Certification Test Plan – Modification

Document Number: HRT-20003-CTP-01

Prepared for:

Vendor Name	Hart InterCivic (Hart)
Vendor System	Verity Voting 2.6
EAC Application No.	HRT-Verity-2.6
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*Accredited by the Election
Assistance Commission (EAC)
for Selected Voting System Test
Methods or Services*

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Revision History

Date	Release	Author	Revision Summary
February 11th, 2021	1.0	J. Panek	Initial Draft
March 4th, 2021	1.1	J. Panek	Updates to address EAC feedback
March 29th, 2021	1.2	J. Panek	As-run updates

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1   INTRODUCTION

This Modification Test Plan outlines the test approach SLI Compliance will follow when performing system modification testing on the **Hart Verity Voting 2.6** voting system against the Election Assistance Commission Voluntary Voting System Guidelines (EAC VVSG) version 1.0. **Verity Voting 2.6** is a modification of **Verity Voting 2.5**, certified by the EAC on September 9th, 2020, 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". The purpose of this document is to provide a clear understanding of the work SLI Compliance will conduct and a detailed plan outlining the test effort.

When the testing is complete, SLI Compliance 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 2.5**, which contains the applications for the **Verity Data**, **Verity Build, Verity Central, Verity Count**, and **Verity Relay**, as well as the polling place devices **Verity Controller, Verity Scan, Verity Print, Verity Touch, Verity Touch with Access, Verity Touch Writer, Verity Touch Writer Duo,** and **Verity Touch Writer Duo Standalone**.

1.1.2   Modifications

Verity Voting 2.6 is a modification of the EAC certified **Verity Voting 2.5** system.

The modifications to **Verity Voting 2.6** address multiple aspects of the system, including features for all devices and workstations, modifications to Verity Data, Verity Count, and Verity Central, as well as associated documentation updates. Additionally, the **Verity Voting 2.6** system does not contain the **Verity Touch**, **Verity Touch with Access**, **Z230 Workstation model**, and the **32GB** workstation configurations that were present within the baseline **Verity Voting 2.5** system.

The following modifications are implemented in this release:

Proposition text wrapping

- Affected Software and Devices: Verity Data
  If the proposition text of a contest does not fit entirely in the remaining space of a column, the system now supports wrapping proposition text to adjacent columns.

Ballot Layout Validations

- Affected Software and Devices: Verity Data
  Verity Data now includes ballot validation for propositions that do not fit on a single page. Validation for propositions that do not fit in a single column is removed.

Column forces by precinct-split

- Affected Software and Devices: Verity Data
  Verity Data now allows users to apply column and page forces to contest by precinct-split.

No candidates have filed

- Affected Software and Devices: All
  Support has been added for contests where no candidates have filed.

Concurrent write-in assignment

- Affected Software and Devices: Verity Count
  Verity Count now supports the simultaneous adjudication of write-in within a single task on multiple Count Client workstations.
  - A new "Refresh" button and "Last Updated" time indicator are added.
  - Adds a new contest selection dropdown experience, that will show all contest that are currently checked out by users.
  - New button "Post" added to the election dashboard, to the "write-in resolution" section of the screen. The post button captures the entire write in resolution state of the task and moves it to become available for reporting.

Support for 10 voting types

- Affected Software and Devices: Verity Count
  Now supports 10 voting types system-wide.
  - A new "Results by Category" report supporting up to 10 Voting Types.
  - The following Count reports and exports now display up to 10 voting types
    - Cumulative
    - Precinct
    - District
    - Canvass
    - HTML Cumulative
    - HTML Precinct

- HTML Canvass
- Detailed Vote Total export

Verity Count MVR Improvement

- Affected Software and Devices: Verity Count
Verity Count supports batch subtraction of records during a Manual Vote Recording session. Supported use cases may include changing election data source or other error corrections.

Configuration Changes to Devices

- The Verity series of Direct Recording Electronic (DRE) devices are not included in the Verity Voting 2.6 configuration. The DRE devices include Verity Touch and Verity Touch with Access.

Configuration Changes to Workstations

- Verity Voting 2.6 only supports workstation models that are equipped with 64GB of memory. As such, the Hewlett Packard Z230 workstation model is not supported in this configuration.

Corrected Defects

The following defects found in Verity Voting 2.5 have been corrected in the Verity Voting 2.6 modification:

Product	Description of Verity Voting 2.5 Defect	Resolution/Results In Verity Voting 2.6
Verity Central	A user was unable to import a Certified Write-in Candidates list that had just been exported.	This has been corrected.
Verity Count	Voting types were not following sequential order in the Reporting Options Screen.	Voting types order has been corrected.

1.1.3   Initial Assessment of Impact of the Modifications

Review of the modifications listed in section 1.1.2 indicates the need for limited Physical and Functional Configuration Audits, in order to verify that the system continues to meet VVSG 1.0 requirements. All software and firmware modifications will be verified by execution of elections that incorporate steps to verify the modifications, or via test suites designed to specifically focus on the functional changes made to the applicable devices and applications.

1.1.4   Regression Testing

The limited FCA will consider functions that have not changed but may be impacted by the modifications. Each modified component of the system will require a new build. This will be subjected to FCA review at an appropriate level of scrutiny.

All modified components of **Verity Voting 2.6** will be regression tested in order to verify continued compliance to VVSG 1.0. Additionally, end-to-end system level general and open primary elections will be performed to verify proper system operation.

1.2 References

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

1. Election Assistance Commission Voluntary Voting System Guidelines (EAC VVSG 1.0), Version 1.0, 2005.
2. NIST Handbook 150: 2020.
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 Compliance VSTL Quality System Manual, Rev. 3.3, December 17th, 2020.

1.3 Terms and Abbreviations

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

Table 1 – 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 Optical 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.

Term	Abbreviation	Description
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/EMI	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	The testing activities associated with the functional testing of the system.
Institute of Electrical and Electronics Engineers	IEEE	A non-profit 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.).

Term	Abbreviation	Description
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 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.
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.
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.
Voting System Test Lab	VSTL	An independent testing organization accredited by NVLAP and the EAC to conduct voting system testing for EAC certification.

1.4 Testing Responsibilities

The following project schedule contains owner assignments and identifies test procedure (module) development, test case (suite) development, 3rd party tests, and EAC and Manufacturer dependencies.

1.4.1 Project Schedule

The subsections below describe the project schedule.

Task Name	Start	Finish
Hart Verity Voting 2.6 EAC Certification Project Plan	**Mon 11/30/20**	**Fri 5/28/21**
Phase 1 Initiation	**Mon 11/30/20**	**Mon 2/1/21**
Project Initiation	**Mon 11/30/20**	**Mon 11/30/20**
TDP Delivery/Receive Vendor Package	**Mon 11/30/20**	**Mon 2/1/21**
TDP Review	**Tue 12/1/20**	**Fri 1/22/21**
Hardware	**Mon 1/25/21**	**Wed 1/27/21**
FCA Assessment	**Wed 1/13/21**	**Thu 1/14/21**

Phase 2 Trusted Build & Test Readiness	**Fri 12/18/20**	**Thu 2/4/21**
Trusted Build	**Tue 1/12/21**	**Mon 1/25/21**
Test Readiness Review (TRR)	**Fri 12/18/20**	**Thu 2/4/21**
Phase 3 Test Plan	**Thu 2/4/21**	**Fri 3/5/21**
Test Plan Development	**Thu 2/4/21**	**Fri 3/5/21**
Phase 4 Create/Validate	**Tue 2/9/21**	**Wed 2/24/21**
Test Suite Development	**Tue 2/9/21**	**Thu 2/11/21**
Vendor Specific Module and Suite Creation/Validation	**Thu 2/11/21**	**Wed 2/24/21**
Phase 5 Official Execution	**Wed 2/24/21**	**Wed 3/17/21**
Official Test Execution of Test Suites	**Wed 2/24/21**	**Wed 3/17/21**
Phase 6 Reporting to EAC	**Wed 3/17/21**	**Fri 5/14/21**
Certification Test Report and Final Test Plan	**Wed 3/17/21**	**Wed 5/12/21**
Delivery of Artifacts to EAC Repository	**Wed 5/12/21**	**Fri 5/14/21**
Phase 7 Completion	**Wed 5/12/21**	**Fri 5/28/21**
Return Equipment to Vendor	**Wed 5/26/21**	**Fri 5/28/21**
Archive Test Materials	**Wed 5/12/21**	**Thu 5/13/21**
Project Management	**Mon 11/30/20**	**Fri 5/14/21**
Project Management Hours	Mon 11/30/20	Fri 5/14/21

1.4.1.1 Owner Assignments

- System Analysis and Review will be conducted by Source Code Review, Security and Voting Test Engineers, with oversight by the Test Manager.

- Source code review will be conducted by Voting Test Engineers (Source Code Review Specialists), with oversight by the Test Manager.

- Documentation review will be conducted by Security and Voting Test Engineers, with oversight by the Test Manager.

- Test Module Development will be conducted by Security and Voting Test Engineers, with oversight by the Test Manager.

- Test Suite Development will be conducted by Security and Voting Test Engineers, with oversight by the Test Manager.

- Formal Test Execution will be conducted by Security and Voting Test Engineers, with oversight by the Test Manager.

1.4.1.2 Test Module Development

Test Modules will be developed and/or modified to provide repeatable detailed test steps. The Modules are defined at a basic level in SLI Compliance'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 Compliance's formal Test Methods, as well as the VVSG 1.0 requirements.

1.4.1.3 Test Suite Development

Test Suites will be developed to help group and focus testing around key areas of the voting system. The Test Suites will contain multiple test modules providing clear and traceable test scripts and information. Various configurations will be identified within the suites. Potentially, variations of the same suite may be run multiple times to verify different configurations.

1.4.1.4 Trusted Build

Prior to formal test execution, a Trusted Build will be performed, producing software and firmware components for **Verity Data, Verity Build**, **Verity Central, Verity Count, Verity Print**, **Verity Controller, Verity Touch Writer, Verity Touch Writer Duo, Verity Touch Writer Duo Standalone**, **Verity Scan,** and **Verity Relay** in order to include modifications made to those applications.

1.4.1.5 Formal Test Execution

Formal execution of the approved Test Suites and modules will be conducted against the declared voting system to verify the system's compliance with the VVSG requirements.

1.4.1.6 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 built and installed successfully, and complete operational status checks prior to formal test execution.

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

Please see the Project Plan for a detailed listing of all activities within the scope of this test campaign.

1.5 Scope of Testing

1.5.1 Block Diagram
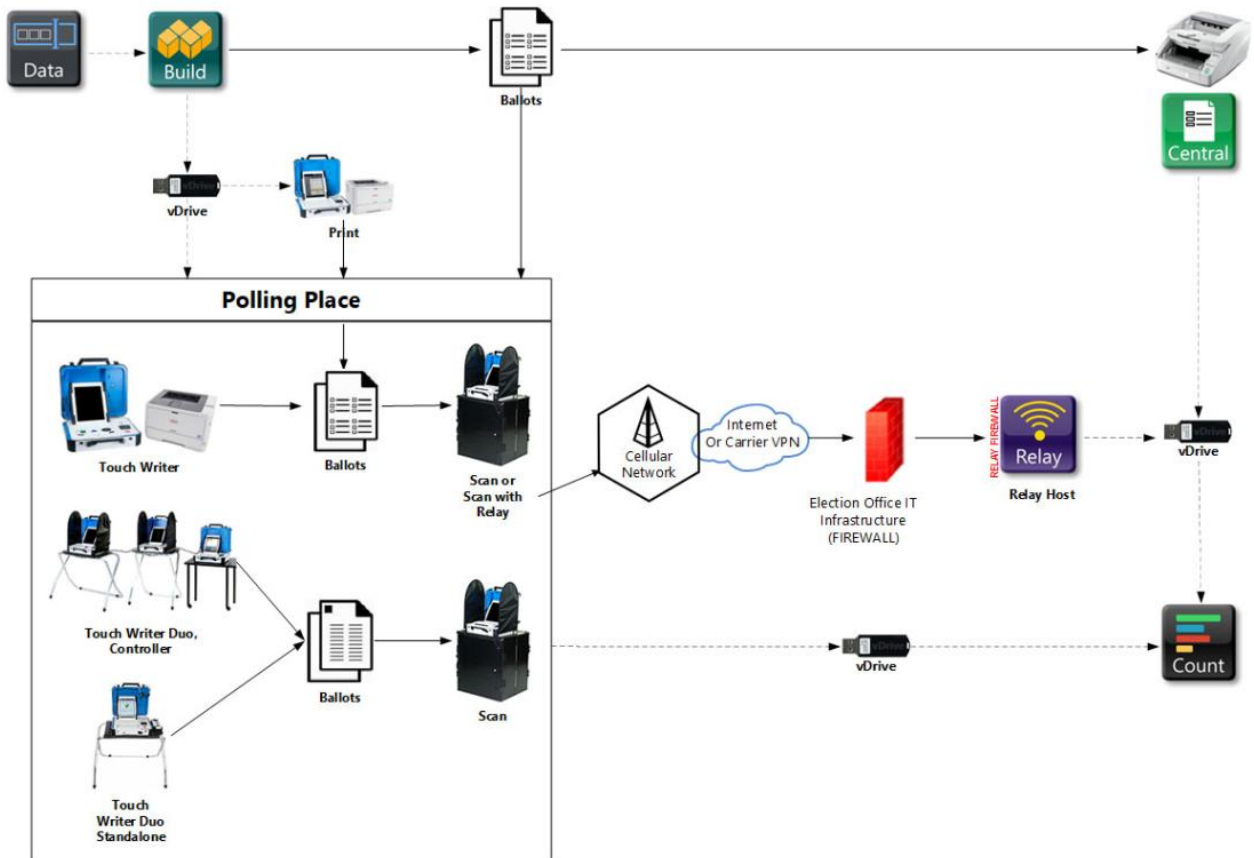
Overview of the diagram:

- 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, Touch Writer Duo Standalone, and Scan may be installed in polling places to support paper-based voting.
- Verity Relay is a remote transmission software application that receives election data transmissions sent by Verity Scan devices equipped with an optional Relay modem accessory.
- Verity Key (not shown) is required for user access into components to

load elections, to use critical features, and to generate reports. Feature access depends on the roles applied to user accounts.

1.5.2   EAC Interpretations – RFI

This Certification Test Plan and the execution of tests for the voting system identified in this plan do not include any additional EAC interpretations.

1.5.3   EAC Notices of Clarification

This Certification Test Plan and the execution of tests for the voting system identified in this plan do not include any additional EAC Notices of Clarification (NOC).

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 2.6** voting system. A full test campaign was conducted by SLI Compliance during the **Verity Voting 2.0** EAC certification project. The **Verity Voting 2.5** release, which was VSTL tested and EAC certified, constitutes the main code base used for the **Verity Voting 2.6** 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 2.6** voting system. Review of Hart's internal testing will be performed during the FCA review.

2.3 Known Field Issues

Review of the "Known Vulnerabilities" database, maintained by SLI Compliance, has provided no known vulnerabilities that relate to the modifications implemented in **Verity Voting 2.6.**

3   MATERIALS REQUIRED FOR TESTING

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

3.1 Software/Firmware

All software and firmware 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 for the execution of hardware, software, telecommunications, and security tests. This includes all supporting software such as operating systems, compilers, assemblers, application software, firmware, any applications used for burning of media, transmission of data or creation/management of databases.

3.1.1   Manufacturer Software/Firmware

The **Hart Verity Voting 2.6** voting system consists of the following software and firmware components:

Table 2 – Manufacturer Software/Firmware

Manufacturer	Application	Version
Verity Data	EMS Software	2.6.0
Verity Build	EMS Software	2.6.0
Verity Central	High-Speed Optical Scanner Software	2.6.0
Verity Count	Central Count Location Tabulation and Report Software	2.6.0
Verity Relay	Data Transmission Software	2.6.0
Verity Scan	Optical Scanner Firmware	2.6.0
Verity Touch Writer	BMD Firmware	2.6.0
Verity Touch Writer Duo	BMD Firmware	2.6.0
Verity Touch Writer Duo Standalone	BMD Firmware	2.6.0
Verity Controller	Firmware	2.6.0
Verity Print	BMD Firmware	2.6.0

3.1.2   COTS Software/Firmware

This section details the Commercial Off The Shelf software and firmware utilized within the **Verity Voting 2.6** system.

Table 3 – COTS Software/Firmware

Manufacturer	Application	Version
Microsoft	Windows 10 Enterprise 2019 LTSC	10.0.17763
Microsoft	Microsoft SQL Server Standard 2017	14.0.1000.169
Microsoft	SQLite	3.28.0
McAfee	McAfee Application Control for Devices ("Solidifier")	8.2.1-143

Manufacturer	Application	Version
Nuance Communications	Nuance Western OCR, Desktop, OEM	V20

3.1.3   Additional Supporting Test Software

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

Table 4 – Additional Supporting Test Software

Manufacturer	Application
CLOC	Count Lines of Code: an open source application used to determine the counts of executable and comment lines.
SLI Compliance	Module Finder: an SLI Compliance proprietary application used to parse module names from source code.
SciTools	Understand: a customizable integrated development environment used for static code analysis.

3.2 Equipment

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

3.2.1   Manufacturer Equipment

The following **Hart Verity Voting 2.6** equipment will be used in testing:

Table 5 – Manufacturer Equipment

Hardware	Model
Verity Controller	3005825
Verity Print	3005356 / 2005856
Verity Scan (digital scanner)	3005350 / 3005800
Verity Touch Writer (BMD)	3005352 / 3005852
Verity Touch Writer Duo (BMD)	3005700
Verity Touch Writer Duo Standalone (BMD)	3005730

3.2.2   COTS Equipment

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

Table 6 – COTS Equipment

Manufacturer	Hardware	Model
OKIDATA (for **Verity Data, Verity Build**, **Verity Central, Verity Count, Verity Relay, Verity Print,** and **Verity Touch Writer**)	Ballot and Report Printer	B431d
OKIDATA (for **Verity Data, Verity Build**, **Verity Central, Verity Count, Verity Relay, Verity Print,** and **Verity Touch Writer**)	Ballot and Report Printer	B432dn
OKIDATA (for **Verity Data, Verity Build,** and **Verity Print**)	Ballot Printer	C831dn
OKIDATA (for **Verity Data, Verity Build,** and **Verity Print**)	Ballot Printer	C844dn
OKIDATA (for **Verity Data** and **Verity Build**)	Ballot Printer	C911dn
OKIDATA (for **Verity Data** and **Verity Build**)	Ballot Printer	C931e
Hewlett-Packard Z4 G4 (for **Verity Data, Verity Build**, **Verity Central**, **Verity Count**, **Verity Relay**)	Verity Workstation (Minimum Requirements) Processor – x86-compatible, 3.0GHz, Quad Core Memory – 64GB 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 functionality	
Hewlett-Packard Z240 (for **Verity Data, Verity Build**, **Verity Central**, **Verity Count**)	Verity Workstation (Minimum Requirements) Processor – x86-compatible, 3.0GHz, Quad Core Memory – 64GB 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	

Manufacturer	Hardware	Model
	Keyboard - USB Keyboard Mouse - USB Mouse No wireless functionality	
Hewlett-Packard P244 Monitor (for **Z4 G4** workstations)	**Verity Display** Panel Active Area – 52.7x29.64 cm Aspect Ratio - 16:9 Optimal Resolution – FHD 1920x1080 @ 60 Hz Contrast Ratio - 1000:1 static, 10000000:1 dynamic Brightness - 250 cd/m^2	
Hewlett-Packard P24 G4 24 Monitor (for **Z4 G4** workstations)	**Verity Display** Panel Active Area – 52.7x29.4 cm Aspect Ratio - 16:9 Optimal Resolution – FHD 1920x1080 @ 60 Hz Contrast Ratio - 1000:1 static, 8000000:1 dynamic Brightness - 250 cd/m^2	
Hewlett-Packard P232 Monitor (for **Z240** workstations)	**Verity Display** Panel Active Area – 52.92x28.64 cm Aspect Ratio - 16:9 Optimal Resolution – 1920x1080 @ 60 Hz Contrast Ratio - 1000:1 static, 5000000:1 dynamic Brightness - 250 cd/m^2	
Canon (for **Verity Central**)	Ballot Scanner	DR-G1100 DR-G1130 DR-G2110 DR-G2140

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 2.6** system.

- 6641-048 A00_Verity_2.6_Administrators Guide_Data
- 6641-049 A00_Verity_2.6_Administrators Guide_Build
- 6641-050 A00_Verity_2.6_Administrators Guide_Central
- 6641-051 A00_Verity_2.6_Administrators Guide_Count
- 6641-052 A00_Verity_2.6_Administrators Guide_Relay
- 6641-053 A00_Verity_2.6_System Administrators Guide
- 6643-010 A00_Verity_2.6_Support Procedures Guide
- 6651-046 A00_Verity_2.6_Polling Place Field Guide - CDS
- 6651-047 A00_Verity_2.6_Polling Place Field Guide - DS
- 6651-048 A00_Verity_2.6_Polling Place Field Guide - SW
- 6651-049 A00_Verity_2.6_Polling Place Field Guide - SRW
- 6651-050 A00_Verity_2.6_Verity Print Field Guide
- 6653-010 A00_Verity_2.6_Device Troubleshooting Field Guide
- 6673-010 E_Verity_Relay Implementation Process
- 6675-011 A_Verity_OKI B432 Tray Extension Kit Installation
- All-In-One Code Framework Coding Standards
- Configuration Management Process 1001074 D01
- Continual Improvement Process 1000550 E02
- Control of Nonconforming Product Procedure 1000657 B02
- Device Configuration Process Document 4005523 B00
- Device OS Creation and Configuration Process Document Verity 2.5 4005675 A00
- Device Win10 Creation Process Document Verity 4005676 A00
- Document Control Procedure 1000538 E06
- Factory TUV SUD inspection 2020 December report signed
- Hardware 2005713-CFAST Door Security Kit Design
- Hardware 3005018-ATI Kit Design
- Hardware 3005174-AutoBallot Kit Design
- Hardware 3005350-Scan Design
- Hardware 3005352-Touch Writer Design
- Hardware 3005356-Print Design
- Hardware 3005357-Ballot Box Design
- Hardware 3005358-Standard Booth Design
- Hardware 3005359-Accessible Booth Design
- Hardware 3005700-Touch Writer Duo Design

- Hardware 3005730-Touch Writer Duo Standalone Design
- Hardware 3005800-Scan Design
- Hardware 3005801-Accessible Booth With ATI Tray Design
- Hardware 3005825-Controller Design
- Hardware 3005852-Touch Writer Design
- Hardware 3005856-Print Design
- Hardware 3005905-Duo Go Design
- Hardware Design Development Procedure 1000513 D01
- Hardware PCB Photos
- Hardware Verification and Validation Process 1000514 D01
- Hart Safety Certificate U8 17 10 90917 004
- Hart Safety Certificate U8 090917 0006
- Hart Safety Certificate U8 090917 0008 Rev. 00
- Hart Secure Ballot Stock Specification 4005526 A01
- HP Z4 G4 Verity Win10 Workstation Manufacturing 4005670 A01
- HP Z240 Verity Win10 Workstation Manufacturing 4005673 A01
- Quality Manual 1000490 D04
- Record Retention Matrix 1000510 E02
- Software Design Development Procedure 1000566 D02
- Software Production 1000551 E01
- Software Test Design Development 1000508 D02
- Software Verification and Validation Process 1000560 D02
- Software Versioning Procedure 1001070 C05
- SQA Requirements Management Process 1000540 A02
- Supplier Qualification and Management 1000563 C02
- The Creation and Configuration of the Access Build Environment 4005517 A01
- The Creation and Configuration of the MCU Build Environment 4005519 A02
- The Creation and Configuration of the Trusted Build Environment 4005518 A04
- Verity 2.6 Implementation Statement 4005685 A00
- Verity 2.6 Notice of Protected Information 1000784 A00
- Verity 2.6 TDP Abstract 1000783 A00
- Verity 2.6 VVSG 1.0 TDP Trace
- Verity 2.6.X COTS List
- Verity Airgap Interface Technical Reference 4005512 A02
- Verity Application Framework TRD 4005634 A00
- Verity Application Installer Build Process Document Verity 2.6 4005684 A00
- Verity Application Programming Interface Specification 4005604 A04
- Verity Ballot Creation TRD 4005636 A00
- Verity Base Station Microcontroller Specification 4005462 A01

- Verity Build TRD 4005628 A00
- Verity Central TRD 4005632 A00
- Verity Coding Standard 4005498 A14
- Verity Controller TRD 4005624 A01
- Verity Count TRD 4005629 A01
- Verity Cuyahoga (Verity 2.6) Modification TRD 4005683 A00
- Verity Data TRD 4005627 A00
- Verity Database Attributes 4005543 C05
- Verity Device Suite TRD 4005621 A00
- Verity Election Definition Data TRD 4005639 A01
- Verity Election Management TRD 4005631 A00
- Verity Electronics Specification 4005461 A21
- Verity Entity Relationship Diagram Database - Devices
- Verity Entity Relationship Diagram Database - Servers (Count Only)
- Verity Entity Relationship Diagram Database - Servers (No Count)
- Verity Key Design 4005514 A02
- Verity Logging TRD 4005635 A00
- Verity Omni Modification TRD 4005655 A01
- Verity Operational Environment 4005515 C16
- Verity PC Application Framework User Interface Design Document
- Verity Performance Characteristics 4005497 C03
- Verity Print TRD 4005626 A00
- Verity Redstone Modification TRD 4005671 A01
- Verity Relay Theory of Operations 4005571 A06
- Verity Risk and Threat Assessment 4005513 C05
- Verity Scan TRD 4005623 A00
- Verity Security Requirements 4005464 A07
- Verity Shared Device User Interface Design Document
- Verity Software Architecture-Design 4005463 B02
- Verity Summative Usability Report 4005496 A00
- Verity Summative Usability Test Plan 4005495 A01
- Verity Supply Chain PRD 4005302 C01
- Verity Touch Writer Duo Base Station Microcontroller Specification 4005638 A00
- Verity Touch Writer Duo TRD 4005625 A00
- Verity Touch Writer TRD 4005622 A00
- Verity User Management TRD 4005630 A00
- Verity Vote Counting and Cast Vote Records TRD 4005640 A00
- Verity Voting 2.6 Change Notes 4005686 A00
- Verity Voting 2.6 Usability Impact Statement
- Verity Voting National Certification Test Specification 4005527 B05
- VirTex Q01 Quality Manual Rev R

- Voting System Implementation and Maintenance 1000745 C02
- VSTL Product Submission Procedure 1000565 D02
- Workstation Configuration Process Document Verity 2.5 4005678 A02
- Workstation Win10 Creation Process Document Verity 2.5 4005677 A00

4   TEST SPECIFICATIONS

The following are the specifications for testing to be conducted on the **Hart Verity Voting 2.6** system. The specifications contain details on the focus of testing, configuration(s), and the functions to be tested.

4.1 Requirements

The **Verity Voting 2.6** modified voting system will be tested to requirements within the VVSG 1.0 sections listed below:

- 2.1.1 Security
- 2.1.6 Election Management System
- 2.1.7.2 Voting Variations
- 2.2 Pre-voting Capabilities
- 2.2.4 Readiness Testing
- 2.3 Voting Capabilities
- 2.4 Post-voting Capabilities
- 3.1.2 Functional Capabilities
- 7 Security Requirements

4.2 Hardware Configuration and Design

The **Hart Verity Voting 2.6** 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 a COTS printer to produce unmarked paper ballots.
- At the precinct level, **Verity Scan** optical scanners, **Verity Touch Writer** BMD, **Verity Touch Writer Duo** BMD, and **Verity Touch Writer Duo Standalone** BMD configurations are employed. Additionally, **Verity Scan** may be equipped with an optional accessory modem for wireless transmission.
- 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.
- **Verity Relay** is a remote transmission software application that receives election data transmissions sent by Verity Scan devices equipped with an optional Relay modem accessory.

4.3 Test Suite Design

4.3.1 Software Functional Test Design and Data

SLI Compliance will prepare functional test modules using the operator/user procedures specified in the TDP. Functionality provided by the **Verity Voting 2.6** 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 Compliance incorporates system level suites that employ modules that exercise the individual functional components of the system.

Following analysis of the changes incorporated into the **Verity Voting 2.6** voting system, these test suites will be implemented:

General Election – The full **Verity Voting 2.6** voting system will be reviewed in order to verify proper integration of the voting system and that all components continue to work as expected.

Modifications – The modifications to each component and software application will be given focused testing in order to verify that the modifications implemented do not adversely affect operations. Elections will be designed and utilized, in some instances repeated, in order to test functionality related to contests where no candidates have been filed as well as the new voting types that are now supported.

Open Primary Election – The full **Verity Voting 2.6** voting system will be reviewed in order to verify proper integration of the voting system and that all components continue to work as expected.

Security – A general security review of the system will be performed to ensure no new security threat has been introduced to the system as a result of the modifications implemented. In any instance where an anomaly or possible security flaw is identified, the potential risk will be evaluated and reported.

Verity Count – The functionality of the **Verity Count** application will be given focused testing in order to verify that the modifications implemented do not produce any adverse effects.

Verity Data/Build – The functionality of the **Verity Data/Build** application will be given focused testing in order to verify that the modifications implemented do not produce any adverse effects.

4.4 TDP Evaluation

SLI Compliance is completing an assessment of the deliveries in the Technical Data Package for **Verity Voting 2.6** against the **Verity Voting 2.5** TDP. Any modification to previously reviewed documentation will be evaluated.

SLI Compliance will conduct a PCA review of all new or modified vendor traced documents submitted for review in the delivery of the **Verity Voting 2.6** TDP. Documents are verified for compliance to the VVSG 1.0, Volume 2, Sections 2.2 through 2.13 and Volume 2, Section 6.6.

Any subsequent re-deliveries of the TDP items will be solely the result of fixes to discrepancies identified in the remaining FCA or PCA activities.

4.5 Source Code Review

The certification campaign for the **Hart Verity Voting 2.6** voting system includes modified software and firmware that have been created as proprietary to **Hart,** as well as review of any commercial off the shelf products. SLI Compliance has conducted a source code review of all modified proprietary source code, and modified COTS products, submitted in the delivery of the voting system TDP for compliance to the EAC VVSG v 1.0, Volume 2, Section 6.6.

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

- C
- C++
- C#

Source code review Tools utilized by SLI Compliance include:

- <u>LocMetrics Line Counter:</u> a commercial application used to determine the counts of executable and comment lines.
- <u>Module Finder</u>: an SLI Compliance proprietary application used to parse module names from C/C++ and VB code and populate the identified module names into the review documents.
- <u>Understand</u>: a customizable integrated development environment used for static code analysis.

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

COTS operating systems and software used in the voting system have been verified as authentic and unmodified in the **Verity Voting 2.6** test campaign.

4.6 Trusted Build

The Trusted Build process for Hart Verity 2.6 was devised to allow for the build to be performed remotely under the supervision of an SLI Compliance Voting System Test

Engineer, to preserve the security of the Hart Trusted Build process, and to maintain SLI Compliance's chain of custody. This process received a single case approval from the EAC. The steps for this process included the following:

- Preparation for the Trusted Build – Obtaining and reviewing Hart's procedure for constructing the build platform, verifying the target build platform, and verifying the proper contents of the source code package were extracted to the target build platform via hash codes.

- Execution of the Trusted Build – SLI Compliance performed the Trusted Build by using the step-by-step build procedure, as provided by Hart to create a pristine build environment. SLI Compliance observed the following items throughout the build process:

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

- Deliverables to Testing – Upon completion of the Trusted Build, the product installs were created and installed on equipment at Hart's facility. Each device had a unique serialized security seal applied that was verified by SLI Compliance upon receipt. In addition, certain items were sent to the SLI Compliance test group:

    o Final software install files
    o Workstation base OS images
    o Workstation product images
    o Build output hash values to validate install files
    o Workstation and device hash files
    o Tamper seal application evidence
    o Build server artifacts

- Final Record Keeping and Archiving Procedures – At the conclusion of the Trusted Build process, SLI Compliance completed all final record keeping and archiving procedures at SLI Compliance'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. Hash files of the build outputs were verified against the hash files obtained from the devices to ensure the contents of the installed images. Tamper seals codes were verified and confirmed to be intact.

4.7 Standard VSTL Test Methods and Uncertainty of Test Data Measurement

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

5 TEST DATA

Test data for the **Hart Verity Voting 2.6** voting system will be compiled such that all modified functionality declared will be tested to determine conformance to the standards.

5.1 Data Recording

SLI Compliance will evaluate the modified system functionality, as described by **Hart** technical documentation, as well as requirements as listed in the EAC VVSG v 1.0, and make determinations as to expected results of all data inputs into the **Hart Verity Voting 2.6** 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, populating test modules with exact expected data for the function being tested.

Testing information is recorded in the test suites and test notebooks, which are utilized according to SLI Compliance's relevant standard lab procedures.

6 TEST PROCEDURE AND CONDITIONS

This section describes the test conditions and procedures for execution of test suites. If a particular sequence is mandatory for the execution of suites, a rationale will be given. Additionally, this section describes procedures for setting up equipment to be utilized in the execution of the test suites.

6.1 Facility Requirements

Testing will be performed on site at SLI Compliance in Colorado.

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 to determine whether 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: 64°F - 79°F (17.7°C - 26.1°C)
- Relative Humidity: 20 to 90%
- Atmospheric Pressure: Local Site Pressure

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

6.2 Test Setup

Configurations of **Verity Voting 2.6** will be deployed that conform to each specific test suite's needs. In all instances **Verity Voting 2.6** 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. Tasks and any applicable predecessor tasks are identified within each suite for the test cases.

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 module precludes attempting subsequent test modules, the latter will be marked as NT.

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

Issues encountered during review and testing will be documented on the Discrepancy Report. 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 Signature

Traci Mapps
Director, SLI Compliance
March 29th, 2021

End of Modification Test Plan