Certification Test Plan – Modification

Document Number: HRT-18002-CTP-01

Version 1.0

Prepared for:

Vendor Name	Hart InterCivic (Hart)
Vendor System	Verity Voting 2.3
EAC Application No.	HRT-Verity-2.3
Vendor Address	15500 Wells Port Drive, Austin, TX 78728

Prepared by:

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

NVLAP Lab Code 200733-0

Accredited by the Election Assistance Commission (EAC) for Selected Voting System Test Methods or Services

Copyright © 2018 by SLI Compliance^{SM}**, a Division of Gaming Laboratories International, LLC**

Revision History

Date	Release	Author	Revision Summary
November 1st, 2018	v1.0	*M. Santos*	Initial Submittal
November 21st, 2018	V1.1	*M. Santos*	Updates for EAC comments

Disclaimer

The information 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.

Trademarks
• SLI is a registered trademark of SLI Compliance.
• All products and company names are used for identification purposes only and may be trademarks of their respective owners.

TABLE OF CONTENTS

1 INTRODUCTION

This Modification Certification Test Plan outlines the test approach SLI Compliance will follow when performing Certification Testing on the **Hart Verity Voting 2.3** voting system against the 2005 Voluntary Voting System Guidelines (VVSG). **Verity Voting 2.3** is a modification of **Verity Voting 2.0**, with limited changes. The system will be tested based on the "modified system" requirements, as set forth in section 4.6.2.3 of the "**EAC** Voting System Testing and Certification Program Manual, version 2.0".

For the modifications being implemented for specific States, those States (PA, OR, IN and OH) will have the ability to review the testing to be performed for their modification.

When the testing is complete, SLI will submit a Certification Test Report that details all test results and findings from the Certification Test effort, as well as a recommendation to the **EAC**.

1.1 Description and Overview of the Certified System

This test plan contains a description of the previously certified system, the specific modifications to the current system version, and the impact of those modifications on the system and certification testing.

1.1.1 Definition of the Baseline Certified System

This modification project builds upon the foundation established in **Verity Voting 2.0**, which contained the applications **Verify Data**, **Verity Build, Verity Central** and **Verity Count**, as well as the polling place devices **Verity Scan** and **Verity Touch Writer**.

1.1.2 Modifications

Verity Voting 2.3 is a modification of the EAC-certified **Verity Voting 2.0** system.

The modifications to **Verity 2.3** addresses multiple facets of the system, including state specific features, new features for **Verity Scan**, **Verity Touch Writer, Verity Controller, Verity Data, Verity Build, Verity Central, Verity Count, Verity User, Verity Desktop**, as well as associated documentation updates. Specific details can be found in Appendix A - Modifications.

Review of the modifications implemented and source code modified indicates the need for a limited Functional Configuration Audit in order to verify that the system continues to meet 2005 VVSG 1.0 requirements. The limited FCA takes into account not only the implemented modifications, but also functions that have not changed but may be impacted by a modification.

Software/firmware that either has modified source code or requires a new build will be subjected to a FCA review.

Verity User, Verity Desktop, Verity Data, Verity Build, **Verity Print**, **Verity Touch Writer**, **Verity Scan, Verity Touch, Verity Controller, Verity Central** and **Verity Count** have modified source code and will require new builds.

1.1.3   Initial Assessment of Impact of the Modifications

Verity Scan
All specific modifications to **Verity Scan** will be discretely tested, as well a Regression test of **Verity Scan** will be exercises, in order to verify that all functionality continues to work as expected.

Verity Touch Writer
All specific modifications to **Verity Touch Writer** will be discretely tested, as well a Regression test of **Verity Touch Writer** will be exercises, in order to verify that all functionality continues to work as expected.

Verity Touch
All specific modifications to **Verity Touch** will be discretely tested, as well a Regression test of **Verity Touch** will be exercises, in order to verify that all functionality continues to work as expected.

Verity Print
All specific modifications to **Verity Print** will be discretely tested, as well a Regression test of **Verity Print** will be exercises, in order to verify that all functionality continues to work as expected.

Verity Data/Build
All specific modifications to **Verity Data/Build** will be discretely tested, as well a Regression test of **Verity Data/Build** will be exercises, in order to verify that all functionality continues to work as expected.

Verity Central
All specific modifications to **Verity Central** will be discretely tested, as well a Regression test of **Verity Central** will be exercises, in order to verify that all functionality continues to work as expected.

Verity Count
All specific modifications to **Verity Count** will be discretely tested, as well a Regression test of **Verity Count** will be exercises, in order to verify that all functionality continues to work as expected.

Verity User Manager

All specific modifications to **Verity User Manager** will be discretely tested, as well a Regression test of **Verity User Manager** will be exercises, in order to verify that all functionality continues to work as expected.

Verity Desktop

All specific modifications to **Verity Desktop** will be discretely tested, as well a Regression test of **Verity Desktop** will be exercises, in order to verify that all functionality continues to work as expected.

1.1.4   Regression Testing

This section describes what system elements will be regression tested to establish assurance that the modifications have no adverse impact on the compliance, integrity or performance of the system.

All components of **Verity Voting 2.3** will be regression tested individually in order to verify continued compliance to (2005) VVSG 1.0.

Additionally, one system level general election, one system level open primary election and one system level closed primary election test will be performed to verify system robustness.

1.2 References

The following key documents were used in preparing this test plan.

1. Election Assistance Commission Voluntary Voting System Guidelines (EAC VVSG), 2005 Version 1.0 Volumes I and II.
2. NIST Handbook 150: 2016.
3. NIST Handbook 150-22: 2017.
4. EAC Voting System Testing and Certification Program Manual, United States Election Assistance Commission, v 2.0, May 2015
5. SLI VSTL Quality System Manual, Rev. 2.6, prepared by SLI, dated March 28, 2018.
6. Appendix A – Modifications

1.3 Attachments

7. Attachment A - Hart Verity Voting 2.3 EAC Electrical Hardware Test Plan v1.0
8. Attachment B - Hart Verity Voting 2.3 EAC Environmental Hardware Test Plan v1.0
9.

1.4 Terms and Abbreviations

The following terms and abbreviations will be used throughout this document:

Table 1 – Terms and Abbreviations

Term	Abbreviation	Description
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 mark sense-based ballot and vote counting device typically located at a central count facility and is operated by an automated multi-sheet feeding capability.
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.
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.
Commercial Off the Shelf	COTS	Term used to designate computer software, hardware or accessories that are ready-made and available for sale, lease, or license to the general public.
Direct Recording Electronic	DRE	Voting systems that, using Touch Screen or other user interfaces, directly record the voter's selections in each race or contest on the ballot in electronic form.
Election Assistance Commission	EAC	An independent, bipartisan commission created by the Help America Vote Act (HAVA) of 2002 that operates the federal government's voting system certification program.
Election Management System	EMS	Typically 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.

Term	Abbreviation	Description
Functional Configuration Audit	FCA	The testing activities associated with the functional testing of the system.
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.).
Precinct Count Scanner	PCS	A digital scanner is a mark sense-based ballot and vote counting device located at a polling place and is typically operated by scanning one ballot at a time.
Request For Information	RFI	A means used by testing laboratories and manufacturers to request that the EAC provide an interpretation of a technical issue related to testing of voting systems.
Requirements Matrix	N/A	A matrix that traces the VVSG 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.
Technical Data Package	TDP	The data package supplied by the vendor, which 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 a voting system.
Test Method	TM	SLI proprietary documents which are designed to group sets of EAC VVSG requirements in a logical manner that can be utilized to more efficiently validate where and how requirements, or portions of a requirement, are met.

Term	Abbreviation	Description
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).
Verity vDrive	vDrive	Media used for transportation of voting system data
Voluntary Voting System Guidelines	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 for EAC certification.
Voter Verifiable Paper Audit Trail	VVPAT	An independent verification system for voting machines designed to allow voters to verify that their vote was cast correctly, to detect possible election fraud or malfunction, and to provide a means to audit the stored electronic results.
Voting System Test Lab	VSTL	An independent testing organization accredited by NVLAP and the EAC to conduct voting system testing for EAC certification.
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 who has been qualified to perform EAC voting system certification testing.

1.5 Testing Responsibilities

The subsections below describe the project responsibilities.

1.5.1 Owner Assignments

- System analysis and review will be conducted by Source Code Review, Security and Voting Test Specialists, with oversight by the Test Manager
- Source code review will be conducted by Source Code Review Specialists, with oversight by the Test Manager
- Documentation review will be conducted by Voting Test Specialists, with oversight by the Test Manager
- Test module development and validation will be conducted by Security and Voting Test Specialists, with oversight by the Test Manager

- Test suite development and validation will be conducted by Security and Voting Test Specialists, utilizing SLI's formal Test Methods, with oversight by the Test Manager

- Formal test execution will be conducted by Security and Voting Test Specialists, with oversight by the Test Manager

1.5.2 Project Timeline

The following schedule outlines the expected timeline for this project.

ID	Task Name	Start	Finish
1	Hart Verity 2.3 Federal Certification Project Plan	Fri 9/28/18	Thu 3/21/19
2	Test Readiness Review (TRR)	Mon 10/15/18	Tue 10/16/18
12	Phase 1	Fri 9/28/18	Fri 12/21/18
13	Project Initiation	Fri 10/19/18	Fri 10/19/18
15	TDP Deliver/Receive Vendor Package	Mon 10/1/18	Mon 10/1/18
46	TDP Review	Fri 9/28/18	Thu 11/1/18
47	Review - Source Code	Fri 9/28/18	Mon 10/22/18
64	PCA Document Review	Tue 10/2/18	Thu 11/1/18
99	FCA Assessment	Mon 10/22/18	Thu 11/1/18
104	Hardware	Wed 10/17/18	Fri 12/21/18
105	HW / SW Configuration Audit	Wed 10/17/18	Fri 10/19/18
111	Develop HW TestPlan	Fri 10/19/18	Wed 10/24/18
113	Hardware Test Execution	Wed 11/21/18	Fri 12/21/18
121	Test Plan Development	Thu 10/25/18	Thu 12/20/18
127	Phase 2	Tue 10/23/18	Thu 11/1/18
128	Training	Tue 10/23/18	Tue 10/23/18
130	Readiness Test	Tue 10/23/18	Wed 10/24/18
132	Test Suite Development	Wed 10/31/18	Thu 11/1/18
134	Phase 3	Thu 10/18/18	Wed 11/21/18
135	Vendor Specific Module and Suite Creation	Thu 10/18/18	Wed 11/21/18
166	Phase 4	Mon 11/5/18	Mon 12/10/18
167	Trusted Build	Mon 11/5/18	Thu 11/8/18
174	Test Suite Validation	Thu 11/8/18	Mon 12/10/18
208	Phase 5	Fri 12/7/18	Thu 1/31/19
209	Trusted Build	Fri 12/7/18	Thu 12/13/18
216	Official Test Execution of Test Suites	Wed 12/12/18	Thu 1/31/19
252	Phase 6	Fri 9/28/18	Wed 3/6/19
253	Certification Test Report and Final Test Plan	Mon 1/21/19	Tue 3/5/19
258	Delivery of Artifacts to EAC Repository	Tue 3/5/19	Wed 3/6/19
261	Project Management	Fri 9/28/18	Tue 1/29/19
263	Phase 7	Tue 3/5/19	Thu 3/21/19
264	Return Equipment to Vendor	Tue 3/19/19	Thu 3/21/19
267	Archive Test Materials	Tue 3/5/19	Wed 3/6/19

1.5.3 Test Module Development and Validation

Test Modules will be developed to provide repeatable detailed test steps. The Modules are defined at a basic level in SLI's formal Test Methods and are designed for use in any suite that employs their functionality. This reusability reduces the development time associated with creating Modules. The Modules will be validated prior to Formal Test Execution to ensure accurate testing of the voting system. Additionally, the Test Modules will provide traceability to SLI's formal Test

Methods, as well as the 2005 VVSG 1.0 requirements. This is done by listing the Test Method name, and each requirement addressed, in the name of the module.

1.5.4 Trusted Build

Prior to Formal Test Execution, a Trusted Build will be performed for **Verity Data, Verity Build**, **Verity Print**, **Verity Controller, Verity Touch, Verity Touch Writer**, **Verity Scan, Verity Central** and **Verity Count** in order to include modifications made to those applications.

1.5.5 Formal Test Execution

Formal execution of the validated Test Suites and modules will be conducted to verify the system's compliance with the 2005 VVSG 1.0 requirements.

1.5.6 Third Party Hardware Testing

Hardware testing will be performed on **Verity Scan** and **Verity Controller**/**Touch Writer Duo**.

Electrical testing will be performed at:

NTS, EMI / EMC Test Lab
1736 Vista View Drive
Longmont, Colorado 80504

Requirements addressed are:

V1: 2.1.4 (b,c), 4.1.2.5, 4.1.2.6, 4.1.2.7, 4.1.2.8, 4.1.2.9, 4.1.2.10, 4.1.2.11, 4.1.2.12, 4.1.7.1
V2: 4.8

See Attachment for more information.

Environmental testing will be performed at:

NTS Environmental/Dynamic
1601 Dry Creek Drive, Suite 2000
Longmont, Colorado 80503

Requirements addressed are:

V1: 4.1.7.1, 2.1.4.d, 4.3.3

V2: 4.6.2, 4.6.3, 4.6.4, 4.6.5, 4.6.6, 4.7.1, 4.7.3

See Attachment for more information.

1.5.7 EAC & Manufacturer Dependencies

The Test Plan will require **EAC** approval prior to finalization.

Hart will be required to provide all source code, documentation, equipment and supporting materials identified as part of the voting system.

The source code must have all discrepancies resolved, be able to be built successfully, and installed.

In addition, **Hart** is required to provide training on the voting system and support throughout the life of the project.

1.6 Scope of Testing

1.6.1   Block Diagram
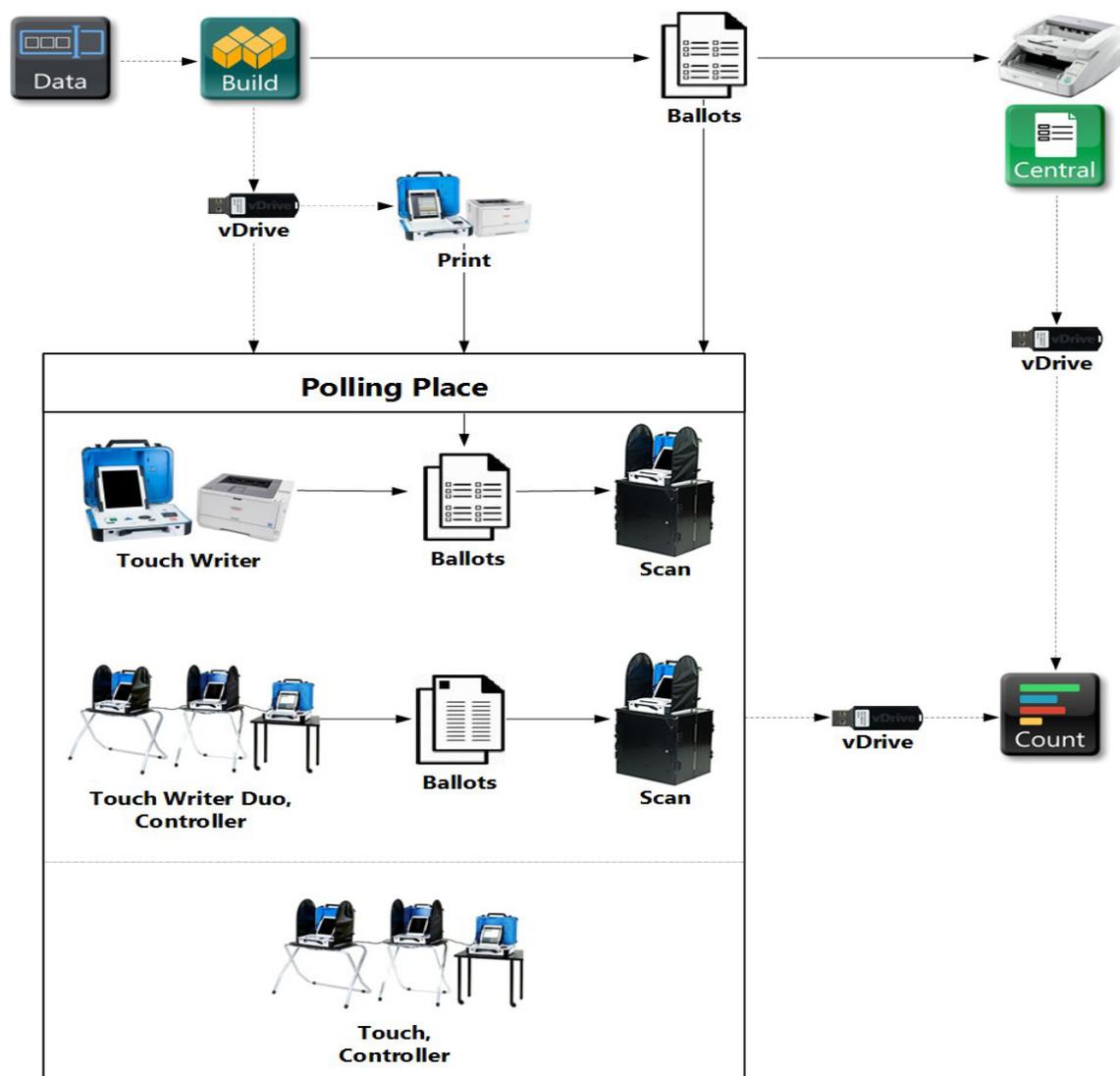
Overview of the diagram:

- The components are displayed as touch points of data access, transfers,

and verification.

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

1.6.2 EAC Request For Interpretation – RFI

EAC RFI 2010-01 is relevant to this modification project.

1.6.3 EAC Notices of Clarification - NOC

This Certification Test Plan and the execution of tests for the voting system identified in this plan account for the following NOC's:

- NOC 13-02: Detailed Description of Changes for Modifications

- NOC 09-005: Development and Submission of Test Plans for Modifications to EAC Certified Systems.

- NOC 09-002: Clarification of EAC Laboratory Independence Requirement

- NOC 09-001: Clarification of the Requirements for Voting System Test Laboratories (VSTLs) Development and Submission of Test Plans

- NOC 08-003: Clarification of EAC Conformance Testing Requirements for Voting System Test Laboratories (VSTLs)

2 PRE-CERTIFICATION TESTING AND ISSUES

2.1 Evaluation of prior VSTL testing

Prior VSTL testing has been performed on predecessor versions of the **Hart Verity Voting 2.3** voting system. A full test campaign was done by SLI during the **Verity Voting 2.0** EAC certification project. The **Verity Voting 2.0** release constitutes the main code base used for the **Verity Voting 2.3** release.

2.2 Evaluation of prior non-VSTL testing

No prior state or non-VSTL lab testing has been performed on the **Hart Verity Voting 2.3** voting system. Review of Hart's internal testing is performed during the FCA review.

2.3 Known Field Issues

Hart Verity Voting 2.3 is a modification of **Verity Voting 2.0**.

For the **Verity Voting 2.3** system, the voting devices are the **Verity Scan** precinct digital scanner, which processes ballots marked by voters, **Verity Touch Writer**, a ballot marking device, **Verity Touch**, a direct recording electronic device, and **Verity Print**, a pre-voting ballot production device that is used to print blank ballots. **Verity Touch Writer Duo** is a new device configuration to the **Verity Voting** system.

Review of the "Known Vulnerabilities" database, maintained by SLI, has provided 14 known vulnerabilities to previous Hart systems (Hart eSlate System Version 6.21) which are accounted for in SLI's Test Methods.

3 MATERIALS REQUIRED FOR TESTING

Any materials that are used in an election cycle must be provided to SLI to facilitate testing of the voting system. This section outlines these required materials.

3.1 Software/Firmware

All software and 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 following software/firmware is required. This includes all supporting software such as operating systems, compilers, assemblers, application software and firmware, any applications used for burning of media, transmission of data or creation/management of databases.

3.1.1 Hart Verity Voting 2.3 Software/Firmware

Hart Verity Voting 2.3 voting system consists of the following software and firmware components:

- **Verity Data** EMS software
- **Verity Build** EMS software
- **Verity Central** high speed optical scanner software
- **Verity Count** central count location tabulation and reporting software

- **Verity Scan** optical scanner firmware
- **Verity Touch Writer** BMD firmware
- **Verity Touch Writer Duo** BMD firmware
- **Verity Controller** firmware
- **Verity Touch** DRE firmware
- **Verity Print** printer firmware
- **Verity** Device Microcontroller firmware for **Verity** devices

Note: Versions for each will be available after execution of the Trusted Build, and will be listed in the Test Report.

3.1.2   COTS Software/Firmware

This section details the Commercial Off The Shelf software and firmware utilized within the **Verity Voting 2.3** system.

Table 2 – COTS Software/Firmware

Manufacturer	Application	Version	Verity Voting 2.3 Component
Microsoft	Microsoft Windows Embedded Standard 7 with Service Pack 1	6.1.7601	Data/Build, Data/Build + Count, Central, Count, Print, Touch Writer, Scan, Touch Writer Duo, Controller, Touch, Touch with Access
Microsoft	Microsoft SQL Server 2012 for Embedded Systems	11.00.2100	Data/Build, Data/Build + Count, Central, Count
Microsoft	Microsoft SQL Server 2012 Express	11.00.2100	Print, Touch Writer, Scan, Touch Writer Duo, Controller, Touch, Touch with Access
McAfee	McAfee Application Control for Devices	6.1.1.369	Data/Build, Data/Build + Count, Central, Count, Print, Touch Writer, Scan, Touch Writer Duo, Controller, Touch, Touch with Access
Nuance Communications	Nuance Western OCR, Desktop, OEM	V20	Verity Scan

3.1.3 Additional Supporting Test Software

This section outlines all test specific software that will be used in the certification campaign.

Table 3 – Additional Supporting Test Software

Manufacturer	Application
LocMetrics	LocMetrics Line Counter, a commercial application used to determine the counts of executable and comment lines
SLI	Module Finder, a SLI proprietary application used to parse module names from C/C++, Java and VB code and populate the identified module names into the review documents
PrestoSoft	ExamDiff Pro: a commercial application used to compare revised code to previously reviewed code

3.2 Equipment

The following equipment is required for the execution of the hardware, software and security tests. This includes system hardware, general purpose data processing and communications equipment, and any test instrumentation required.

3.2.1 Hart Verity Voting 2.3 Equipment

The following **Hart Verity Voting 2.3** equipment will be used in testing:

Table 4 – Hart Verity Voting 2.3 Equipment

Hardware
Verity Scan (digital scanner)
Verity Touch (DRE)
Verity Touch Writer (BMD)
Verity Touch Writer Duo (BMD)
Verity Print
Verity Controller

3.2.2 COTS Equipment

The following Commercial Off-the-Shelf equipment will be used in testing:

- Desktops
- Printers
- Scanners

Table 5 – COTS Equipment

Manufacturer	Hardware	Model
OKIDATA (for **Verity Data, Verity Build**, **Verity Print, Verity Central, Verity Touch Writer, Verity Touch Writer Duo** and **Verity Count**)	Ballot and Report Printer	B432dn
OKIDATA (for **Verity Print, Verity Build**)	Ballot Printer	C831dn
Various (for **Verity Data, Verity Build, Verity Central** and **Verity Count**)	Intel-Windows Workstation **(Minimum Requirements)** Processor – Intel Celeron D 420 3.06GHz Dual Core Memory – 2GB Hard Drive – 120 GB Removable Storage – 8xDVD+/-RW Slim line USB Ports – 4 ports Video Card - Integrated Graphics Keyboard - USB Keyboard Mouse - USB Mouse	
Various (for **Verity Data, Verity Build, Verity Central, Verity Count, Verity Relay**)	**Monitor (Minimum Requirements)** Panel Size - 50.8 cm Aspect Ratio - Widescreen (16:9) Optimal Resolution - 1600 x 900 at 60Hz Contrast Ratio - 1000: 1 Brightness - 250 cd/m2 (typical)	
Canon (for **Verity Central**)	Ballot Scanner	DR-G1100
Canon (for **Verity Central**)	Ballot Scanner	DR-G1130

3.3 Test Materials

The following test materials are required for the performance of testing including, as applicable, test ballot layout and generation materials, test ballot sheets, test ballot cards and control cards, standard and optional output data report formats, and any other materials used in testing.

- Ballots & Blank Ballot grade paper
- Thumb Drives
- USB Dongle
- Ballot marking pens
- Printer paper rolls

3.4 Deliverable Documents

The following are documents to be delivered as a part of the **Hart Verity Voting 2.3** system.

- Change Notes Verity Voting, Version 2.0 to 2.3
- All-In-One Code Framework Coding Standards.pdf
- Configuration Management Process 1001074 D01.pdf
- Continual Improvement Process 1000550 E02.pdf
- Control of Nonconforming Product Procedure 1000657 B02.pdf
- Device Configuration Process Document 4005523 B00.pdf
- Device OS Creation and Configuration Process Document Verity 2.3 4005563 A01.pdf
- Device WES7 Creation Process Document Verity 4005562 A01.pdf
- Document Control Procedure 1000538 E05.pdf
- Factory TUV SUD inspection 2018 June report signed.pdf
- Hardware 2005713-CFAST Door Security Kit Design.pdf
- Hardware 3005018-ATI Kit Design.pdf
- Hardware 3005174-AutoBallot Kit Design.pdf
- Hardware 3005350-Scan Design.pdf
- Hardware 3005351-Controller Design.pdf
- Hardware 3005352-Touch Writer Design.pdf
- Hardware 3005353-Touch with Access Design.pdf
- Hardware 3005355-Touch Design.pdf
- Hardware 3005356-Print Design.pdf
- Hardware 3005357-Ballot Box Design.pdf
- Hardware 3005358-Standard Booth Design.pdf
- Hardware 3005359-Accessible Booth Design.pdf
- Hardware 3005700-Touch Writer Duo Design.pdf
- Hardware 3005800-Scan Design.pdf
- Hardware 3005801-Accessible Booth With ATI Tray Design.pdf
- Hardware 3005825-Controller Design.pdf
- Hardware Design Development Procedure 1000513 D01.pdf
- Hardware PCB Photos.pdf
- Hardware Verification and Validation Process 1000514 D01.pdf
- Hart NRTL Safety Certificate U8 17 10 90917 004.pdf
- Hart Secure Ballot Stock Specification 4005526 A01.pdf
- Notice of Protected Information 1000773 A00.pdf
- Quality Manual 1000490 D04.pdf
- Record Retention Matrix 1000510 E02.pdf
- Software Design Development Procedure 1000566 D02.pdf
- Software Production 1000551 E01.pdf
- Software Test Design Development 1000508 D02.pdf

- Software Verification and Validation Process 1000560 D02.pdf
- Software Versioning Procedure 1001070 C04.pdf
- SQA Requirements Management Process 1000540 A02.pdf
- Supplier Qualification and Management 1000563 C02.pdf
- The Creation and Configuration of the Access Build Environment 4005517 A01.pdf
- The Creation and Configuration of the MCU Build Environment 4005519 A02.pdf
- The Creation and Configuration of the Trusted Build Environment 4005518 A02.pdf
- Verity 2.3 TDP Abstract 1000772 A00.pdf
- Verity 2.3.X COTS List.pdf
- Verity Airgap Interface Technical Reference 4005512 A02.pdf
- Verity Application Framework TRD 4005634 A00.pdf
- Verity Application Installer Build Process Document Verity 2.3 4005641 A00.pdf
- Verity Application Programming Interface Specification 4005604 A03.pdf
- Verity Ballot Creation TRD 4005636 A00.pdf
- Verity Base Station Microcontroller Specification 4005462 A01.pdf
- Verity Build TRD 4005628 A00.pdf
- Verity Central TRD 4005632 A00.pdf
- Verity Coding Standard 4005498 A14.pdf
- Verity Controller TRD 4005624 A00.pdf
- Verity Count TRD 4005629 A00.pdf
- Verity Data TRD 4005627 A00.pdf
- Verity Database Attributes 4005543 C02.pdf
- Verity Device Suite TRD 4005621 A00.pdf
- Verity Election Definition Data TRD 4005639 A00.pdf
- Verity Election Management TRD 4005631 A00.pdf
- Verity Electronics Specification 4005461 A15.pdf
- Verity Entity Relationship Diagram Database - Devices.pdf
- Verity Entity Relationship Diagram Database - Servers (Count Only).pdf
- Verity Entity Relationship Diagram Database - Servers (No Count).pdf
- Verity Key Design 4005514 A02.pdf
- Verity Logging Design NR 103.pdf
- Verity Logging TRD 4005635 A00.pdf
- Verity Operational Environment 4005515 C03.pdf
- Verity PC Application Framework User Interface Design Document.pdf
- Verity Performance Characteristics 4005497 C02.pdf
- Verity Print TRD 4005626 A00.pdf
- Verity Risk and Threat Assessment 4005513 B01.pdf
- Verity Scan TRD 4005623 A00.pdf

- Verity Security Requirements 4005464 A07.pdf
- Verity Shared Device User Interface Design Document.pdf
- Verity Software Architecture-Design 4005463 B01.pdf
- Verity Summative Usability Report 4005496 A00.pdf
- Verity Summative Usability Test Plan 4005495 A01.pdf
- Verity Supply Chain PRD 4005302 C01.pdf
- Verity System Limits 4005470 C01.pdf
- Verity Touch TRD 4005633 A00.pdf
- Verity Touch Writer Duo Base Station Microcontroller Specification 4005638 A00.pdf
- Verity Touch Writer Duo TRD 4005625 A00.pdf
- Verity Touch Writer TRD 4005622 A00.pdf
- Verity User Management TRD 4005630 A00.pdf
- Verity Vote Counting and Cast Vote Records TRD 4005640 A00.pdf
- Verity Voting 2.3 Change Notes.pdf
- Verity Voting 2.3 Implementation Statement 4005637 A00.pdf
- Verity Voting 2.3 Usability Impact Statement.pdf
- Verity Voting National Certification Test Specification 4005527 B02.pdf
- Verity Workstation Manufacturing 4005525 B00.pdf
- Verity_2.3_Administrators Guide_Build 6641-021 A00.pdf
- Verity_2.3_Administrators Guide_Central 6641-022 A00.pdf
- Verity_2.3_Administrators Guide_Count 6641-023 A00.pdf
- Verity_2.3_Administrators Guide_Data 6641-020 A00.pdf
- Verity_2.3_Device Troubleshooting Field Guide 6653-005 A00.pdf
- Verity_2.3_Polling Place Field Guide - CDS 6651-012 A00.pdf
- Verity_2.3_Polling Place Field Guide - CT 6651-014 A00.pdf
- Verity_2.3_Polling Place Field Guide - SW 6651-013 A00.pdf
- Verity_2.3_Support Procedures Guide 6643-005 A00.pdf
- Verity_2.3_System Administrators Guide 6641-024 A00.pdf
- Verity_2.3_Verity Print Field Guide 6651-015 A00.pdf
- VirTex Q01 Quality Manual Rev R.pdf
- Voting System Implementation and Maintenance 1000745 C02.pdf
- VSTL Product Submission Procedure 1000565 D02.pdf
- Workstation Configuration Process Document Verity 2.3 4005564 A01.pdf
- Workstation WES7 Creation Process Document Verity 2.0 4005565 A00.pdf

4   TEST SPECIFICATIONS

The following are the specifications for testing to be conducted on the **Hart Verity Voting 2.3** system. The specifications contain details on the focus of testing, configuration(s), and the functions to be tested.

4.1 VVSG Requirements

4.1.1 Functional Requirements

The **Verity Voting 2.3** modification will be tested to the 2005 VVSG 1.0 requirements listed below:

Volume I:

- 2.1.2.a,b,c Accuracy
- 2.1.7.1.c Functions
- 2.2.1.2.b Ballot Formatting
- 2.2.2.d Election Programming
- 2.2.4.a-e Readiness Testing
- 2.3.3.1.c,d Common Requirements
- 2.3.3.2.b,e,h Paper based System Requirements
- 2.3.3.3.c,d,e,h,j.k.o DRE System Requirements
- 4.1.5.2 Ballot Reading Accuracy

Volume II
- 3.2.3 Testing to Reflect Additional Capabilities
- 3.2.4 Testing to Reflect Previously Tested Capabilities
- 6.2.2 System Baseline for Testing
- 6.2.3 Testing Volume

4.1.2 Hardware Requirements

Volume I:
- 2.1.4 (b,c,d) Integrity
- 4.1.2.5-12 Environmental Requiremetns
- 4.1.7.1 Removable Storage Media
- 4.3.3 Reliability

Volume II:

- 4.6.2-6 Non-operating Environmental
- 4.7.1&3 Environmental Tests, Operating
- 4.8 Other Environmental Tests

4.1.3 Hart State Specific Modifications

The modifications addressed represent Hart internally developed features designed to satisfy these jurisdictional requests.

Pertinent Hart requirements are listed in Appendix A - Modifications

4.2 Hardware Configuration and Design

The **Hart Verity Voting 2.3** system, as declared in the application for certification submitted to the EAC, consists of:

- A **Verity Data/Build** workstation to create all election information and election media.
- **Verity Print** is a pre-voting ballot production device that is paired with COTS printer, to produce unmarked paper ballots.
- At the precinct level, **Verity Scan** optical scanners, **Verity Touch** DRE and **Verity Touch Writer** BMD, and **Verity Touch Writer Duo** BMD configurations are employed.
- The central count location employs a high speed COTS scanner, in combination with a workstation that utilizes the **Verity Central** software, for tabulation of paper ballots.
- The consolidation, tally and reporting location employs a workstation with **Verity Count** software as well as a printer.

4.3 Test Suite Design

4.3.1 Software Functional Test Design and Data

SLI has prepared functional test modules using the operator/user procedures specified in the TDP. Functionality provided by the **Verity Voting 2.3** voting system is exercised in order to verify that each functional component performs as expected. Accept/reject criteria are based on requirements of the VVSG and the system specification documents provided within the TDP. As many of the individual functional components rely on preceding functionality within the system, SLI incorporates system level suites that employ modules that exercise the individual functional components of the system.

After analysis of the changes incorporated into the **Verity Voting 2.3** voting system, the following tests are implemented.

Verity Data/Build test suite – The modification to the **Verity Data/Build** component will be given focused testing in order to verify that the modification implemented, and the subsequent Trusted Build of the firmware, does not adversely affect operations.

Verity Desktop test suite – The modification to the **Verity Desktop** component will be given focused testing in order to verify that the modification implemented, and the subsequent Trusted Build of the firmware, does not adversely affect operations.

Verity User Management test suite – The modification to the **Verity User Management** component will be given focused testing in order to verify that the modification implemented, and the subsequent Trusted Build of the firmware, does not adversely affect operations.

Verity Touch Writer test suite – The modification to the **Verity Touch Writer** component will be given focused testing in order to verify that the modification implemented, and the subsequent Trusted Build of the firmware, does not adversely affect operations.

Verity Touch Writer Duo test suite – The modification to the **Verity Touch Writer Duo** component will be given focused testing in order to verify that the modification implemented, and the subsequent Trusted Build of the firmware, does not adversely affect operations.

Verity Touch test suite – The modification to the **Verity Touch** component will be given focused testing in order to verify that the modification implemented, and the subsequent Trusted Build of the firmware, does not adversely affect operations.

Verity Print test suite – The modification to the **Verity Print** component will be given focused testing in order to verify that the modification implemented, and the subsequent Trusted Build of the firmware, does not adversely affect operations.

Verity Scan test suite – The modification to the **Verity Scan** component will be given focused testing in order to verify that the modification implemented, and the subsequent Trusted Build of the firmware, does not adversely affect operations.

Verity Central test suite – The modification to the **Verity Central** application will be given focused testing in order to verify that the modification implemented, and the subsequent Trusted Build of the software, does not adversely affect operations.

Verity Count test suite – The modification to the **Verity Count** application will be given focused testing in order to verify that the modification implemented, and the subsequent Trusted Build of the software, does not adversely affect operations.

General Election test suite – The full **Verity Voting 2.3** voting system will be reviewed in order to verify continued integration of the voting system and that all components continue to work as expected.

Closed Primary Election test suite – The full **Verity Voting 2.3** voting system will be reviewed in order to verify continued integration of the voting system and that all components continue to work as expected.

Open Primary Election test suite – The full **Verity Voting 2.3** voting system will be reviewed in order to verify continued integration of the voting system and that all components continue to work as expected.

Language test suite – Testing is conducted to ensure the voting system is capable of presenting the ballot, ballot selections, review screens and instructions in the required languages. The system's ability to handle the prescribed foreign languages that have been declared to be supported, English, Spanish, Chinese, Japanese, Korean, Khmer, Thai, Vietnamese, Tagalog, Ilocano, and Hindi will be validated.

Accuracy test suite – **Verity Scan** will be tested for accuracy of ballot marks reading in association with updated hardware. **Verity Central** will also be tested to verify ability to read 8.5"x20" ballots accurately.

Volume test suite – The full **Verity Voting 2.3** voting system will be reviewed in order to verify compliance with the updated stated system limits, as per the VVSG's stated intent of volume, "more than the expected".

Stress test suite - The full **Verity Voting 2.3** voting system will be reviewed in order to verify appropriate responses, as per the VVSG's stated intent of stress, testing a system's "response to transient overload conditions".

4.4 TDP Evaluation

SLI is completing an assessment of the deliveries of the Technical Data Package for **Verity Voting 2.3** against the **Verity Voting 2.0** TDP. Any modification to previously reviewed documentation is being reviewed.

4.4.1 Document Review

SLI conducts a PCA review of all vendor documents submitted for review in the delivery of the **Hart Verity Voting 2.3** TDP. These include:

- System configuration overview
- System functionality description
- System hardware specifications
- Software design and specifications
- System test and verification specifications
- System security specifications
- User/system operations procedures
- System maintenance procedures

- Personnel deployment and training requirements
- Configuration management plan
- Quality assurance program
- System change notes

Documents are verified for compliance to the 2005 VVSG, Volume 2, Sections 2.2 through 2.13 and Volume 2, Section 6.6. Unless noted otherwise, all requirements are successfully met within the pertinent areas of the TDP.

4.5 Source Code Review

The certification campaign for the **Hart Verity Voting 2.3** voting system includes proprietary software and firmware that have been created/modified by **Hart**. SLI has conducted a source code review of all modified proprietary source code submitted in the delivery of the voting system for compliance to the VVSG version 2005, Volume 2, Section 6.6. No COTS products were modified for this voting system version.

The coding languages involved in the vendor's applications include:

- C
- C++
- C#

Source Code Review Tools utilized by SLI include:
- <u>Practiline Line Counter</u>: a commercial application used to determine the counts of executable and comment lines;
- <u>Module Finder</u>: an SLI proprietary application used to parse module names from C/C++ and VB code and populate the identified module names into the review documents;
- <u>ExamDiff Pro</u>: a commercial application used to compare revised code to previously reviewed code; and

Any subsequent re-reviews of source code will be the result of fixes to discrepancies identified in the Functional Configuration Audit activities.

COTS Operating systems and software used in the voting system have been verified as authentic and unmodified in the **Verity Voting 2.3** test campaign.

4.6 QA & CM Process Review

The review processes employed are designed to verify that the manufacturer not only has documented processes and procedures in both the Quality Assurance and Configuration Management arenas, but that those processes and procedures are actually implemented within the software development life cycle that is used to produce the **Hart Verity Voting 2.3** version that is submitted for certification.

The QA portion of the review focuses on the testing performed by the system's manufacturer, **Hart InterCivic**. The scope of the testing performed is reviewed in order to verify that the manufacturer has verified all VVSG requirements are met. SLI reviews the test case design documents and data as provided by **Hart InterCivic**. In evaluating selected modules with respect to flow control parameters and data on both entry and exit, SLI assesses for discrepancies between the Software Specifications and the test case design. Additionally, interviews of key Quality Assurance staff may be conducted to verify that the QA processes and procedures are known, understood and implemented by the appropriate personnel within the organization.

The CM portion of the review focuses on the organization's understanding and implementation of the declared configuration management processes, procedures and policies. Initial deliverables will be reviewed against all pertinent CM processes employed by **Hart**. All subsequent deliveries will also be reviewed to determine that appropriate processes are employed. Additionally, interviews of pertinent staff, with regard to configuration management, may be conducted if determined to be necessary to verify that processes, procedures and policies are known, understood and implemented within the organization.

4.7 Trusted Build

The Trusted Build will be conducted prior to SLI's official testing and will be completed on site at SLI's facility. SLI will use its approved standard lab procedure that details the processes for controlling, managing, and conducting the Trusted Build. This process includes the following:

- Preparations for the Trusted Build – Obtaining and reviewing Hart's procedure for constructing the build platform, verifying the target build platform, and acquiring and verifying the necessary materials, if rebuild of the existing environment is needed.

- Execution of the Trusted Build – SLI will perform the Trusted Build by using the step-by-step build procedure, as provided by **Hart** to create a pristine build environment. SLI ascertains and records the following items throughout the build process:

  - Build environment images at various key points
  - Build environment and file hashes at various key points
  - Build environment hardware characteristics
  - Build results from code compilation and file hashes
  - Final software install files and file hashes
  - Build virtual machine files

- Deliverables to Testing – Upon completion of the Trusted Build, certain items are sent to the SLI test group. The final result will be a media containing the following:

  - o Final software install files
  - o Hash values to validate install files

- Final Record Keeping and Archiving Procedures – At the conclusion of the Trusted Build process, SLI completes all final record keeping and archiving procedures at SLI's facility. This record keeping includes any unique identifiers, results of the build with version numbers and dates, and descriptions of all hashes and images in the repository.

4.8 Standard VSTL Test Methods and Uncertainty of Test Data Measurement

This test campaign utilizes Standard VSTL test methods and election specific type test data only.

5 TEST DATA

Test data for the **Hart Verity Voting 2.3** voting system has been compiled such that all functionality declared will be tested to determine conformance to the standards.

5.1 Data Recording

SLI has evaluated the system functionality, as described by **Hart** technical documentation, as well as requirements as listed in the EAC 2005 VVSG 1.0, and made determinations as to expected results of all data inputs into the **Hart Verity Voting 2.3** voting system. This includes:

- Election type
- Precincts of all types
- Districts
- Offices
- Contests
- Candidates
- Parties
- Devices used
- Voting variations employed
- Issues/Referendums

- Votes cast for each candidate/issue/referendum
- Vote consolidation data from one device/level to the next

The data is contained in one master data record, including each input and each expected output. This data is incorporated into the appropriate test suite.

Testing information is recorded in the test suites, as well as in test notebooks, which are utilized according to SLI's standard lab procedure *SLP-VC-30 - Test Notebooks*.

5.2 Test Data Criteria

SLI has evaluated the system functionality as described by Hart technical documentation, as well as requirements as listed in the EAC 2005 VVSG 1.0, and made determinations as to expected output of all data inputs into the **Hart Verity Voting 2.3** voting system. The system's execution shall be measured against the expected results.

6   TEST PROCEDURE AND CONDITIONS

This section describes the test conditions and procedures for execution of test suites. Additionally, this section is used to describe procedures for setting up equipment that will be utilized in the execution of the test suites.

6.1 Facility Requirements

Testing will be performed on site at SLI in Denver, Colorado.

Four secure labs are available with appropriate power supply and space to accommodate the various configurations defined within this test plan. Temperature/humidity gauges will be employed in order to determine the appropriate conditions exist during testing.

Unless otherwise specified herein, all remaining tests, including system level functional testing, shall be performed at standard ambient conditions:

- Temperature: 25ºC ± 10°C (77ºF ± 18ºF)
- Relative Humidity: 20 to 90%
- Atmospheric Pressure: Local Site Pressure

All TDP and test documentation is stored on site at SLI's facility in a secure project directory on SLI's secure "Voting" and "TDP" servers.

6.2 Test Setup

Configurations of **Verity Voting 2.3** will be deployed that conform to each specific test suite's needs. In all instances **Verity Voting 2.3** documentation will be followed in the setup of the configurations.

6.3 Test Sequence

While there is no required sequence for performing voting system certification testing and audits, there are prerequisite tasks for some testing. Any needed prerequisites are contained within the suite for that test.

6.4 Test Operations Procedures

An inventory has been performed to verify the voting equipment received contains hardware and software elements as defined in the TDP prior to commencement of testing.

Throughout the testing effort, test suites and modules will be marked as follows:

- **Accept –** Test is accepted as successful.
- **Reject –** Test is rejected as unsuccessful.
- **NT –** Not Testable is used for test modules that cannot be completed. For example, if failure of one test modules failure precludes attempting subsequent test modules, the latter will be marked as NT.

Test results **Reject** and **NT** will include comments by the VTS explaining the reason for the result.

Issues encountered during review and testing will be documented on the Discrepancy Report and on the EAC's VRT. Test findings showing that an aspect of the voting system does not conform to the requirements of the identified test standard will be marked as Documentation Discrepancies, Source Code Review Discrepancies, Hardware Discrepancies, or Functional Discrepancies.

Issues that are encountered during testing or documentation review but are not addressed by the applicable standard will be added to the Discrepancy report and noted as Informational. The vendor has the option whether to address Informational issues. All responses provided by the vendor are noted in the Discrepancy Report attachment to the Certification Test Report.

7   Approval Signatures

SLI:

Traci Mapps
Director of Operations, SLI Compliance
November 21st, 2018

8 Appendix A – Modifications

General Features
- Support for additional languages. The following languages are supported: English, Spanish, Chinese, Japanese, Korean, Khmer, Thai, Vietnamese, Tagalog, Ilocano, Hindi (11 total)
- Higher system limits
- Digitally signed reports and exports
- Support for three additional symbols:
  - ¢ ("Cents sign": ALT + 0 + 162);
  - § ("Section": ALT + 0 + 167);
  - ° ("Degree sign": ALT + 0 + 176)
- Support for dependent contests
- Support vote capture and recording for contests tagged as fractional cumulative. Tabulation is completed manually by using the CVR export or report from the Count Auditing Dashboard.
- Support for 8.5" x 20" ballots
- Increased physical security with a serialized security seal that fully secures the Smart Panel CFast door compartment on devices and on all workstation chassis.

Pennsylvania-specific features
- Support Cross-filing
- Support Pennsylvania method for electronic interface voting with straight party
- Support Pennsylvania preferences for electronic ballot displays, esp. with many choices in a single contest

Oregon-specific features
- Support "No Party Preference (NPP)" ballot styles for modified closed primaries

Indiana-specific features
- Straight party overvote invalidates partisan contests
- Retrieval codes can be inserted into Cast Vote Records, to support retrieval of Early Voting ballots, if necessary.

Ohio-specific features
- Support multiple write-in lines associated with a single target area for choices in a contest (e.g., Governor/Lieutenant Governor)

Features for Verity Touch Writer series
- Verity Touch Writer Duo
  - Support for Verity Controller management and daisy-chain configuration.
  - Additional ballot template: summary layout
  - Alternative to attached laser printer: integrated thermal printer

- Standalone Verity Touch Writer
  - Removal of Access Codes
    - Enter Access code screen is removed
    - Deactivate Code screen is removed
    - Poll worker screen to "Confirm Access Code" screen (ballot style, etc.) is renamed "Confirm Selections"
    - Poll worker screen to "Create ballot access code" is renamed "Activate ballot"
    - "Access Code Summary Report" is renamed "Ballot Marking Session Report"
    - In all log entries, the term "Access Code" is replaced with "Session ID"
  - Support for AutoBallot (previously available on Verity Print and Verity Controller)
- Software alternative for Poll Worker button on rear of device (touch "Ready to Use," on the idle screen)
- Support for customized instructions at the end of voting session, to include references to casting the ballot at Verity Scan, or anything else specific to the polling place that the jurisdiction may wish to mention; customized instruction is entered in user–defined preferences in Data (Preferred Wording)
- Support users' ability to set time zone
- Screens indicate if devices do not have AC power ("Batteries last a limited time only")
  - Displayed on Power On Self-Test (POST) screen, or during normal operations
  - Does not interrupt a voting session
- "Battery low" warning is displayed when AC power is disconnected, and battery is critically low
  - Prevents further action until AC power is restored
  - Recoverable when AC power is applied; reboot is no longer required unless the battery is below 5% alert threshold.
- System displays a system alert if the available space on the vDrive is 50 MB or less
- After polls are suspended or closed (applies to Verity Controller, Verity Scan, Verity Touch Writer, and Verity Touch Writer Duo), screen alerts users to re–dock and power down device if they attempt to store a tablet that has not been powered down
- Now feature a metal serialized security seal that fully secures the Smart Panel CFast door compartment.
- Enhancements to idle screens
  - Identifies what the device is
  - Indicates "Ready for use," in English, for poll workers
  - Displays voter instructions in same languages as the election

- Warning is displayed if a voter attempts to deselect a write–in name previously entered
- Warning is displayed if voter makes substitution in <n of m> contest
  - If all selections are made, and if the voter selects an additional choice, the screen indicates which selection is being removed, and which selection is being added
- Voting session idle timeout
  - If the idle timer on an electronic ballot reaches 5 minutes, the device asks, "Are you still voting?"
  - If the voter responds within 45 seconds, it returns to voting and restarts the timer (the timer changes in real–time)
  - If the voter does not respond within 45 seconds, the device goes to a "Session Locked" voter screen, and the poll worker can either unlock the screen, or spoil the ballot. The poll worker must enter the poll worker passcode, and then it goes to the "Session Locked" poll worker screen to unlock or spoil
  - Enable/disable in Verity Build
- Optional orientation wizard, with guidance for audio and screen settings, and additional voter instructions.

Features for Verity Scan
- Second-chance voting check for marginal marks
- Second-chance voting check for blank page (in addition to existing check for blank sheet)
- Support for scanning summary vote records
- If a user elects to save ballot images (based on Build settings), when saving the image on the vDrive, in PNG format, the image filename includes the GUID that links to the GUID in the CVR (this is to provide support for RLAs)
- Support users' ability to set time zone
- Screens indicate if devices do not have AC power ("Batteries last a limited time only")
  - Displayed on Power On Self-Test (POST) screen, or during normal operations
  - Does not interrupt a voting session
- "Battery low" warning is displayed when AC power is disconnected, and battery is critically low
  - Prevents further action until AC power is restored
  - Recoverable when AC power is applied; reboot is no longer required unless the battery is below 5% alert threshold.
- System displays a system alert if the available space on the vDrive is 50 MB or less
- After polls are suspended or closed (applies to Verity Controller, Verity Scan, Verity Touch Writer, and Verity Touch Writer Duo), screen alerts users to re–dock and power down device if they attempt to store a tablet that has not been powered down

- Now feature a metal serialized security seal that fully secures the Smart Panel CFast door compartment.
- Enhancements to idle screens
  - Identifies what the device is
  - Indicates "Ready for use," in English, for poll workers
  - Displays voter instructions in same languages as the election

Features for Verity Controller
- Dashboard icons indicate power and battery status of all connected units

- Dashboard icons indicate when a ballot has been cast on a connected Touch DRE unit

- Support for Touch Writer Duo BMD

- Support users' ability to set time zone

- Screens indicate if devices do not have AC power ("Batteries last a limited time only")

  - Displayed on Power On Self-Test (POST) screen, or during normal operations

  - Does not interrupt a voting session

- "Battery low" warning is displayed when AC power is disconnected, and battery is critically low

  - Prevents further action until AC power is restored

  - Recoverable when AC power is applied; reboot is no longer required unless the battery is below 5% alert threshold.

- System displays a system alert if the available space on the vDrive is 50 MB or less

- After polls are suspended or closed (applies to Verity Controller, Verity Scan, Verity Touch Writer, and Verity Touch Writer Duo), screen alerts users to re–dock and power down device if they attempt to store a tablet that has not been powered down

- Now feature a metal serialized security seal that fully secures the Smart Panel CFast door compartment.

Verity Touch
- Warning is displayed if a voter attempts to deselect a write–in name previously entered
- Warning is displayed if voter makes substitution in <n of m> contest
  - If all selections are made, and if the voter selects an additional choice, the screen indicates which selection is being removed, and which selection is being added

- Voting session idle timeout
  - o If the idle timer on an electronic ballot reaches 5 minutes, the device asks, "Are you still voting?"
    - If the voter responds within 45 seconds, it returns to voting and restarts the timer (the timer changes in real–time)
    - If the voter does not respond within 45 seconds, the device goes to a "Session Locked" voter screen, and the poll worker can either unlock the screen, or spoil the ballot. The poll worker must enter the poll worker passcode, and then it goes to the "Session Locked" poll worker screen to unlock or spoil
    - Enable/disable in Verity Build
- Optional orientation wizard, with guidance for audio and screen settings, and additional voter instructions.

Verity User Management

- Role–Based Access Control (RBAC)

  - o Allow user to create & delete custom roles & assign or remove permissions

- Configurable password options

  - o Require password changes to be different than the last <n> previous passwords

  - o Minimum password length is configurable

  - o Require that passwords not contain the username

- For each user listed, adds a field indicating whether the user is currently logged in (yes/no)

Verity Desktop

- Support for setting time zone

Features for Verity Data

- Add fields for preferred wording:

  - o Define custom wording for "This page left blank" (40 char limit)

  - o Define custom wording for "Read both sides" on paper ballots (40 char limit)

  - o Define custom instructions for ballot marking device paper handling

- Add "Notes" field for Additional Text

- Add "Notes" field for Ballot Order Screen

- Additional Text screen allows user to associate one or more parties to each Additional Text in an Open Primary

- For Rotation, add confirmation if "Generate Indices" button is selected, as selecting the button will overwrite any existing indices that have already been entered.

- Warning message added if a user validates a language, and then attempts to navigate away from the screen before locking the language

- Validation to ensure that every precinct is assigned to at least one polling place

- Validation to ensure that every polling place has at least one precinct assigned to it

- Support for multiple paper sizes in a single election: allow up to two different ballot size templates: one 8.5" wide template for in Central or in–person scanning on Verity Scan, and option to add 11"x17" for Central only

- Support for condensed format summary vote records: short election title; short jurisdiction name; short contest title; custom header; title; English & bilingual portrait and landscape templates; preview layout

- Staging features

  o Generate English-only paper ballots before entering any translations or audio for election data

  o Accommodate selective edits to certain ballot styles without having to reprint all ballots in the election; includes Version Compatibility Report

- WMA audio format in Data/Build.

- Audit log reports are digitally-signed

- All PC workstation chassis now feature a metal serialized security seal that fully secures the chassis from physical access to interior components

Features for Verity Build
- Elimination of pre-determined vDrive IDs in Verity Build, to allow batch writing of vDrives with vDrive duplicator

- Validation to ensure that every precinct is assigned to at least one polling place

- Validation to ensure that every polling place has at least one precinct assigned to it

- Support for multiple paper sizes in a single election: allow up to two different ballot size templates: one 8.5" wide template for in Central or in–person scanning on Verity Scan, and option to add 11"x17" for Central only

- Device settings:

- o Allow/reject "Blank page" on Scan (as distinct from "Blank ballot")

- o Allow/reject "Marginal mark" on Scan

- o Voter idle timeout feature – enable/disable

- o Default voting session volume setting for accessible devices

- o Enable/disable human-readable unique ID for Touch Writer Duo

- Read vDrives screen:

  - o Removes vDrive ID

  - o Adds Device Type, Polling Place, and Election Version

- Print queue import includes field to define the Starting Ballot Number for each row in the import (can be used to support integration with third-party systems, including remote accessible vote- by-mail)

- Ballot Style Report includes the same ballot style numbers as shown on the ballot preview window

- Data validation window displays a "Start Validation" button, rather than automatically starting the validation when entering the workspace

- Modified barcode format for ballot unique IDs (human-readable unique IDs are shorter than barcode versions)

- The device password for Verity Key is now required to be 8-10 alphanumeric characters (0-9, Uppercase A-Z).

- Staging features

  - o Generate English-only paper ballots before entering any translations or audio for election data

  - o Accommodate selective edits to certain ballot styles without having to reprint all ballots in the election; includes Version Compatibility Report

- WMA audio format in Data/Build.

- Audit log reports are digitally-signed

- All PC workstation chassis now feature a metal serialized security seal that fully secures the chassis from physical access to interior components

Features for Verity Central
- Support for scanning 8.5" wide and 11"x17" ballots in the same election

- Allow administrators to set conditions that will be automatically accepted in all batches during the scanning process (e.g. accept all undervotes during scanning, in lieu of manual review and adjudication)

- Allow administrators to control/limit the conditions included in "Accept" feature, for all users (i.e. ability to place limitations on adjudicators' ability to accept undervotes, overvotes, etc.)

- Support adjudicators' ability to accept (i.e. auto–resolve) specific types of conditions by batch, on a selective basis (e.g., for selected batches, accept all undervotes)

- If a user selects "Accept" for one or more entire batches, Verity Central prompts the user with a confirmation message

- If a user selects "Revert" for one or more entire batches, Verity Central prompts the user with a confirmation message

- Allow users to adjudicate damaged contests, where an option box is unrecognizable, through the Ballot Review window (instead of requiring users to locate the rejected ballot during scanning)

- In the Ballot Review window, add button to Accept page (without additional keystrokes required for "Actions" button)

- In the Ballot Review window, "Previous" and "Next" buttons will take users to the previous or next unresolved contest

- UI wording changes to clarify the Boolean and–or relationship of how combinations of filters will work

- Filter for specific marked contest choices

- Import/export certified write–in names (in same format as Verity Count import/export)

- Precinct Summary Report

- Batch Summary Report

- Batch Summary by Precinct Report

- Scanned Batch report includes Batch Notes

- Increase character limits in Batch Notes field to 500

- vDrive Recovery Screen indicates batches included on original vDrive

- Features to support risk-limiting audits (RLAs)

  - In Central, when a CVR is written to vDrive, the GUID used in the CVR filename is associated with the ballot in Central

  - In Central's Scanned Ballot Information Export, there is now a column for the GUID

- o In Central's Ballot Review window, for any image, the GUID for the ballot sheet is displayed on the left-hand side of the screen, along with Batch and Sequence information.

- o In Central, exported ballot images default to a naming convention that includes page number and GUID

- o In Central, provide the capability to search for a specific ballot (i.e. its images) by GUID.

- o Verity Count tracks CVRs by GUID

- Audit log reports are digitally-signed

- All PC workstation chassis now feature a metal serialized security seal that fully secures the chassis from physical access to interior components

Features for Verity Count
- Remove "of Y" vDrives from the vDrives Tabulated graph in the Dashboard
- Remove percentage of vDrives Tabulated from the graph in the Dashboard
- Support "freeform write–in resolution," so that users can enter additional write–in candidate names without leaving the write–in assignment interface.
- Option to sign data exports and reports (and include the public key information as part of each export).
    - o Note: if this option is disabled, Count will still sign audit log reports.
- Option to include turnout boxes for each contest on Cumulative Report
- Option to include turnout subtotals in each precinct on the Precinct Results Report
- Percentages removed from residual vote sections (Overvotes, Undervotes, Invalid Votes) on Cumulative and Precinct Reports
- Filters
    - o For choices, include/exclude write-ins
    - o Filter by "Included Provisionals," or "Non-Provisionals"
- Import/export certified write–in names. Export is through the Detailed Vote Totals report.
- Export the status of the provisional ballots in the currently open Task.
- Import provisional ballot status for ballots in the currently open Task
- Option to show/hide sheet count totals in report headers that include results from paper ballots
- District Results report
- Support import of additional district definitions
- Support for Calvoter import/export
- When reading vDrives, the display:
    - o Removes vDrive ID
    - o Adds Device ID and associated polling place (or Verity Central)
- In CVR reports, the GUID for each CVR is now in the header of the report.
- Audit log reports are digitally-signed

- All PC workstation chassis now feature a metal serialized security seal that fully secures the chassis from physical access to interior components

Corrected Defects

The following defect found in Verity 2.0 has been corrected in the Verity Voting 2.3 modification

Product	Description of Verity Voting 2.0 Defect	Resolution/Results In Verity Voting 2.3
Verity Count	Different messages seen for vDrives from Verity Central and Verity Scan, when rejection reason is 'vDrive has already been counted'	Corrected. Message from Verity Count has been aligned for consistency.

Updated System Limits[1]

Element	Limit	Comments
Precincts	3,000	Increased from 2,000
Splits per precinct	20	Unchanged
Total precincts + splits in an election	3,000	Increased from 2,000
Districts for voting devices and applications	400	Up from 75
Parties in a General Election	24	Unchanged
Parties in a Primary Election	10	Unchanged
Contests in an election	2,000	Increased from 200
Total contest choices (voting positions) in an election	5,000	Increased from 600
Maximum length of choice name	100 characters	Unchanged
Choices in a single contest	300	Up from 75
Maximum write–in length	25 characters	Unchanged
Ballot styles	N/A	Unchanged
Voting types	5	Unchanged
Maximum polling places per election	3,050	Increased from 1200
Maximum devices per election	N/A	Unchanged
Maximum number of central count scanners in a single network	4	Unchanged
vDrive capacity – Scan voting device	9,999 sheets per vDrive	Unchanged
vDrive capacity – Verity Central	80,000 sheets per vDrive	Unchanged
Number of voters definable per election	2,500,000	Increased from 1,000,000

Number of total ballots cast per election	1,750,000	Increased from 1,000,000
Maximum number of sheets per ballot	4 sheets	Unchanged
Maximum number of sheets – Verity Scan	9,999	Unchanged
Maximum number of CVRs – Verity Count	7,000,000 CVRs	4,000,000 CVRs
Ballot sizes	8.5x11, 8.5x14, 8.5x17, 8.5x20, 11x17 (Central only)	Addition of 8.5x20
Number of languages in a single election (including English)	11	Increased from 2

[1] Verity Voting 2.3 system limits are applicable to all HP Z240 workstations with 64 GB memory deployments, except for the combined Data/Build/Count deployment. Verity Voting 2.3 also supports upgrades to the previous generation HP Z230 workstations with 32 GB memory, at system limits documented for Verity Voting 2.0.

End of Verity Voting 2.3 Certification Test Plan