a review on Safety Report:

“Attachment G2 - Verity\_Safety\_Report\_PTI-1411085-000\_TRF\_iec60950\_ALL from PTI.”

Conclusion:

- All critical components comply with IEC 60950-1: 2005, or relevant component standards.

Hardware testing conducted specifically for this test campaign involved the **Verity Scan** and **Verity Touch Writer**. That testing involved verification of the following requirements:

- VVSG 2005 Vol. 1, Section 4 Hardware Requirements
- VVSG 2005 Vol. 2, Section 4 Hardware Testing

Additionally hardware testing conducted specifically for this test campaign involved the **Verity Central** (COTS) systems. That testing involved verification of the following requirements:

- VVSG 2005 Vol. 2, 4.7.1 Temperature and Power Variation , 4.7.3 Reliability



### 5.3.1 Operating Mode

Prior to and during testing, proper operation of the equipment was confirmed using Hart InterCivic software. An operational status check was successfully performed prior to and after each test verifying the equipment is within acceptable performance limits. Equipment was inspected for damages after each test. No issues were found.

**Verity Scan** and **Very Touch Writer** were in a test election mode and the following **Verity** applications were executed:

- Shoe Shine test application – provides a method of exercising the integrated scanner in Verity Scan. When application runs, a ballot is inserted into the scanner and the scanner continuously scans the ballot through its ballot feeder.
- Audio Test application – is used to test the Audio playback in Verity Touch Writer.
- USB Stick Test – is an application to write data to either of the USB ports that are inside Verity Scan and Touch Writers secure device compartment.
- Printer Test - is an application to print to the thermal printer integrated into Verity Scan and Touch Writers.

## 5.4 Known Vulnerabilities Testing

**Hart Verity Voting 1.0** is an un-fielded system, with all new hardware and software components. This system does not contain a DRE precinct voting device, nor does it support public transmissions.

Within the declared system, the only public facing components are the **Verity Scan** precinct optical scanner, which processes ballots marked by voters in a public polling place and **Verity Touch Writer**, a precinct place ballot marking device.

**Verity Central** is a central count location device, which is implemented in a secure environment.

Given this, there are no known vulnerabilities to this particular system at this time.

Review of the “Known Vulnerabilities” database, maintained by SLI, provided 14 known vulnerabilities to previous Hart systems already accounted for in SLI’s Test Methods.

## 5.5 Functional Testing Summary

SLI performed tests on each of the system configurations identified in Sections 3 and 4.2. The testing incorporated end-to-end election scenarios testing the functionality supported by Hart.

### 5.5.1 How each Device was tested

Functionality was tested as identified below. The following functional areas exist for Hart InterCivic Verity 1.0 voting system.



### 5.5.1.1 Verity Touch Writer

- **Verity Touch Writer** is a standalone precinct level ballot marking device. It assists voters in marking their ballot and prints it out for them. Once the ballot is printed, **Verity Touch Writer** erases all memory components of that session.
- **Verity Touch Writer** was tested first as an individual component in order to verify that all declared functionality is present and working as documented, utilizing **Verity Build** produced media and data. All documented features were tested, and all functional features were verified to be documented.
- **Verity Touch Writer** was then tested as an integrated piece of the voting system, in several different test suites, where it accepted user input instructions, prior to producing marked ballots that mirror user intent, utilizing all HAVA related options.
- As an individual component each function contained within the **Verity Touch Writer** device was examined to determine that it functioned as expected. Each screen was inspected and exercised in order to provide full coverage. All supported ballot sizes were exercised on the device as well. **Verity Touch Writer** testing also included all applicable HAVA aspects.
- **Verity Touch Writer** was also tested within the Accuracy test, Volume test, Stress test, and multiple system level tests that simulated election day activities.

### 5.5.1.2 Verity Scan

- **Verity Scan** is a standalone precinct level scanning device. It accepts and records votes from voter hand marked ballots, as well as from **Verity Touch Writer** marked ballots. Data from the votes cast is stored in a **Verity vDrive** and transported to central count locations for accumulation and tallying in **Verity Count**.
- **Verity Scan** was tested first as an individual component in order to verify that all declared functionality is present and working as documented, with **Verity Build** produced media and data. All documented features were tested, and all functional features were verified to be documented.
- As an individual component, each function contained within the **Verity Scan** device was examined to determine that it functioned as expected. Each screen was inspected and exercised in order to provide full coverage. All supported ballot sizes were exercised on the device as well.
- **Verity Scan** was also tested as an integrated piece of the voting system in several different test suites, where it inputs **Verity Build** produced media and data, then accepts user filled out ballots as well as **Verity Touch Writer** produced ballots within the polling place, prior to producing all defined output media.
- **Verity Scan** was also tested within the Accuracy test, Volume test, Stress test, and multiple system level tests that simulated election day activities.



### 5.5.1.3 Verity vDrive

- **Verity vDrive** is Verity memory device. It carries information from **Verity Build** to each of the components within the **Verity** system during the pre-voting phase of an election. On election day, data from the votes cast in **Verity Scan** and **Verity Central** is stored in a **Verity vDrive** and transported to central count locations for accumulation and tallying.
- **Verity vDrive** was tested first as an individual component in order to verify that all declared functionality is present and working as documented, utilizing **Verity Build** produced media and data. All documented features were tested, and all functional features were verified to be documented.
- **Verity vDrive** was also tested as an integrated piece of the voting system where it inputs **Verity Build** produced media and data, then accept and transporting cast vote record data and ballot images from the polling place to **Verity Count**.

### 5.5.1.4 Verity Key

- **Verity Key** is Verity security device. It carries security information from **Verity Build** to each of the components within the **Verity** system.
- **Verity Key** was tested first as an individual component in order to verify that all declared functionality is present and working as documented, utilizing **Verity Build** produced data. All documented features were tested, and all functional features were verified to be documented.
- **Verity Key** was also tested as an integrated piece of the voting system where it is utilized for authorizing loading election information onto **Verity Touch Writer, Scan** and **Central**, as well as accumulating vote data into **Verity Count**.

## 5.5.2 How each Application was tested

### 5.5.2.1 Verity Build

- **Verity Build** accepts imported election information and produces ballots, election information, **Verity vDrives** and **Verity Keys**.
- **Verity Build** was tested first as an individual component in order to verify that all declared functionality is present and working as documented. All documented features were tested, and all functional features were verified to be documented.
- **Verity Build** was also tested as an integrated piece of the voting system where it output **Verity Build** produced media and data (via Verity Key and vDrive), which feed into **Verity Touch Writer, Verity Scan, Verity Central** and **Verity Count**.

### 5.5.2.2 Verity Central

- **Verity Central** is a central count location system that utilizes high speed scanners to scan large volumes of voted ballots, which are recorded onto a **Verity vDrive** for transportation to **Verity Count** for accumulation and tallying.



- **Verity Central** was tested first as an individual component in order to verify that all declared functionality is present and working as documented. All documented features were tested, and all functional features were verified to be documented.
- **Verity Central** was also tested as an integrated piece of the voting system where it inputs **Verity Build** produced media and data, then accepts user filled out ballots as well as **Verity Touch Writer** produced ballots, prior to producing all defined output medias.

#### 5.5.2.3 Verity Count

- **Verity Count** is the **Verity** application used for accumulation and tallying of voted ballots, transported via **Verity vDrive**, from **Verity Scan** and **Verity Central**.
- **Verity Count** was tested first as an individual component in order to verify that all declared functionality is present and working as documented. All documented features were tested, and all functional features were verified to be documented.
- **Verity Count** was also tested as an integrated piece of the voting system where it inputs **Verity Build** produced media and data, then accepts **Verity vDrive** data from **Verity Scan** and **Verity Central**, prior to tabulating results and producing all defined output reports.

#### 5.5.2.4 Verity Election Manager

- **Verity Election Manager** is the **Verity** application used for importing, exporting, archiving and restoring elections into and from **Verity Build, Central and Count**.
- **Verity Election Manager** was tested first as an individual component in order to verify that all declared functionality is present and working as documented,
- **Verity Election Manager** was also tested as an integrated piece of the larger voting applications where it resides (**Verity Build, Central and Count**), verifying that it performed the appropriate functions for the parent application.

#### 5.5.2.5 Verity User Manager

- **Verity User Manager** is the **Verity** application used for creating and managing all user roles and accounts within each of the parent applications, **Verity Build, Central and Count**.
- **Verity User Manager** was tested first as an individual component in order to verify that all declared functionality is present and working as documented,
- **Verity User Manager** was also tested as an integrated piece of the larger voting applications where it resides (**Verity Build, Central and Count**), verifying that it performed the appropriate functions and managed the pertinent roles for the parent application.



#### 5.5.2.6 Verity Desktop

- **Verity Desktop** is the **Verity** application used for setting workstation date/time, accessing the desktop and gathering hash codes for **Verity Build, Central and Count**.
- **Verity Desktop** was tested first as an individual component in order to verify that all declared functionality is present and working as documented,
- **Verity Desktop** was tested as an integrated piece of the larger voting applications where it resides (**Verity Build, Central and Count**), verifying that it performed the appropriate functions for the parent application.

#### 5.5.3 How different System Level Configurations were tested

**Verity Build, Verity Central and Verity Count** are each capable of being run as standalone instantiations or networked with a central database. **Additionally, Verity Build and Verity Count are able to be run on the same physical device, as Verity Build/Count workstations. Verity Build/Count can also be utilized in either a stand-alone implementation or a networked configuration.** Given these possible configurations, the following configurations were exercised:

- **Verity Build** was tested in standalone mode with accompanying database
- **Verity Count** was tested in standalone mode with accompanying database
- **Verity Build/Count** was tested in standalone mode with accompanying database
- **Verity Central** was tested in standalone mode with accompanying database
- **Verity Build** server was tested in a networked mode with accompanying database and 3 client workstations (total of 4 workstations).
- **Verity Count** server was tested in a networked mode with accompanying database and 3 client workstations (total of 4 workstations).
- **Verity Build/Count** server was tested in a networked mode with accompanying database and 3 client workstations (total of 4 workstations).
- **Verity Central** server was tested in a networked mode with accompanying database and 3 client workstations (total of 4 workstations).



## 5.5.4 Test Suites Utilized

The following test suites were executed:

### 5.5.4.1 Readiness test suite

Ensuring readiness of a voting system is crucial for testing and assisting each jurisdiction in preparing for use of a voting system. Readiness Testing is different from testing very specific pieces of functionality within a system; it is broader than acceptance and functionality testing. It focuses on creating a validated baseline for testing and verifying system readiness.

The Readiness suite consisted of a full system setup. The setup included the election importation module (**Verity Election Manager**), user management module (**Verity User Manager**), workstation management module (**Verity Desktop**), election creation module (**Verity Build**), precinct location count devices (**Verity Touch Writer** and **Verity Scan**), Central Count devices (**Verity Central** with associated COTS scanner as well as an accumulation and reporting system (**Verity Count**). A basic election was created and executed, including offices with candidates, parties, referenda and multiple ballot styles.

The Readiness test is considered the gateway test and is always performed prior to any other testing.

This test was completed without issue, and each device and application was considered to pass.

### 5.5.4.2 Verity Election Manager test suite

All functionality present in **Verity Election Manager** was verified to work as documented, providing the appropriate functionality for each main application/workstation type, and that all functionality is appropriately documented.

This test covered **Verity Build**, **Verity Central** and **Verity Count**.

This test was completed without issue, and each device and application was considered to pass.

### 5.5.4.3 Verity User Manager test suite

All functionality present in **Verity User Manager** was verified to work as documented, providing the appropriate functionality for each main application/workstation type, and that all functionality is appropriately documented.

This test covered **Verity Build**, **Verity Central** and **Verity Count**.

This test was completed without issue, and each device and application was considered to pass.



#### 5.5.4.4 Verity Desktop test suite

All functionality present in **Verity Desktop** was verified to work as documented, providing the appropriate functionality for each main application/workstation type, and that all functionality is appropriately documented.

This test covered **Verity Build, Verity Central** and **Verity Count**.

This test was completed without issue, and each device and application was considered to pass.

#### 5.5.4.5 Verity Build – Single workstation test suite

All functionality present in **Verity Build** was verified to work as documented, and that all functionality is appropriately documented.

This test covered **Verity Build** in a stand-alone configuration and focused on all functionality within the application.

This test was completed without issue, and each device and application was considered to pass.

#### 5.5.4.6 Verity Build – Client/Server configuration, Networked test suite

Testing of the client/server configuration, for **Verity Build**, was the focus of this testing, such that reliability of data consistency was verified in a networked setting. **Verity Build** networked supports a Server/Client workstation and up to 3 additional Client workstations, and was tested in its maximum configuration of 4 total workstations. The focus of the testing for the networked configuration was to verify that no concurrency issues existed. Updates to common functionalities were handled in a logical manner and as intended. No database issues were introduced, nor any data corruption. Audit logs correctly recorded the transactions performed by each user. No escalation of privileges occurred when multiple levels of role access were involved.

This test was completed without issue, and each device and application was considered to pass.

#### 5.5.4.7 Verity Central– Single workstation test suite

All functionality present in **Verity Central** was verified to work as documented, and that all functionality is appropriately documented.

This test covered **Verity Central** in a stand-alone configuration and focused on all functionality within the application.

This test was completed without issue, and each device and application was considered to pass.



#### 5.5.4.8 Verity Central – Client/Server configuration, Networked test suite

Testing of the client/server configuration, for **Verity Central**, was the focus of this testing, such that reliability of data consistency was verified in a networked setting. **Verity Central** networked supports a Server/Client workstation and up to 3 additional Client workstations, and was tested in its maximum configuration of 4 total workstations. The focus of the testing for the networked configuration was to verify that no concurrency issues existed. Updates to common functionalities were handled in a logical manner and as intended. No database issues were introduced, nor any data corruption. Audit logs correctly recorded the transactions performed by each user. No escalation of privileges occurred when multiple levels of role access were involved.

This test was without issue, and each device and application was considered to pass.

#### 5.5.4.9 Verity Count– Single workstation test suite

All functionality present in **Verity Count** was verified to work as documented, and that all functionality is appropriately documented.

This test covered **Verity Count** in a stand-alone configuration and focused on all functionality within the application.

This test was completed without issue, and each device and application was considered to pass.

#### 5.5.4.10 Verity Count – Client/Server configuration, Networked test suite

Testing of the client/server configuration, for **Verity Count**, was the focus of this testing, such that reliability of data consistency was verified in a networked setting. **Verity Count** networked supports a Server/Client workstation and up to 3 additional Client workstations, and was tested in its maximum configuration of 4 total workstations. The focus of the testing for the networked configuration was to verify that no concurrency issues existed. Updates to common functionalities were handled in a logical manner and as intended. No database issues were introduced, nor any data corruption. Audit logs correctly recorded the transactions performed by each user. No escalation of privileges occurred when multiple levels of role access were involved.

This test was completed without issue, and each device and application was considered to pass.

#### 5.5.4.11 Verity Build/Count– Single workstation test suite

This test covered **Verity Build/Count** in a stand-alone configuration and focused on all functionality within the two applications and verified that the applications did not interfere with each other, nor produce unexpected behavior.

This test was completed without issue, and each device and application was considered to pass.



#### 5.5.4.12 Verity Build/Count – Client/Server configuration, Networked test suite

Testing of the client/server configuration, for **Verity Build/Count**, was the focus of this testing, such that reliability of data consistency was verified in a networked setting. **Verity Build/Count** networked supports a Server/Client workstation and up to 3 additional Client workstations, and was tested in its maximum configuration of 4 total workstations. The focus of the testing for the networked configuration was to verify that no concurrency issues existed. Updates to common functionalities were handled in a logical manner and as intended. No database issues were introduced, nor any data corruption. Audit logs correctly recorded the transactions performed by each user. No escalation of privileges occurred when multiple levels of role access were involved.

This test was completed without issue, and each device and application was considered to pass.

#### 5.5.4.13 Verity Scan test suite

All functionality, including administrative, maintenance as well as election day poll worker functionality, present in **Verity Scan** was verified to work as documented, and that all functionality is appropriately documented.

This test was completed without issue, and each device and application was considered to pass.

#### 5.5.4.14 Verity Touch Writer test suite

All functionality, including administrative, maintenance as well as election day poll worker functionality, present in **Verity Touch Writer** was verified to work as documented, and that all functionality is appropriately documented.

This test was completed without issue, and each device and application was considered to pass.

#### 5.5.4.15 GenVariation1 test suite

The focus of this suite was validating N of M voting, Partisan offices, Non-Partisan Offices, , Straight Party Voting, Ballot Rotations, Ballot Formatting, precincts and split precincts, as well as Tally and Reporting functionality.

This test covered **Verity User Manager, Verity Election Manager, Verity Desktop, Verity Build, Verity Touch Writer, Verity Scan, Verity Central** as well as **Verity Count**. Vote counts were accumulated from both **Verity Central** and **Verity Scan** into **Verity Count**.

This suite utilized 8.5x11 and 8.5x14 ballots, both stubbed and unstubbed. Languages implemented in the suite included English, Spanish and (English/Spanish).

This test was completed without issue, and each device and application was considered to pass.



#### 5.5.4.16 GenVariation2 test suite

This suite built off the GenVariation1 Test. Additional definition was added, with a focus on validating N of M voting, Partisan offices, Non-Partisan Offices, Write-Ins, ADA/HAVA, as well as Tally and Reporting functionality.

This test covered **Verity User Manager, Verity Election Manager, Verity Desktop, Verity Build** networked, **Verity Touch Writer, Verity Scan, Verity Central** networked as well as **Verity Count** networked. Vote counts were accumulated from both **Verity Central** and **Verity Scan** into **Verity Count**.

This suite utilized 8.5x14, 8.5x17, 11x17 ballots, both stubbed and unstubbed. Languages implemented in the suite included English, Spanish and (English/Spanish). ADA devices utilized included Headphones, paddles, sip and puff.

This test was completed without issue, and each device and application was considered to pass.

#### 5.5.4.17 PriOpen test suite

The focus of this suite was an election designed to conform to an Open Primary election with focus on validating primary presidential delegation nominations, N of M voting, Partisan offices, Non-Partisan Offices, Straight Party Voting, Ballot Rotations, Ballot Formatting, ADA/HAVA, precincts and split precincts, as well as Tally and Reporting functionality. Please see "Table 3 – Terms and Abbreviations" for additional detail of an Open Primary.

This test covered **Verity User Manager, Verity Election Manager, Verity Desktop, Verity Build, Verity Touch Writer, Verity Scan, Verity Central** as well as **Verity Count**. Vote counts were accumulated from both **Verity Central** and **Verity Scan**.

This suite utilized 8.5x11, 8.5x14, 8.5x17, 11x17 ballots, both stubbed and unstubbed. Languages implemented in the suite included English, Spanish and (English/Spanish).

This test was completed without issue, and each device and application was considered to pass.

#### 5.5.4.18 PriClosed test suite

The focus of this suite was an election designed to conform to a Closed Primary election with N of M voting, Partisan offices, Non-Partisan Offices, Ranked Order Voting, Ballot Formatting, ADA/HAVA, precincts and split precincts, as well as Tally and Reporting functionality. Please see "Table 3 – Terms and Abbreviations" for additional detail of a Closed Primary.

This test covered **Verity User Manager, Verity Election Manager, Verity Desktop, Verity Build, Verity Touch Writer, Verity Scan, Verity Central** as well as **Verity Count**. Vote counts were accumulated from both **Verity Central** and **Verity Scan**.

This suite utilized 8.5x14, 8.5x17, 11x17 ballots, both stubbed and unstubbed. Languages implemented in the suite included English, Spanish and (English/Spanish). ADA devices utilized included Headphones, paddles, sip and puff.

This test was completed without issue, and each device and application was considered to pass.



#### 5.5.4.19 PriBlanket test suite

The focus of this suite was an election designed to conform to a Blanket Primary election with N of M voting, Partisan offices, Non-Partisan Offices Ballot, Ballot Formatting, ADA/HAVA, precincts and split precincts, as well as Tally and Reporting functionality. Please see "Table 3 – Terms and Abbreviations" for additional detail of a Blanket Primary.

This test covers **Verity User Manager, Verity Election Manager, Verity Desktop, Verity Build, Verity Touch Writer, Verity Scan, Verity Central** as well as **Verity Count**. Vote counts will be accumulated from both **Verity Central** and **Verity Scan**.

This suite utilized 8.5x11, 8.5x17 ballots, both stubbed and unstubbed. Languages implemented in the suite included English, Spanish and (English/Spanish).

This test was completed without issue, and each device and application was considered to pass.

#### 5.5.4.20 Error Messaging and Recovery test suite

Testing in this suite focused on Error Messaging and Recovery in key areas of the system identified from researching previous testing and voting system documentation to help identify potential failure points. Voting systems can be subject to various conditions and when the system exceeds limitations errors are typically found. Testing of Error messaging focused on the appropriate error messages being generated in response to specific errors, and content of the message. Methods employed to generate errors included attempting to access functions out of order or without authorization, erroneous responses to error messages, use of invalid blank drives as well as invalid inputs. Testing of the voting system Error Recovery capability was also incorporated into Stress testing in order to leverage the necessary range of performance impacts needed to generate system errors and force recoveries that were adequate, verifying system and audit log's validity of content, any downstream process were not negatively affected by errors

This test covered **Verity User Manager, Verity Election Manager, Verity Desktop, Verity Build, Verity Touch Writer, Verity Scan, Verity Central** as well as **Verity Count**.

This test was completed without issue, and each device and application was considered to pass.

#### 5.5.4.21 Audit test suite

Audit records are used to track what system functions have been executed, what data has been modified, as well as by who and when. Election audit trails provide the supporting documentation for verifying the accuracy of reported election results. They present a concrete, indestructible archival record of all system activity related to the vote tally, and are essential for public confidence in the accuracy of the tally, for recounts, and for evidence in the event of criminal or civil litigation. Additionally, audit record data content can be a key factor in identifying system anomalies and provide assistance in troubleshooting system errors.

Analysis of the **Verity 1.0** voting system was performed to determine the content needed to accurately depict the machinations of the system for the given situation was properly



captured. This test suite looks at the overall coverage of auditing of events within the **Verity 1.0** system as well as the content of the audit record in order to ensure sufficient information is captured. The **Verity 1.0** applications utilize both an audit log and a system log to track workstation occurrences at two different levels. Tests were incorporated into Election Validation suites as well as specific Audit validation suites, such that all related requirements were explicitly validated.

This test covered **Verity User Manager, Verity Election Manager, Verity Desktop, Verity Build, Verity Touch Writer, Verity Scan, Verity Central** as well as **Verity Count**.

This test was completed without issue, and each device and application was considered to pass.

#### 5.5.4.22 Accuracy test suite

Testing the ability of the system to capture, record, store, consolidate and report the specific selections and absence of selections, made by the voter for each ballot position without error.

Required accuracy is defined in terms of an error rate that for testing purposes represents the maximum number of errors allowed while processing a specified volume of data. For the Accuracy test, the defined volume is no errors in 1.55 million ballot marking positions, or no more than 1 error in 3.1 million ballot marking positions.

Accuracy testing was conducted at both the device level and the system level.

Each device was subjected to scrutiny that verified that the requirements for accuracy are met. Additionally, the system was reviewed and exercised to validate that the accumulation, tallying and reporting mechanisms at the system level are able to accurately perform their functions.

This test covered, **Verity Scan, Verity Touch Writer, Verity Central** as well as **Verity Count**. Vote counts were accumulated from both **Verity Central** and **Verity Scan**. Note that **Verity Central** was tested with all supported scanners.

**Verity Scan** supports 3 base ballot sizes

- 8.5" x 11"
- 8.5" x 14"
- 8.5" x 17"

Each ballot size was exercised in the **Verity Scan**. Each size contained 2600 ballots with 600 ballot marking positions. This totaled 7800 ballots and 4.8 million marking positions read by **Verity Scan**.

**Verity Touch Writer** supports 3 base ballot sizes

- 8.5" x 11"
- 8.5" x 14"
- 8.5" x 17"



Each ballot size was exercised in the **Verity Touch Writer**. Each size contained 50 ballots with 600 ballot marking positions. This totaled 150 ballots and 90,000 marking positions, which were then read by **Verity Scan**.

**Verity Central** supports 3 scanner types and 4 base ballot sizes

- 8.5" x 11"
- 8.5" x 14"
- 8.5" x 17"
- 11" x 17"

Each ballot size was exercised in **Verity Central** through each scanner type. Each size contained 2600 ballots with 600 ballot marking positions. This totaled 7800 ballots and 4.8 million marking positions through each scanner type, for a total of 23,400 ballots and 14.4 million ballot marking positions.

Voting positions were distributed on each ballot size so as to exercise the entire ballot. This was done by eliminating contest headers which maximized the area for distribution of the ballot marking positions.

All ballot sizes and ballots exercised as described above, were inputted into **Verity Count**. This accumulated to 31,350 ballots and 20.1 million ballot marking positions.

All Accuracy tests were completed without issue, and each device and application was considered to pass.

#### 5.5.4.23 Mark Sensitivity test suite

The purpose of Ballot Mark Sensitivity testing was to determine that the system under test is able to accurately determine when a mark has been made within a ballot marking position. For this test, various marks were made within the ballot marking positions, using Verity supported colors of ink.

Marks include fully filled boxes, left and right oriented slashes, "X" markings, check marks, horizontal single line marks, and circles of various sizes. Marks also included vertical lines within the marking position that fill approximately five percent of the designated space. Small dots down to approximately two percent of the ballot marking position are also included.

The Verity specifications specify that only blue or black ink is to be utilized in the marking of ballot positions. These ink colors had no issues. Additional inks were also tested, as well as #2 pencil lead. The colors purple green and the pencil lead were read without issue on both **Verity Scan** and **Verity Central**. The ink colors red, orange and pink were tested and were able to be read on **Verity Central**, but were not detected on **Verity Scan**. The results on **Verity Scan** were not unexpected as the scanner employs a LED light source. As **Verity Scan** is a polling place device, the governance of marking utensils should be able to prevent issues with these ink colors. This test covered **Verity Scan**, **Verity Central** as well as **Verity Count**. Vote counts were accumulated from both **Verity Central** and **Verity Scan** into **Verity Count**.

This test was completed as described above and each device and application was considered to pass.



#### 5.5.4.24 Volume and Stress test suite

Volume Testing consists of a system's response when subjected to large quantities of data, "more than the expected", as called out in the standards. Volume testing is typically considered a type of non-functional testing. However, as a voting system's primary function is to accumulate, tally, and pass a volume of data (votes) the VSTL approaches volume testing as a functional test. Experience has shown that large amounts of data can slow a system, or even cause failures and loss of data due to architectural limitations. The testing focused on not only passing large amounts of data but how the system operates and handles the data in key areas of functionality within the voting system. Vote gathering components (**Verity Scan** and **Verity Central**) were subjected to volumes of data that met the upper limits of expected performance.

**Verity Scan** is a standalone device that processes ballots one at a time. Anticipated expected usage in an election environment is 1,000 ballots per device. The test was conducted in a 12 hour time period and processed 4,300 ballots.

**Verity Central** is designed to run either in standalone or in networked configurations of up to 4 workstations (1 Server/Client and 3 Clients). The Server/Client workstation maintains the database for all 4 workstations. This configuration was exercised in order to create a significant volume on **Verity Central**. The Kodak i5600 ballot scanner has an expected usage of 20,000 ballots in an 8 hour period. The Cannon DR-G1100 ballot scanner has an expected usage of 14,000 ballots in an 8 hour period. The Cannon DR-G1130 ballot scanner has an expected usage of 14,500 ballots in an 8 hour period. 1 Kodak i5600, 2 Cannon DR-G1100's and 1 CannonDR-G1130 were utilized in this volume/stress configuration. The expected usage was 62,500 ballots in an 8 hour period. The test was conducted in a 12 hour period and processed 94,000 ballots.

This test covered **Verity Touch Writer**, **Verity Scan**, **Verity Central** as well as **Verity Count**. Vote counts were accumulated from both **Verity Central** and **Verity Scan**.

Stress testing consists of a "system's response to transient overload conditions." Experience has shown that when passing a dataset through a system that eclipses the system architectural limitations, failures can occur and result in the loss of critical data. The testing focused on the system's ability to operate after the limitations have been exceeded and if failures occur, how the data is maintained or recovered in key areas of functionality within the voting system. Vote gathering components (**Verity Scan** and **Verity Central**) were subjected to volumes of data that surpassed the upper limits of expected performance.

As this test is the "next step" from the Volume test, it was performed at the conclusion of the Volume test, utilizing the implementation setup as described for the Volume test.

**Verity Scan.** The test was conducted in an additional 8 hour time period and processed an additional 3700 ballots on the same device. The number of ballots for the device totaled 8,000.

**Verity Central.** The test was conducted in an additional 6 hour time period and processed an additional 51,000 ballots on the same configuration. The number of ballots for the component totaled 145,000.



This test covered **Verity Build, Verity Touch Writer, Verity Scan, Verity Central** as well as **Verity Count**. Vote counts were accumulated from both **Verity Central** and **Verity Scan**.

This test was completed without issue, and each device and application was considered to pass.

#### 5.5.4.25 Language testing

Testing was conducted to ensure the voting system is capable of implementing and presenting the ballot, ballot selections, review screens and instructions in the required languages, English and Spanish. This testing is incorporated in the General and Primary test suites detailed within this section.

This testing covers **Verity Election Manager, Verity Build, Verity Touch Writer, Verity Scan, Verity Central** as well as **Verity Count**. Vote counts were accumulated from both **Verity Central** and **Verity Scan**.

This testing was completed without issue, and each device and application was considered to pass.

#### 5.5.4.26 Data Retention and Hardware Integrity testing

Integrity requirements ensure the physical stability and function of the vote recording and counting processes, such that the system is not prone to a single point of failure that would prevent voting at a polling place. Testing verified prevention of failure of data input or storage, in terms of data retention, as well as confirming that appropriate audit records are maintained without modification.

The requirements related to this testing were incorporated into other test suites for validation. A review of all testing performed and notation of any pertinent issues encountered also factored into the requirements validation consideration.

This testing covers **Verity Build, Verity Touch Writer, Verity Scan, Verity Central** as well as **Verity Count**.

This testing was completed without issue, and each device and application was considered to pass.

#### 5.5.4.27 Import Election Data test suite

This testing was concerned with the import capabilities of the voting system as the primary means of populating the system with election data. This test verified the appropriate documentation exists for a 3<sup>rd</sup> party to create the necessary XML data file to create an election within the Verity Voting 1.0 voting system. Testing also verified that Verity Build successfully checked for appropriate data and gracefully handles negative data entries beyond the scope of the voting system's expected inputs

This test configuration covers **Verity Election Manager** and **Verity Build**.

This test was completed without issue, and each device and application was considered to pass.



#### 5.5.4.28 Security Access Control test suite

Access control testing verifies procedures and system capabilities that detect or limit access to system components in order to guard against loss of system integrity, availability, confidentiality, and accountability. This testing verified that system resources such as data files, application programs and computer-related facilities and equipment are protected against unauthorized operation, modification, disclosure, loss or impairment. Unauthorized operations include modification of compiled or interpreted code, run-time alteration of flow control logic or of data, and abstraction of raw or processed voting data in any form other than a standard output report by an authorized operator.

This test covered **Verity User Manager, Verity Desktop, Verity Build, Verity Touch Writer, Verity Scan, Verity Central** as well as **Verity Count**.

This test was completed without issue, and each device and application was considered to pass.

#### 5.5.4.29 Security Software test suite

Software security testing was conducted to verify the installation procedures and ongoing foreign software detection mitigation abilities of the voting system in order to protect against the modification of the software and/or the insertion of malicious software during the installation and during ongoing operations.

This test covered **Verity Desktop, Verity Build, Verity Touch Writer, Verity Scan, Verity Central** as well as **Verity Count**.

This test was completed without issue, and each device and application was considered to pass.

#### 5.5.4.30 Physical Security Measures test suite

Physical security testing verified monitoring and control of the environment of the work place and computing facilities. It also verified monitor and control access to and from such facilities. Separating the network and work place into functional areas are also physical controls. Some portions of physical security are functional while other portions are procedural. Functional portions were tested as appropriate while procedural portions were verified to be documented as prescribed by the VVSG. For polling place devices, **Verity Scan**, and accompanying ballot box, was inspected for the **Hart** prescribed locks and seals, as well as that the physical device and accompanying ballot box were resistant to unauthorized access as well as providing for detection to tampering, and for **Verity Touch Writer**, the device was inspected for **Hart** prescribed locks, resistance to unauthorized access, as well as providing for detection to tampering. Note that no telecommunications are implemented in the polling place.

This test covered **Verity Build, Verity Touch Writer, Verity Scan, Verity Central** as well as **Verity Count**.

This test was completed without issue, and each device and application was considered to pass.



#### 5.5.4.31 Audio test suite

Audio testing was performed in order to verify that the polling place ballot marking device, **Verity Touch Writer**, fell within the acceptable parameters of hearing as defined in the 2005 VVSG.

This test covered **Verity Touch Writer**.

This test was completed without issue, and each device and application was considered to pass.

#### 5.5.4.32 Accessibility and Usability test suite

Testing accessibility requirements for a voting system generally consist of both objective and observable requirements. In combination the two types of requirements verify that the voting system components are accessible to all eligible voters, including those that may have a type of challenge that creates a need for **ATI peripherals** of some type. The voting systems should be self contained such that the individual voter is able to cast their vote without assistance from another **person**. Accessibility calls for the voting system to take into account vision, varying degrees of vision, dexterity, mobility, aural issues, and speech and language proficiency.

Usability is defined as a measure of the effectiveness, efficiency, and satisfaction achieved by a specified set of users with a given product in the performance of specified tasks. In the context of voting, the primary user is the voter, the product is the voting system, and the task is the correct recording of the voter ballot selections. Testing is conducted to ensure voters are able to negotiate the process effectively, efficiently and comfortably according to the requirements dictated, including HAVA requirements.

This tests focus was as described above, as well as a review of the report of mandated usability study performed by Hart, as per 2005 VVSG requirements.

This test covered **Verity Touch Writer** and **Verity Scan**

This test was completed without issue, and each device and application was considered to pass.

#### 5.5.4.33 Maintainability test suite

Maintainability encompasses a range of maintenance actions that examine all scheduled and unscheduled events in place for preventing failures on all hardware devices. Testing verifies the ease with which maintenance actions can be performed based on the design characteristics of the equipment and software. Non-technical election workers are to be able to be made aware of the problem through the equipment and software's ability to correctly self-diagnose problems.

This test included review of Hart documentation for maintenance actions as well as performance of those maintenance actions for ease of use and understandability.

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Template Rev 05-09, Doc Rev 02



This test covered **Verity Touch Writer** and **Verity Scan**

This test was completed without issue, and each device and application was considered to pass.

## 5.6 Evaluation of Testing

The above tests were successfully conducted using the executables delivered in the final Trusted Build, in association with the appropriate hardware versions as declared in this Test Report for the **Hart InterCivic Verity 1.0** voting system.

Issues were found during functional testing as described in section “5.8 – Discrepancies Found During Testing”. This resulted in a total of 4 Trusted Builds. The number of issues was reduced in number in each Trusted Build, with the final issues being resolved in Trusted Build #4.

After the initial Trusted Build, which consisted of a full run through of all test suites, as listed in sections 5.5.2, 5.5.3 and 5.5.4 above, each subsequent round of testing consisted of discrepancy fix verification and additional regression testing. Analysis of each individual discrepancy determined the level of retesting required to verify the issue was resolved and did not result in any new issues occurring downstream within the system workflow. Often, the issue being addressed was isolated in its effect, but occasionally resulted in the test suite of interest, where the issue was first found, to be re-run in its entirety. Additionally for each subsequent Trusted Build, a Readiness test was performed, and a minimum of one general election and one primary election performed. For the final Trusted Build, the Security Access Control and Security Software test suites were re-run as well.

## 5.7 Environmental Hardware Test Summary

Based upon an examination of the equipment listed in “Table 8 – COTS Equipment”, and **Hart’s** Hardware Specification, SLI concluded that the hardware listed is COTS (Commercial off the Shelf). As such, it is not subject to Environmental Hardware Testing.

SLI and their third-party certified hardware test laboratories, EMC Integrity, and Cascade TEK, executed Environmental Hardware testing on the non-COTS hardware listed in “Table 7 – Hart Verity 1.0 Voting Equipment”, and “Table 4 – Hart Verity 1.0 Software and Firmware”.

The testing consisted of:

- Electromagnetic Emissions / Immunity Tests:
  - 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).
- Non-Operating Environmental Tests:
  - Bench Handling - MIL-STD-810D, Method 516.3, Procedure VI
  - Vibration - MIL-STD-810D, Method 514.3, Category 1- Basic Transportation, Common Carrier.
  - Low Temperature - MIL-STD-810D, Methods 502.2, Procedure I-Storage.
  - High Temperature - MIL-STD-810D, Methods 501.2, Procedure I-Storage.
  - Humidity (85%) Soak - MIL-STD-810D, Method 507.2, Procedure I-Natural Hot-Humid.
- Operating Environmental Tests:
  - Temperature/Power Variation - similar to the low temperature and high temperature tests of MIL-STD-810-D, Method 502.2 and Method 501.2.
  - Reliability – Vol. 1, Section 4 for the acceptable Mean Time Between Failure (MTBF).

### 5.7.1 Evaluation of Environmental Hardware Testing

Any critical issues found were reported, resolved and re-tested. Attachments G contain the hardware environmental reports from SLI's EAC approved Hardware Environmental Test Subcontractor(s), EMC Integrity, and Cascade TEK. These reports detail specific information on the environmental hardware testing. As of the writing of this report, all devices subjected to hardware testing, as listed above, have successfully passed all tests.

### 5.8 Quality Assurance and Configuration Management Audits

The review processes employed verified that the manufacturer not only has written processes and procedures in both the Quality Assurance and Configuration Management arenas, but that those processes and procedures were actually implemented within the software development life cycle that is used to produce the **Hart Verity Voting 1.0** version that is submitted for certification.

The QA portion of the review focused on the testing performed by **Hart InterCivic**. The scope of the testing performed was reviewed in order to verify that **Hart InterCivic** verified that all VVSG requirements were met in **Verity 1.0**. SLI reviewed the test case design documents and data as provided by **Hart InterCivic**. In evaluating each test, with respect to flow control parameters and data on both entry and exit, SLI assessed discrepancies between the Software Specifications and the test case design. Interviews of key Quality Assurance staff were conducted to verify that the QA processes and procedures are known, understood and implemented by the appropriate personnel within the organization.

Coverage of tests employed by **Hart** were deemed satisfactory for appropriate robustness of **Verity 1.0** in meeting the requirements of the 2005 VVSG.



The CM portion of the review focused on the organizations understanding and implementation of the declared configuration management processes, procedures and policies. Deliverables were reviewed against all pertinent CM processes employed by **Hart InterCivic**. Interviews of pertinent staff, with regard to configuration management were conducted to verify that processes, procedures and policies are known, understood and implemented within the organization.

Implementation of the **Hart** configuration processes were adequately documented and followed throughout the course of the **Verity 1.0** project.

## 5.9 Deficiencies Found During Testing

Discrepancies found fall into 4 major categories, Hardware, Documentation, Source Code, and Functional. Hardware discrepancies are issues that occur specifically in the hardware arena, and are usually found during the hardware testing phase. Documentation discrepancies are issues that occur during the PCA documentation review phase and are issues that are resolved by updates to the documentation. Source Code discrepancies are issues that occur during source code review and are issues that must be fixed in the source code prior to the Trusted Build. Functional discrepancies are issues that occur during functional testing and can be related to any software or firmware within the system. Functional discrepancies often lead to source code modifications, additional source code review and an additional Trusted Build.

### 5.9.1 Hardware Discrepancies

Ten hardware discrepancies were written during this campaign, with 7 of the issues occurring during the hardware testing. The primary issues were around electrical testing, such electrostatic discharge, electrical fast transient, lightning surge and radiated emissions. **Hart** developed appropriate remedies for each issue and eventually passed all hardware tests.

Two issues were concerned with firmware issues and were resolved during functional testing.

One issue was concerned with invalid calibration sheets and was resolved during functional testing.

### 5.9.2 Documentation Discrepancies

Seventy Eight documentation issues were written during the PCA documentation review phase. The issues centered around 2 main issues, incorrect information or missing information. In all instances the issues were addressed and resolved prior to the writing of this report.



### 5.9.3 Source Code Discrepancies

Source code review generated 5609 discrepancies during the review process.

Basic formatting and naming convention issues accounted for 4935 of the issues.

Basic **programming** construct issues were addressed in 664 of the discrepancies.

Issues of a logic nature accounted for 10 of the discrepancies.

All issues were addressed **prior to performing** the Trusted Build

### 5.9.4 Functional Discrepancies

Functional testing generated 30 discrepancies.

XML import issues, concerned with importing election data, accounted for 7 discrepancies.

User interface issues accounted for 4 discrepancies.

System functionality issues accounted for 11 discrepancies.

Concurrency issues in networked configurations accounted for 5 discrepancies.

Memory issues accounted for 2 discrepancies.

Data retention issues accounted for 1 discrepancy.

All issues were resolved prior to the final Trusted Build, and writing of this report.

### 5.9.5 Functional Anomalies

1 anomaly was encountered during functional testing. With a **Verity Key** plugged in to a **Verity Touch Writer** that had an incorrect paper size for the current election, when trying to print, an error occurred whose resolution was a restart of the environment. The **Verity Key** would only be present in a pre-election warehouse environment, and usually only during configuration of the election onto the **Touch Writer**. This issue occurred once and was not able to be reproduced despite multiple retries on various environments, including the original environment.

Please see "Attachment H – Discrepancies" for additional details on encountered discrepancies.

### 5.10 Deficiencies

**SLI has determined that there are no remaining unresolved deficiencies against the requirements tested.**



## 6 Recommendations

SLI has successfully completed the testing of the Hart InterCivic Verity 1.0 voting system. It has been determined that the Verity 1.0 voting system meets the required acceptance criteria of the Election Assistance Commission Voluntary Voting System Guidelines 2005.

This recommendation reflects the opinion of SLI Global Solutions based on testing scope and results. It is SLI's recommendation based on this testing effort that the EAC grant certification of Hart InterCivic Verity 1.0 voting system.

**SLI:**

A handwritten signature in black ink, appearing to read 'Traci Mapps'.

Traci Mapps

VSTL Director/Sr. Director of Operations

March 27<sup>th</sup> 2015



## **7 EAC Certification & Voting System Configuration**

This report has been submitted to the Election Assistance Commission on March 19<sup>th</sup> 2015. Upon acceptance of this report by the EAC technical committee, a certification number will be issued.

This certification is for the Hart InterCivic Verity 1.0 voting system, configured as detailed in section 3 of this document.

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**End of Certification Test Report**

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United States Election Assistance Commission



Certificate of Conformance

ES&SEVS5.2.0.0

The voting system identified on this certificate has been evaluated at an accredited voting system testing laboratory for conformance to the 2005 *Voluntary Voting System Guidelines (2005 VVSG)*. 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: 5.2.0.0

Name of VSTL: NTSHuntsville

EAC Certification Number: ESSEVS5200

Date Issued: 7/2/2014

A handwritten signature in blue ink, appearing to read "D. S. Miller".

Chief Operating Officer & Acting Executive Director  
U.S. Election Assistance Commission

Scope of Certification Attached

Manufacturer: Election Systems & Software  
System Name: EVS5.2.0.0  
Certificate: ESSEVS200

Laboratory: NTS Huntsville  
Standard: VVSG 1.0(2005)  
Date: June 30, 2014



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## Scope of Certification

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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:

ES&SEVS5.2.0.0 is comprised of the ExpressVote, AutoMARK Voter Assist Terminal (AutoMARK A100, A200 & A300), DS200 Precinct Digital Scanner (DS200), DS850 high-speed Central Count Digital Scanner, ElectionWare, Election Reporting Manager (ERM), ES&SEvent Log Service, Removable Media Service (RMS), ExpressVote Previewer and VAT Previewer.

- The ExpressVote is a universal vote capture device designed for all voters, with independent voter-verifiable paper record that is digitally scanned for tabulation. This system combines paper-based voting with touch screen technology. The ExpressVote includes a mandatory vote summary screen that requires voters to confirm or revise selections prior to printing the summary of ballot selections using the internal thermal

printer. Once printed, ES&S ballot scanners process the vote summary card. The ExpressVote can serve all voters, including those with special needs, allowing voters to cast ballots autonomously. ES&S has fully integrated the ExpressVote with the existing suite of ES&S voting system products.

- AutoMARK Voter Assist Terminal enables voters who are visually or physically impaired and voters more comfortable reading or hearing instructions and choices in an alternative language to privately mark optical scan ballots. The AutoMARK supports navigation through touchscreen, physical keypad or ADA support peripheral such as a sip and puff device or two position switch.
- DS200 digital scanner is a paper ballot tabulator designed for use as a polling place scanner. After the voter makes their selections on their paper ballot, their ballot is inserted into the unit for immediate tabulation. Both sides of the ballot are scanned at the same time using a high-resolution image-scanning device that produces ballot images.
- The DS850 is a high-speed, digital scan central ballot counter that uses cameras and imaging algorithms to capture voter selections on the front and back of a ballot, evaluate results and then sort ballots into discrete bins without interrupting scanning. A dedicated audit printer generates a continuous event log. Machine level reports are produced from a second, laser printer. The scanner saves voter selections and ballot images to an internal hard disk and exports results to a USB Memory stick for processing with Election Reporting Manager.
- ElectionWare integrates the election administration functionality into a unified application. Its intended use is to define an election and create the resultant media files used by the ExpressVote, DS200 tabulator, AutoMARK™ Voter Assist Terminal (VAT), the DS850 Central Ballot Scanner, and Election Reporting Manager (ERM). An integrated ballot viewer allows election officials to view the scanned ballot and captured ballot data side-by-side and produce ballot reports.
- ES&S Event Log Service is a Windows Service that runs in the background of any active ES&S Election Management software application to monitor the proper functioning of the Windows Event Viewer. The ES&S Event Log Service closes any active ES&S software application if the system detects the improper deactivation of the Windows Event Viewer.
- The ExpressVote Previewer is an application within the EMS program that allows the user to preview audio text and screen layout prior to burning Election Day media for the ExpressVote.
- The VAT Previewer is an application within the EMS program that allows the user to preview audio text and screen layout prior to burning Election Day media for the AutoMARK™.
- Removable Media Service (RMS) is an application that runs in the background of the EMS client workstation and supports the installation and removal of election and results media.
- Election Reporting Manager (ERM) generates paper and electronic reports for election workers, candidates, and the media. Jurisdictions can use a separate ERM installation to display updated election totals on a monitor as ballot data is tabulated, and send the results' reports directly to the media outlets.

ERM supports accumulation and combination of ballot results data from all ES&S tabulators. Precinct and accumulated total reports provide a means to accommodate candidate and media requests for totals and are available upon demand. High-speed printers are configured as part of the system accumulation/reporting stations PC and related software.

**Mark definition:**

ES&S declared level mark recognition for the DS200 and DS850 is a mark across the oval that is 0.2" long x 0.03" wide at any direction.

**Tested Marking Devices:**

Bic Grip Roller Pen

**Language capability:**

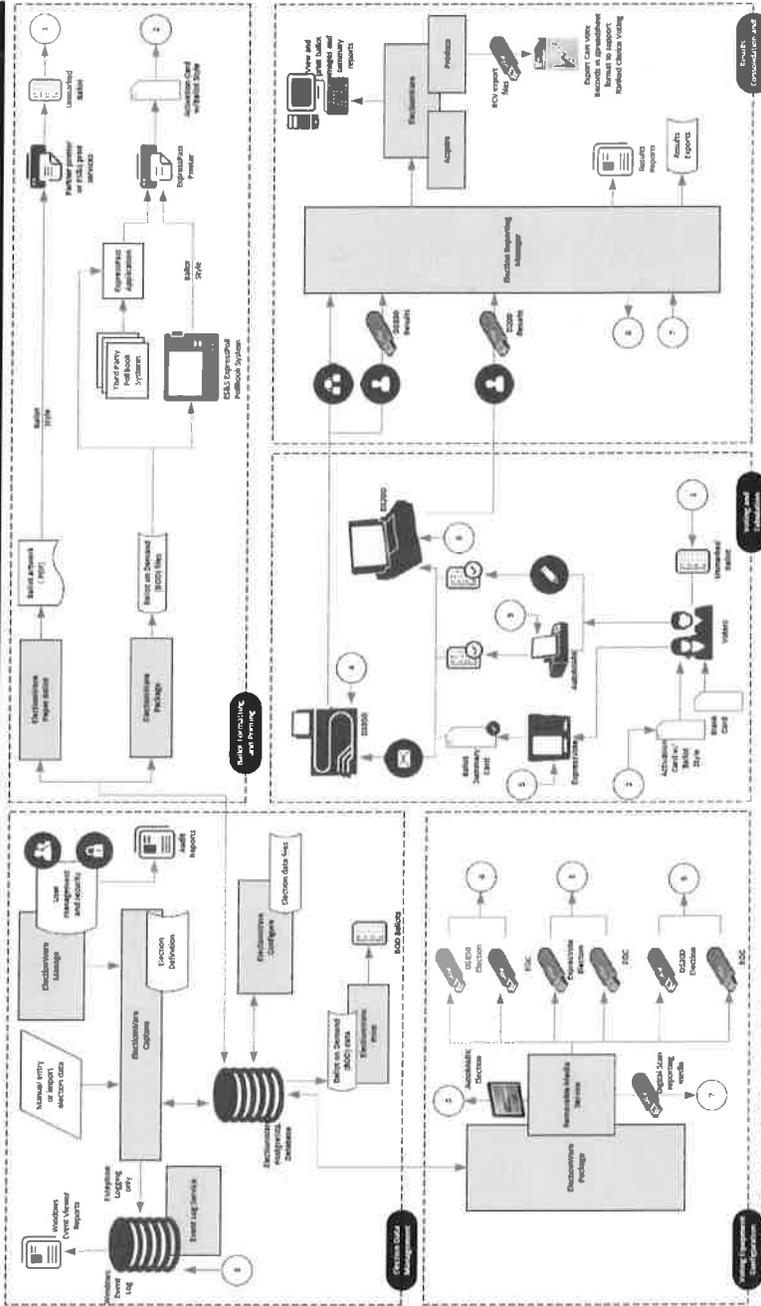
EVS5.2.0.0 supports English, Spanish, Chinese, Korean and Japanese ballot languages.

**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	Operating System or COTS	Comments
ExpressVote	1.4.0.0	1.0		Vote Capture Device
DS200	2.12.0.0	1.2.1, 1.2.3, 1.3		Precinct Digital Scanner
AutoMARKA100	1.8.6.0	1.0		ADA Ballot Marking Device
AutoMARKA200	1.8.6.0	1.1, 1.3		ADA Ballot Marking Device
AutoMARKA300	1.8.6.0	1.3		ADA Ballot Marking Device
DS850	2.10.0.0	1.0		Central Count Scanner, high-speed
Ballot Box Hardware		1.2, 1.3		Plastic ballot box
Ballot Box Hardware		1.0, 1.1, 1.2		Metal ballot box with/without diverter
Election Ware	4.6.0.0			
Election Reporting Manager (ERM)	8.11.0.0			
ES&S Event Log Service	1.5.5.0			
VAT Previewer	1.8.6.0			
Removable Media Service	1.4.5.0			
EMS Reporting Workstation		Dell Optiplex 980		

System Component	Software or Firmware Version	Hardware Version	Operating System or COTS	Comments
EMSServer		Dell PowerEdge T710		
EMSreporting Laptop		Dell Latitude E6410		
Ballot on Demand Printer		C9650		
DS850 Report Printer		Oki B430dn & Oki B431dn		Laser report printer
DS850 Audit Printer		Oki Microline 420		Dot Matrix Printer
Headphones		Avid FV-060		
USB Flash Drive		Delkin 512MB		
USB Flash Drive		Delkin 4GB		
USB Flash Drive		Delkin 8 GB		
USB Flash Drive		Delkin 1 GB		
USB Flash Drive		Delkin 2 GB		
Compact Flash		Delkin Devices 1.0 GB capacity		
Barcode Scanner				



## 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	9900	ERM
Max. count for any precinct element	500,000 (65,500 from any tabulator media)	ERM report (ERM resultsimport)
Max. candidates allowed per election	Depends on election content (limited by 21,000 maximum counters) <sup>1</sup>	ERM
Max. contests allowed in an election	Depends on election content (limited by 21,000 maximum counters) <sup>2</sup>	ERM
Max. counters allowed per precinct	Limits candidates and contests assigned to a precinct to 1,000 <sup>3</sup>	ERM
Max. contests allowed per ballot style	200 or number of positions on ballot	N/A
Max. candidates (ballot choices) allowed per contest	175	ERM (database create)
Max. number of parties allowed	General election: 75 Primary election: 20 (including nonpartisan party)	ERM (database create)
Max. 'vote for' per contest	98	ERM (database create)
Ballot formats	All paper ballots used in an election must be the same size and contain the number of response rows.	Ballot scanning equipment
Max. Ballot Styles	9900	ERM
Max. District Types/Groups	20	ERM
Max. districts of a given type <sup>4</sup>	40	ERM
Supported Languages	<ul style="list-style-type: none"> <li>• English</li> <li>• Spanish</li> <li>• Chinese</li> <li>• Korean</li> <li>• Japanese</li> </ul>	System Configuration

<sup>1</sup> Calculation of the number of counters must include a minimum of 4 counters for each contest, 3 overhead (overvote, undervote, precincts counted) and at least 1 candidate. Additional contest candidates each add a counter. If some precincts are defined as Absentee, a fourth overhead counter (absentee precincts counted) must be added to each contest. The number of statistical counters (Ballots Cast, Registered voters) must be added to the contest counters to determine the total counters.

<sup>2</sup> Example of maximum contest calculation if all contests had 2 candidates (5 counters each, 3 overhead counters + 2 candidates) and there were 10 statistical counters (i.e. Ballots Cast-Total, Republican, Democratic, Libertarian, Nonpartisan and Registered Voters-Total, Republican, Democratic, Libertarian, Nonpartisan.  $(21000-20)/5 = 4196$  or  $(\text{counter limit} - \text{statistics} \times 2) / \text{number of counters/contest} = \text{number of contests}$ .

<sup>3</sup> Contest counters are calculated as indicated in footnote 1, but two counters must be added for each statistical counter defined for the precinct. There are a minimum of 3 statistic counters assigned to each precinct (six added counters), "Ballots Cast," "Registered Voters" and "Ballots Cast Blank."

<sup>4</sup> Excludes the Precinct Group which contains all precincts.

## Component Limitations:

### Paper Ballot Limitations

1. The paper ballot code channel, which is the series of black boxes that appear between the timing track and ballot contents, 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 1-26,839), Type (available codes 1-30) or Split (available codes 1-40).
2. If Sequence is used as a ballot style ID, it must be unique election-wide and the Split code will always be 1. In this case the practical style limit would be 26,000.

### DS200

1. The ES&S DS200 configured for an early vote station does not support precinct level results reporting. An election summary report of tabulated vote totals is supported.

### AUTOMARK Voter Assist Terminal

1. ES&S AutoMARK capacities exceed all documented limitations for the ES&S Selection management, vote tabulation and reporting system. For this reason, Election Management System and ballot tabulator limitations define the boundaries and capabilities of the AutoMARK system as the maximum capacities of the ES&S AutoMARK are never approached during testing.

### ElectionWare

1. ElectionWare capacities exceed the boundaries and limitations documented for ES&S voting equipment and election reporting software. For this reason, ERM and ballot tabulator limitations define the boundaries and capabilities of ElectionWare system.

### ExpressVote

1. ExpressVote capacities exceed all documented limitations for the ES&S Selection 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 ES&S ExpressVote are never approached during testing.

### Election Reporting Manager (ERM)

1. Election Reporting Manager requires a minimum monitor screen resolution of 800x600.
2. ERM Database Create allows 1600 Precincts per Ballot Style.
3. There is a limit of 3510 precincts in the precincts counted/not counted display.
4. There is a limit of 3000 precincts in the precincts counted/not counted scrolling display.
5. Contest/Precinct selection pop up display limited to 3000 contests/precincts.

- 6. Non-English characters are not supported in ERM. This has to do with the creation of the XML results file out of ERM.
- 7. ERM's maximum page size for reports is 5,000 pages.

Functionality

2005 VVSG Supported Functionality Declaration

Feature/ Characteristic	Yes/ No	Comment
<b>Voter Verified Paper Audit Trails</b>		
VPAT	No	
<b>Accessibility</b>		
Forward Approach	Yes	
Parallel (Side) Approach	Yes	
<b>Closed Primary</b>		
Primary: Closed	Yes	
<b>Open Primary</b>		
Primary: Open Standard (provide definition of how supported)	Yes	
Primary: Open Blanket (provide definition of how supported)	No	
<b>Partisan &amp; Non-Partisan:</b>		
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	
<b>Write-In Voting:</b>		
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	
<b>Primary Presidential Delegation Nominations &amp; States</b>		
Primary Presidential Delegation Nominations: Displayed delegate states for each presidential party	No	
State & Group Voting: one selection votes the state.	No	
<b>Ballot Rotation:</b>		
Rotation of Names within an Office; define all supported rotation methods for location on the ballot and vote tabulation/reporting	Yes	
<b>Straight Party Voting:</b>		
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	
<b>Cross-Party Endorsement:</b>		
Cross party endorsements, multiple parties endorse one candidate.	Yes	

Feature/ Characteristic	Yes/ No	Comment
<b>Split Precincts</b>		
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	No	
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.
<b>Vote N of M:</b>	Yes	
Vote for N of M: Counts each selected candidate, if the maximum is not exceeded.	No	
Vote for N of M: Invalidates all candidates in an overvote (paper)	No	
<b>Recall Issues, with options:</b>		
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 2 <sup>nd</sup> 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 2 <sup>nd</sup> contest.)	No	Overturned - US District Court 7/29/03: CA Election Code sect. 11363
<b>Cumulative Voting</b>		
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	
<b>Ranked Order Voting</b>		
Ranked Order Voting: Voters can write in a ranked vote.	No	
Ranked Order Voting: A ballot stops being counting when all ranked choices have been eliminated	No	
Ranked Order Voting: A ballot with a skipped rank counts the vote for the next rank.	No	
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	No	

Feature/ Characteristic	Yes/ No	Comment
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	
<b>Provisional or Challenged Ballots</b>		
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	
<b>Overvotes (must support for specific type of voting system)</b>		
Overvotes: P & M: Overvote invalidates the vote. Define how overvotes are counted.	Yes	
Overvotes: DRE: Prevented from or requires correction of overvoting.	No	
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.	No	
<b>Undervotes</b>		
Undervotes: System counts undervotes cast for accounting purposes	Yes	
<b>Blank Ballots</b>		
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	
<b>Networking</b>		
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	No	
<b>Used as (if applicable):</b>		
Precinct counting device	Yes	DS200
Central counting device	Yes	DS850

Baseline Certification Engineering Change Order's (ECO)

This table depicts the ECO's certified with the voting system:

Change ID	Date	Component	Description	Inclusion
ECO 901	6/23/14	DS850	Data in firmware change for the bus controller, main motor controller, input tray motor controller, and output motor controller	Non-De Minimis Optional
ECO 910	6/23/14	Steel Ballot Box	Deflector flap needed to guide ExpressVote cards around chute in steel ballot box in conjunction with the DS200	Non-De Minimis Optional
ECO 912	6/02/2014	DS850	Second source UPS for DS850	De Minimis Optional
ECO 913	6/23/14	DS200	Second source battery for DS200	Non De Minimis Optional
ECO 1456	6/23/14	ExpressVote	Second source battery for ExpressVote	Non De Minimis Optional
ECO 1500	6/23/14	ExpressVote	Add scuff pads to housing and increase allowable flatness to kickstand	De Minimis
ECO 1516	6/23/14	ExpressVote	Added new InnoDisk	De Minimis
ECO 1530	6/23/14	DS200	Plastic change to enhance a better fit	De Minimis Optional
ECO 1587	6/23/14	ExpressVote	Updated BOM and drawings to match manufacturer production	De Minimis



United States Election Assistance Commission



**Certificate of Conformance**

**MicroVote EMS 4.1  
(Modification)**

The voting system identified on this certificate has been evaluated at an accredited voting system testing laboratory for conformance to the *2005 Voluntary Voting System Guidelines Version 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:** MicroVote EMS 4.1 (Modification)

**Model or Version:** Version 4.1

**Name of VSTL:** NTS Huntsville

**EAC Certification Number:** MVTEMS41

**Date Issued:** July 16, 2015

A handwritten signature in blue ink, appearing to read "D. S. Nelson".

*Chief Operating Officer & Acting Executive Director*

**Scope of Certification Attached**



# Scope of Certification

Manufacturer: MicroVote General Corporation Product: EMS4.1 (Modification)

VSTL: NTS Laboratories Certification #: MVTEMS41 Standard: VVSG 2005 Date: 07/16/2015

This document describes the scope of the certification of the modified system identified above, which is the system certified under certificates MVTEMS4 and MVTEMS40B (Modified) with changes modifying the system to MicroVote EMS4.1 (Modified). Configuration changes, revision changes, additions or subtractions from the system defined in this document are not included in this certification.

## 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.

## Language capability:

In addition to English, the voting system has the capability of presenting the ballot, ballot selections, review screens and instructions in Spanish.

**Definition of Modification:**

A modification is any change to a previously EAC-certified voting system's software, or firmware or hardware that is not determined to be a de minimis change. All modifications to a voting system require testing and review by the EAC in accordance to the requirements of Chapter 4 of the Voting System Testing & Certification Program Manual.

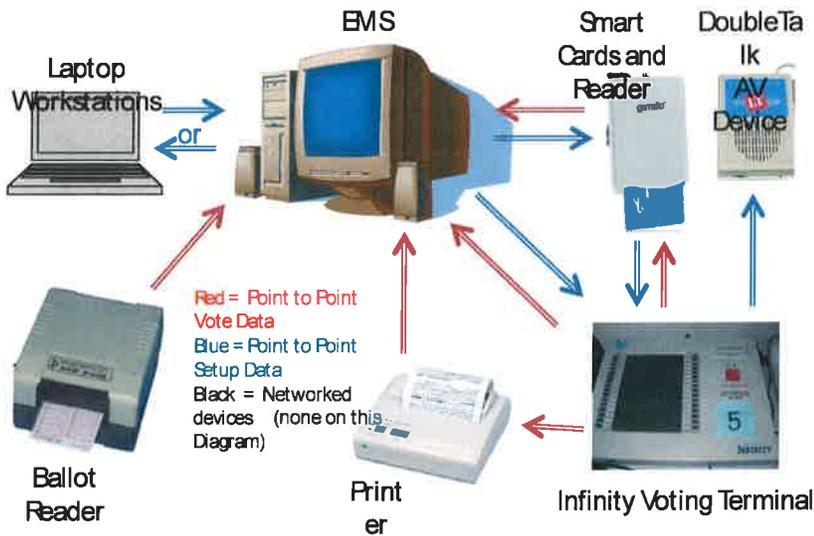
**Certified System before Modification:**

MicroVote General Corporation Election Management System Release 4.0  
Certificate ID: MVTEMS40

MicroVote General Corporation Election Management System Release 4.0B (revision)  
Certificate ID: MVTEMS40B

**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 Revision	Hardware Revision	COTS Information	Dependency Notes
<b>EMS Software</b> MicroVote 4.1	Software 4.1.21.0	N/A	--	MicroVote EMS 4.1
<b>EMS Server</b> Dell Desktop	COTSSQL SERVER2012 SP1	COTS Model DHM or Dell Optiplex 3010	Windows 7 Professional SP1	MicroVote EMS 4.1
<b>Laptop(s)</b> Dell	COTSSQL SERVER2012 SP1	COTS Model Dell Latitude FP17L or E5440	Windows 7 Professional SP1	MicroVote EMS 4.1
<b>Infinity</b> Model VP 1 Voting Panel	Firmware V4.10-983	Rev Cor  Rev D.05	--	Rev C-- All  Rev D.05 EMS4.1
<b>Scanner Dual Sided</b> Chatsworth ACP 2200	N/A	COTS Model 605000- 190	--	All Certified Systems
<b>Printer</b> Seiko	N/A	COTS Model DPU- 414 or DPU- 3445	--	All Certified Systems
<b>Doubletalk</b> Model LT3	BIOS0212	V1.0 LTRC8650	--	All Certified Systems
<b>Smartcard Reader</b>	COTS	COTS	PC/SC compatible USB contact reader/writer	MicroVote EMS 4.1
<b>Smart Cards</b>	N/A	16K or 115K	--	16K--All  115K-EMS4.1
<b>Voting Booth</b>	N/A	Model 2000	--	All Certified Systems

System Limitations

This table depicts the limits of the system has currently been exercised and the vendor calculated design limits.

Characteristic	Limiting Component	Evaluated	EMS	Infinity	ACP 2200
Maximum Ballot Positions	Ballot Design Form	150	600	600	402
Maximum Precincts in Election	Precinct Number	559	9,999	9,999	9,999
Maximum Contests in Election	Contests in Ballot Style * Ballot Styles/Election	100	300,000	2,999,700	2,009,799
Maximum Candidates/Counters in Election	Precinct Counters * Total Precincts	300	5,989,401	5,989,401	4,019,598
Maximum Candidates/Counters in Precinct	Ballot Design Form	125	599	599	402
Maximum Candidates/Counters in Activation	Ballot Design Form	125	599	599	402
Maximum Ballot Styles in Election	Ballot Style Number	270	1000	9999	1000
Maximum Contests in a Ballot Style	Ballot Design Form	50	300	300	201
Maximum Candidates in a Contest	Ballot Design Form	68	599	599	401
Maximum Count for any Precinct Element	Transact-SQL Bigint	600	Note 1	65,000	Note 1
Maximum Ballot Styles in a Precinct	Precinct Style Assignment Form	1	1	1	1
Maximum Activations per Ballot Style	Build Activations Form	15	99	30	99
Maximum Activations per Election	Act/Ballot Style * Ballot Style/Elec	1300	99,000	299,970	299,970
Maximum Number of Parties	Party Code Combinations	8	50,653	598	400
Maximum Vote For in Contest	Office Vote Limit	56	99	64	99

Note 1: 9,223,372,036,854,770,000

Functionality

This section outlines the features that the system does not provide:

WPAT	No
Wide Area Network Functionality (No use of modems even if included in COTS devices)	No
Used as a precinct counting device?	No
Local Area Network Functionality (No use of TCP/IP, No use of IPad, No use of Wireless even though those interfaces are present on defined equipment)	No

Primary: Open Defined in VWSG 2.1.7.2	No
Names of candidates rotation: Defined in VWSG 2.1.7.2	No
Recall: Defined in VWSG 2.1.7.2	No
Ranked Voting: Defined in VWSG 2.1.7.2 (Voters rank candidates in a contest in order of choice (1,2,3,etc.) A write in vote can be ranked)	No
Ranked Vote Tabulation: Defined in VWSG 2.1.7.2	No
Voting method exclusive to multi-member boards (Each voter may cast as many votes as there are seats to be filled and may cast two or more of those votes for a single candidate)	No
Encryption of data (Per Federal Standards -FIPS140-2)	No

Engineering Change Orders (ECOs) Included in the Certified Product:  
 The system must be configured with all the changes listed in the original certification MVTEM S40, revised certification MVTEM S40B plus for optional Rev D05 Infinity hardware the new changes listed in this table. This table does not include any de minimis changes that may be applied to the system

DATE	ECO Identification	Manufacturer	Description
2/5/2014	# 1505	Carson Manufacturing Co. Inc.	Adjusted scan delay time and clock checks for higher speed main processor
2/27/2014	# 1510	Carson Manufacturing Co. Inc.	Add AAEON PCM-3336-Bridge-A03 as an approved alternate
4/28/2014	# 1518	Carson Manufacturing Co. Inc.	Update Infinity BOM for new production
11/19/2014	#1542	Carson Manufacturing Co. Inc.	New motherboard (baseboard)
5/22/2015	# 1548	Carson Manufacturing Co. Inc.	Modification to mSATA cable to prevent EMI susceptibility
5/26/2015	# 1549	Carson Manufacturing Co. Inc.	Added support for latest Gemalto smart card reader
6/12/2015	# 1553	Carson Manufacturing Co.	New RAM and mSATA

		Inc	chips
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List of Changes to Certified System:

This section outlines the features that have been changed from the originally certified system:

Enhancement	System	Description
E-01	EMSand Infinity Panel	Added support for 115kB tally smart cards. The increased space allows larger jurisdictions to use the tally card feature instead of the direct connect option.
E-02	EMS	Increase undervote manual entry capacity. For elections which contain large numbers of undervoted contests (i.e. a large primary election with a combined absentee precinct) this enhancement will allow a single manual vote entry to input the vote totals eliminating the need to split the entry into smaller pieces.
E-03	EMS	Add tblProcessingError event log to detail audit report for enhanced audit reporting of unexpected processing errors that occur during EMSApplication execution.
Defect	System	Description
D-01	EMS	Audit reporting is now available within the EMSApplication as a standard report. Previously this was provided via multiple disk files.
D-02	EMS	Database version control has been added to prevent the opening of backup elections containing executable code from other versions of the EMSsoftware.
D-03	EMS	Method of inserting ballot objects, informational messages, error trapping and logging for the ballot designer have all been improved to address a previously identified ballot designer deficiency.
D-04	EMS	The overall election voter turnout percentage on the Election Summary and All Precincts header was corrected.
D-05	EMS	Candidate reorder warning message is now consistently displayed.
D-06	EMS	Several changes were made to integrate Windows 7 SCAP security hardening.
D-07	Infinity	Shading was removed from contest headers to maintain 3:1 contrast ratio
D-08	Infinity	Lighten/Darken button functionality reversed
Replacement	System	Description
R-01	Infinity	Added Infinity hardware version D05 with new processor board/bridge/heat sink assembly, universal baseboard, LED display, external uninterruptable power supply and optional new smart card reader.



## HAMILTON COUNTY ELECTION COMMISSION

700 RIVER TERMINAL ROAD  
CHATTANOOGA, TENNESSEE 37406  
TELEPHONE (423) 493-5100 • FAX (423) 493-5101  
TTY (423) 493-5100, EXT. 254  
Website: [elect.hamiltontn.gov](http://elect.hamiltontn.gov)

July 8, 2015

State Election Commission  
Division of Elections  
312 Rosa L. Parks Avenue  
7<sup>th</sup> Floor, Snodgrass Tower  
Nashville, Tennessee 37243

Dear Commissioners,

We, the Hamilton County Election Commission (HCEC), are writing to express our full support for the permanent approval of our utilization of Provisional Ballot Bags. Since 2012, the State Election Commission has approved temporary usage on three occasions subject to re-approval in subsequent election cycles. The safety, security, and durability of Hamilton County's uniquely designed bag make it far superior to any other ballot bag on the market.

In 2006 Administrator Bud Knowles sought an alternative to the heavy, cumbersome, and often destructive metal provisional ballot boxes that are deployed to all of Hamilton County's polling sites. Administrator Knowles, in collaboration with bank security bag provider A. Rifkin Co., custom designed a thick, rugged canvas ballot bag with a modified locking mechanism to include at least the minimum number of locks and seals required by state election law. The locking system includes a heavy duty master lock, along with a third security seal. Rifkin also incorporated a baffle inside the deposit slot making it virtually impossible to extract a provisional ballot without breaking three(3) seals and two(2) locks.

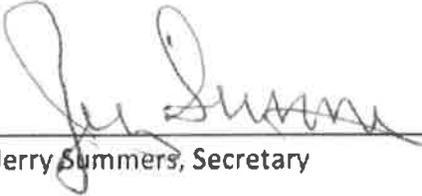
Upon review of Administrator Knowles' proposal, the HCEC received the full support of then-State Election Coordinator Brooke Thompson to transition to provisional ballot bags on a pilot project basis. In fact, Coordinator Thompson provided federal HAVA funds for Hamilton County to proceed with the purchase. At the 2015 TACEO summer seminar it became apparent that Hamilton County has been mistakenly linked to a substandard ballot bag manufactured by PrintElect. State Election Coordinator Mark Goins demonstrated how the PrintElect bag was easily compromised and the contents altered without breaking a seal or destroying a lock. Frankly, there is no comparison of the substandard PrintElect bag to Hamilton County's superior custom designed bag.

If this was intended to be a pilot project, we believe it is reasonable to affirm the HCEC has demonstrated success. In 25 elections over the last 9 years, we have successfully deployed provisional ballot bags to all 130 voting precincts without incident. We recognize that meeting our mission of conducting fair and impartial elections is contingent on the integrity of every ballot cast. We have established extraordinary security measures above and beyond what is required by law, and we respectfully request the State Election Commission permanently approve the Hamilton County Election Commission's Provisional Ballot Bag.

Sincerely,



Michael S. Walden, Chairman  
Hamilton County Election Commission



Jerry Summers, Secretary



Ruth Bray



Chris Clem



Kelvin Scott

# 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 Systems Upgrade**

- EAC Certification;
- Presentation of software upgrade before State Election Commission at a monthly 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, 7<sup>th</sup> 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.

**2-5-214. Ballot boxes.**

(a) The county election commission shall furnish for each polling place and for absentee voting at the commission office, locks and standard ballot boxes made of metal or such other material deemed as safe, durable, and secure by the coordinator of elections and the state election commission.

(b) The coordinator of elections shall prescribe the dimensions for such boxes, making allowance for the differences in numbers of voters using paper ballots at the various polling places.

(c) The county election commission shall prescribe and provide the type of lock and seals to be used.

Acts 1972, ch. 740, § 1; T.C.A., § 2-520; Acts 1985, ch. 78, § 1; 1993, ch. 518, §§ 15, 21; 1994, ch. 859, § 9.

**Cross-References.** Sealed absentee ballots, § 2-6-311.

**Section to Section References.** This section is referred to in § 2-6-311.

Tre Hargett, Secretary of State  
**State of Tennessee**



Division of Elections  
312 Rosa L. Parks Avenue, 7<sup>th</sup> Floor  
Nashville, Tennessee 37243-0305

Mark Goins  
Coordinator

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

## MEMORANDUM

**To:** State Election Commission Members

**From:** Mark Goins *Mark Goins*  
Coordinator of Elections

**Date:** September 28, 2015

**Subject:** Results of the September 25, 2015 Certification Exam

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On September 25, 2015, this office administered a certification exam. The following Administrators of Elections obtained a passing score on that exam:

**Susan Hughes (Blount County)**  
**Matt Teply (Cannon County)**  
**Peg Hamlett (Carroll County)**  
**Jill Davis (Cumberland County)**  
**Julianne Hart (Gibson County)**  
**Chad Gray (Williamson County)**

State Election Commission  
Voting Machine Subcommittee  
August 19, 2015 - Summary

October 12, 2015

We were tasked with reviewing Tennessee's procedures for certifying voting machines. Presenting at the meeting were TN Election Coordinator Mark Goins and four voting machine vendors (ES&S, MicroVote, Harp Enterprises, Dominion), all of which provide voting equipment and/or services to Tennessee counties.

From the presentations, we discovered:

All 50 states require:

1. Federal Standards Compliance testing at a Voting Systems Test Laboratory and /or US Election Assistance Commission certification
2. Compliance review of state code and rules, if applicable

Additionally:

- 7 states require no additional state certification testing or compliance review
- 5 states have their own testing staff to accomplish a 4-6+ month certification process
- 3 states require in-state field test
- 1 state requires out-of-state field test (TN)
- 34 states require final state board or SOS (Secretary of State) Approval only \*\*

\*\*Most of the states perform state specific End to End Regression Tests and some allow for parallel testing. The End to End Regression Tests are performed by one of three federally approved independent laboratories cost \$3-5,000. The revenue for these tests is generated by an application fee paid by the vendors to the states when submitting their equipment for consideration. While Tennessee does require an application fee, it is significantly less than the stated End to End Regression Test costs.

The committee respectfully requests additional time to obtain the following information, and any additional information requested by the Commission or Coordinator, in order to be better prepared before considering submitting changes to TN current's procedures for certifying voting machines.

Recommended additional research by committee:

1. What are other states' code and rules
2. What is End to End Regression Testing
3. Which state require End to End Regression Testing
4. What is Parallel Testing
5. Which states require Parallel Testing
6. What is Tennessee's application fee
7. What are other states' application fee
8. If practical, visit a voting systems laboratory (nearest one is in Huntsville, AL)
9. Any additional information requested by the Commission or Coordinator



Certificate of Appreciation

Presented to

*Wayne Pruett*

In Recognition of His Service and Dedication  
to the Secretary of State - Elections Division and County Election Officials

During His Many Years of Service as HAVA Coordinator.

*WITH GRATITUDE AND APPRECIATION*

Chairman

Secretary

Member

Member

Member

Member

Member