

Certification Test Report - Modification

Report Number HIN-19003-CTR-01

Hart InterCivic Verity Voting 2.4

Certification Test Report Rev 1.0

Prepared for:

Vendor Name	<i>Hart InterCivic Inc. (Hart)</i>
Vendor System	<i>Verity Voting 2.4</i>
EAC Application No.	<i>HRT-Verity-2.4</i>
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Accredited by the National Institute of Standards and Technology (NIST) National Voluntary Lab Accreditation Program (NVLAP) and accredited by the Election Assistance Commission (EAC) for VSTL status.



Revision History

Date	Release	Author	Revision Summary
January 9 th , 2020	1.0	J. Panek	Initial Draft
January 24 th , 2020	1.1	J. Panek	Updates to address EAC comments

Disclaimer

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

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- Verity is a trademark of Hart InterCivic Inc.
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The tests referenced in this document were performed in a controlled environment using specific systems and data sets, and results are related to the specific items tested. Actual results in other environments may vary.

Opinions and Interpretations

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

Other Labs Performing Hardware Testing

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

Laboratory	Address
NTS – EMI / EMC	1736 Vista View Dr. Longmont, CO 80504
NTS – Environmental / Dynamic	1601 Dry Creek Dr. Suite 200 Longmont, CO 80503



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1 Introduction

SLI Compliance is submitting this report as a summary of the certification testing efforts for the **Hart Verity Voting 2.4** voting system against the Voluntary Voting System Guidelines 1.0 (VVSG 1.0). The purpose of this document is to provide an overview of the certification testing effort and the findings of the testing effort for the **Verity Voting 2.4** system.

This test campaign included review of updates made to the Technical Data Package, source code review, and testing of the **Hart Verity Voting 2.4** voting system. The process consisted of the development of a test plan, managing system configurations, executing component and system level tests prepared by SLI, and analysis of results. The review and testing were performed at SLI's Wheat Ridge, Colorado facility, from August 14th, 2019 to January 9th, 2020.

1.1 References

1. Election Assistance Commission Voluntary Voting System Guidelines version 1.0 (EAC VVSG 1.0), Volumes I and II
2. NIST Handbook 150: 2016
3. NIST Handbook and 150-22: 2017
4. EAC Voting System Testing and Certification Program Manual, United States Election Assistance Commission, v 2.0, May 2015
5. SLI VSTL Quality System Manual, v 3.1, prepared by SLI, dated June 28th, 2019

1.2 Document Overview

This document contains the following sections:

- System Identification identifies hardware and software for the **Verity Voting 2.4** system.
- System Overview discusses the functionality of **Verity Voting 2.4** system software and firmware.
- Certification Test Background is a summary of the testing process.
- Certification Test Results Summary contains the results and analysis of the testing effort.
- Attachments:
 - Attachment A – Warrant of Change Control
 - Attachment B – Attestation of Durability for Verity Voting
 - Attachment C – Attestation of Integrity for Verity Voting
 - Attachment D – Attestation of Production Hardware and Software for Verity Voting
 - Attachment E – Verity 2.4.2 Record of Trusted Build



- Attachment F1 - Hart Verity Voting 2.4 Modification Test Plan As Run v1.2
- Attachment F2 - Hart Verity 2.4 EAC Electrical Hardware Test Plan v1.1
- Attachment F3 - Hart Verity 2.4 EAC Temp Power Var. Hardware Test Plan v1.2
- Attachment G – Verity Voting 2.4 Discrepancy Report
- Attachment H1 – Immunity Test Report for Verity Touch & Touch with Access
- Attachment H2 – Radiated and Conducted Emissions Test Report for Verity Touch & Touch with Access
- Attachment H3 – Immunity Test Report for Verity Touch Writer
- Attachment H4 – Radiated and Conducted Emissions Test Report for Verity Touch Writer
- Attachment H5 – Environmental Hardware Test Report for Verity Central

1.3 Terms and Abbreviations

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

Table 1 – Terms and Abbreviations

Term	Abbreviation	Description
Ballot Marking Device	BMD	An accessible computer-based voting system that produces a marked paper ballot that is the result of voter interaction with visual or audio prompts.
Cast Vote Record	CVR	Record of all selections made by a single voter whether in electronic or paper. Also referred to as a ballot image when used to refer to electronic ballots.
Central Count Scanner	CCS	High Speed Digital Scanner is a ballot scanning device typically located at a central count facility and is operated by an automated multi-sheet feeding capability.
Chevron (Arrows at top of current screen)	No Abbreviation	Verity software applications are organized around easy-to-follow workflows, with specific activities associated with “chevrons” or “arrows” in the application user interface.
Compact Flash card	CF	This is a type of flash memory card in a standardized enclosure often used in voting systems to store ballot and/or vote results data.



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



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



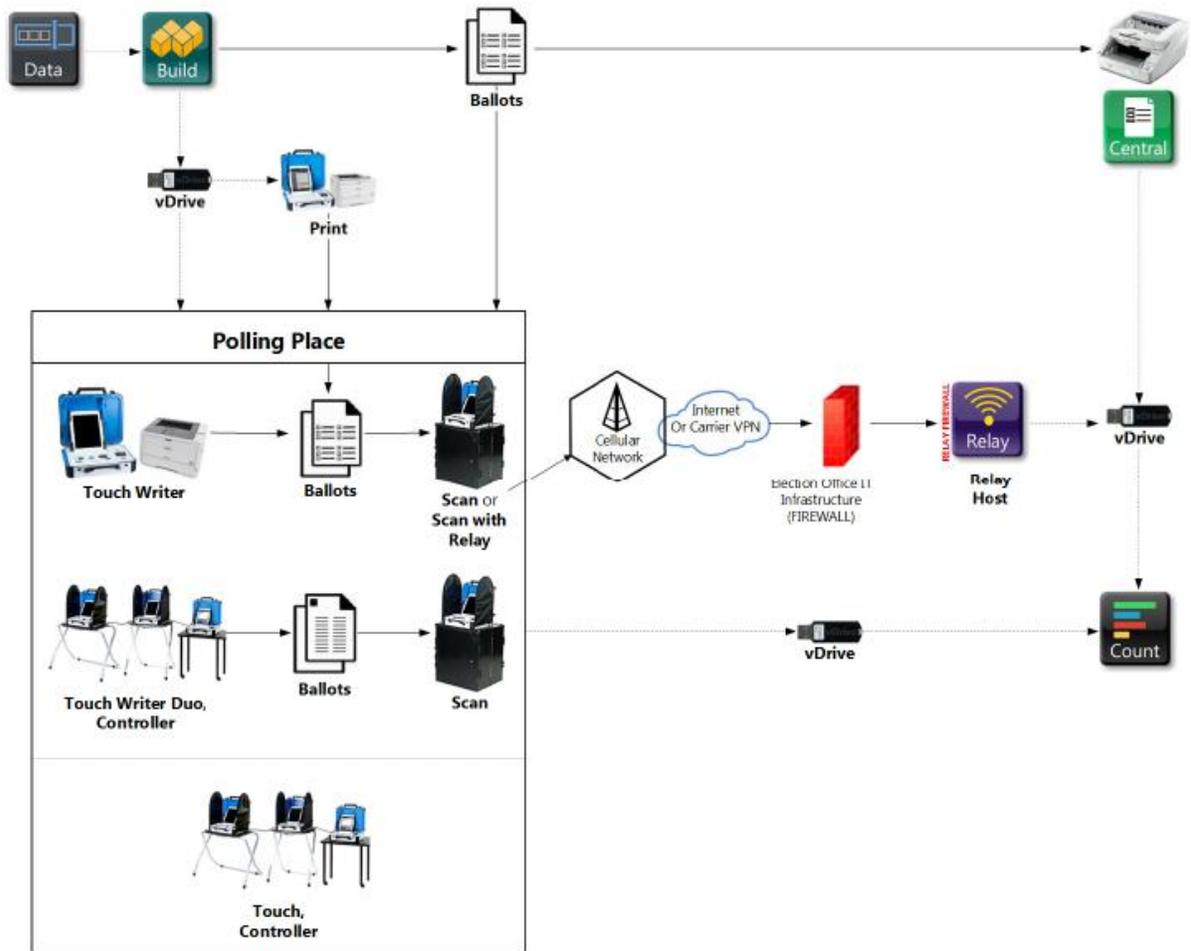
Term	Abbreviation	Description
		software, firmware components of each voting system.
Test Method	No Abbreviation	SLI proprietary documents which are designed to group sets of EAC VVSG requirements in a logical manner that can be utilized to efficiently validate where and how requirements, or portions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

2 System Identification

This section details the scope of the **Verity Voting 2.4** voting system and associated components.

The **Verity Voting 2.4** system is composed of software applications, central count location devices and polling place devices with accompanying firmware, and COTS hardware and software.

2.1 System Diagram



Overview of the diagram:

- The components are displayed as touch points of data access, transfers, and verification.
- Dotted lines show the flow of data and air gaps using **Verity vDrives** and are also used to separate the deployment models shown within the polling place.



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

2.2 Software and Firmware

The software and firmware employed by **Verity Voting 2.4** consists of 2 types, custom and commercial off the shelf (COTS). COTS applications were verified to be pristine or were subjected to source code review for analysis of any modifications and verification of meeting the pertinent standards.

The tables below detail each application employed by the **Verity Voting 2.4** system.

Table 2 – Software and Firmware

System Component	Application(s)	Version
Verity Data	Ballot setup and configuration software	2.4.2
Verity Build	EMS software	2.4.2
Verity Central	High-speed digital scanner software	2.4.2
Verity Count	Central count location accumulation, tallying, and reporting software	2.4.2
Verity Relay	Data transmission software	2.4.2
Verity Scan	Digital scanner firmware	2.4.2
Verity Touch Writer	BMD firmware	2.4.2
Verity Touch Writer Duo	BMD firmware	2.4.2
Verity Controller	Verity device firmware	2.4.2
Verity Touch	DRE firmware	2.4.2



System Component	Application(s)	Version
Verity Touch with Access	DRE firmware	2.4.2
Verity Print	Printer firmware	2.4.2

Table 3 – COTS Software and Firmware

Description	Version
Verity Data/Build	
Microsoft Windows Embedded Standard 7, Service Pack 1	6.1.7601
Microsoft SQL Server 2012 for Embedded Systems License	11.00.2100
McAfee Application Control for Devices (McAfee Solidifier)	8.2.1-143
Verity Central	
Microsoft Windows Embedded Standard 7, Service Pack 1	6.1.7601
Microsoft SQL Server 2012 for Embedded Systems License	11.00.2100
McAfee Application Control for Devices (McAfee Solidifier)	8.2.1-143
Verity Count	
Microsoft Windows Embedded Standard 7, Service Pack 1	6.1.7601
Microsoft SQL Server 2012 for Embedded Systems License	11.00.2100
McAfee Application Control for Devices (McAfee Solidifier)	8.2.1-143
Verity Relay	
Microsoft Windows Embedded Standard 7, Service Pack 1	6.1.7601
Microsoft SQL Server 2012 for Embedded Systems License	11.00.2100
McAfee Application Control for Devices (McAfee Solidifier)	8.2.1-143
Verity Print	
Microsoft Windows Embedded Standard 7, Service Pack 1	6.1.7601
Microsoft SQL Server 2012 Express License	11.00.2100
McAfee Application Control for Devices (McAfee Solidifier)	8.2.1-143
Verity Scan – Paper Ballot Scanner	
Microsoft Windows Embedded Standard 7, Service Pack 1	6.1.7601
Microsoft SQL Server 2012 Express License	11.00.2100
McAfee Application Control for Devices (McAfee Solidifier)	8.2.1-143
Nuance Western OCR, Desktop, OEM	V20



Verity Touch Writer – Electronic BMD Device	
Microsoft Windows Embedded Standard 7, Service Pack 1	6.1.7601
Microsoft SQL Server 2012 Express License	11.00.2100
McAfee Application Control for Devices (McAfee Solidifier)	8.2.1-143
Verity Touch Writer Duo – Electronic BMD Device	
Microsoft Windows Embedded Standard 7, Service Pack 1	6.1.7601
Microsoft SQL Server 2012 Express License	11.00.2100
McAfee Application Control for Devices (McAfee Solidifier)	8.2.1-143
Verity Controller – Networked Centralized Management Device	
Microsoft Windows Embedded Standard 7, Service Pack 1	6.1.7601
Microsoft SQL Server 2012 Express License	11.00.2100
McAfee Application Control for Devices (McAfee Solidifier)	8.2.1-143
Verity Touch - Electronic DRE Device	
Microsoft Windows Embedded Standard 7, Service Pack 1	6.1.7601
Microsoft SQL Server 2012 Express License	11.00.2100
McAfee Application Control for Devices (McAfee Solidifier)	8.2.1-143
Verity Touch with Access - Electronic DRE Device	
Microsoft Windows Embedded Standard 7, Service Pack 1	6.1.7601
Microsoft SQL Server 2012 Express License	11.00.2100
McAfee Application Control for Devices (McAfee Solidifier)	8.2.1-143

2.3 Equipment (Hardware)

The hardware employed by **Verity Voting 2.4** consists of 2 types, custom and commercial off the shelf (COTS). COTS hardware was verified to be pristine or was subjected to review for analysis of any modifications and verification of meeting the pertinent standards.

The tables below detail each device employed by the **Verity Voting 2.4** system.

Table 4 – Equipment (Hardware)

Hardware Description	Version
Verity Print – Ballot Printer	3005356 Rev E
Verity Print – Ballot Printer (Updated device for tablet electronics obsolescence)	3005856 Rev B



Verity Scan – Paper Ballot Scanner	3005350 Rev I
Verity Scan – Paper Ballot Scanner (Updated device for tablet electronics obsolescence)	3005800 Rev B
Verity Touch Writer – Electronic BMD Device	3005352 Rev H
Verity Touch Writer – Electronic BMD Device (Updated device for tablet electronics obsolescence)	3005852 Rev B
Verity Touch Writer Duo – Electronic BMD Device	3005700 Rev B
Verity Controller – Networked Centralized Management Device	3005351 Rev E
Verity Controller – Networked Centralized Management Device (Updated device for tablet electronics obsolescence)	3005825 Rev B
Verity Touch - Electronic DRE Device	3005355 Rev E
Verity Touch - Electronic DRE Device (Updated device for tablet electronics obsolescence)	3005854 Rev B
Verity Touch with Access - Electronic DRE Device	3005353 Rev F
Verity Touch with Access - Electronic DRE Device (Updated device for tablet electronics obsolescence)	3005853 Rev B

Table 5 – COTS Equipment

COTS Hardware Description	Version
Verity Data/Build	
Verity Data and Build Applications and Workstation Kit <ul style="list-style-type: none"> • HP Z240 Workstation • HPZ230 Workstation supported for existing customers only • Verity Data Software • Verity Build Software 	C
OKI Data C831dn Color Printer for existing customers only	N35100A
OKI Data C844dn Color Printer	N35301A
OKI Data C911dn Color Printer for existing customers only	N36100A
OKI Data C931e Color Printer	N36100A
OKI Data B432dn Mono Report and Ballot Printer	N22500A
OKI Data B431d Mono Report Printer for existing customers only	N22202A
8-port Ethernet Switch	1405-8GV3
Vinpower Digital USB Duplicator 7-targets	USBShark-7T-BK
Vinpower Digital USB Duplicator 23-targets	USBShark-23T-BK



Verity Central	
Verity Central Applications and Workstation Kit <ul style="list-style-type: none"> • HP Z240 Workstation • HPZ230 Workstation supported for existing customers only • Verity Central Software 	C
Canon DR G1100 High-Speed Scanner	M111181
Canon DR G1130 High-Speed Scanner	M111171
Canon DR-G2110 High-Speed Scanner	6130030
Canon DR-G2140 High-Speed Scanner	6130020
OKI Data B432dn Mono Printer Report printer	N22500A
OKI Data B431d Mono Report Printer for existing customers only	N22202A
8-port Ethernet Switch	1405-8GV3
Verity Count	
Verity Count Applications and Workstation Kit <ul style="list-style-type: none"> • HP Z240 Workstation or HP Z230 Workstation • HP Z230 Workstation supported for existing customers only • Verity Count Software 	C
OKI Data B432dn Mono Report printer	N22500A
OKI Data B431d Mono Report Printer for existing customers only.	N22202A
8-port Ethernet Switch	1405-8GV3
Verity Relay	
Verity Relay Applications and Workstation Kit <ul style="list-style-type: none"> • HP Z240 Workstation • Verity Relay Software 	A
OKI Data B432dn Mono Report printer	N22500A
OKI Data B431d Mono Report Printer for existing customers only.	N22202A
8-port Ethernet Switch	1405-8GV3
Verity Print	
OKI Data C831dn Color Printer	N35100A
OKI Data B432dn Mono Blank Ballot Printer	N22500A
OKI Data C844dn Color Printer	N35301A
OKI Data B431d Mono Printer for existing customers only	N22202A
Optional AutoBallot Barcode Scanner Kit	B



Includes the following 2d barcode scanner: <ul style="list-style-type: none"> Hart part number: 1003672 Motorola/Zebra part number: DS4308 	
Verity Scan – Paper Ballot Scanner	
Verity Ballot Box	B
Optional Relay Accessory kit (4G LTE Cat-M1)	A
Optional Relay Accessory kit (Aeris, EV-DO) for existing customers only	A
Optional Relay Accessory kit (HSDPA+, Global) for existing customers only	A
Verity Touch Writer – Electronic BMD Device	
OKI Data B432dn Mono Marked Ballot Printer	N22500A
OKI Data B431d Mono Report Printer for existing customers only	N22202A
Accessible Voting Booth	D
Optional AutoBallot Barcode Scanner Kit Includes the following 2d barcode scanner: <ul style="list-style-type: none"> Hart part number: 1003672 Motorola/Zebra part number: DS4308 	B
Headphones <ul style="list-style-type: none"> Brand: V7, part number HA300-2NP 	2005230
Verity Touch Writer Duo – Electronic BMD Device	
Brother PJ700 Series Thermal Printer	PJ723
Accessible Voting Booth with ATI Tray	D
Standard Voting Booth	D
Optional detachable ATI Kit	A
Optional Headphones for ATI Kit <ul style="list-style-type: none"> Brand: V7, part number HA300-2NP 	2005230
Verity Controller	
Optional AutoBallot Barcode Scanner Kit Includes the following 2d barcode scanner: <ul style="list-style-type: none"> Hart part number: 1003672 Motorola/Zebra part number: DS4308 	B
Verity Touch - Electronic DRE Device	
Standard Voting Booth	D



Verity Touch with Access - Electronic DRE Device	
Accessible Voting Booth	D
Headphones <ul style="list-style-type: none"> • Brand: V7, part number HA300-2NP 	2005230

2.4 Documentation

The documents that are a part of the examination of the **Verity Voting 2.4** system are listed in the table below:

Table 6 – Documentation

Document Title	Version
All-In-One Code Framework Coding Standards.pdf	© 2014 Microsoft Corporation
Change Notes Verity Voting 2.4.0 to 2.4.1 4005659 A00.pdf	A.00
Change Notes Verity Voting 2.4.1 to 2.4.2 4005660 A00.pdf	A.00
Configuration Management Process 1001074 D01.pdf	D.01
Continual Improvement Process 1000550 E02.pdf	E.02
Control of Nonconforming Product Procedure 1000657 B02.pdf	B.02
Device Configuration Process Document 4005523 B00.pdf	B.00
Device OS Creation and Configuration Process Document Verity 2.4 4005563 A02.pdf	A.02
Device WES7 Creation Process Document Verity 4005562 A01.pdf	A.01
Document Control Procedure 1000538 E05.pdf	E.05
Factory TUV SUD inspection 2019 June report signed.pdf	N/A
Hardware 2005713-CFAST Door Security Kit Design.pdf	B
Hardware 3005018-ATI Kit Design.pdf	A
Hardware 3005174-AutoBallot Kit Design.pdf	B
Hardware 3005350-Scan Design.pdf	I
Hardware 3005351-Controller Design.pdf	E
Hardware 3005352-Touch Writer Design.pdf	H
Hardware 3005353-Touch with Access Design.pdf	F
Hardware 3005355-Touch Design.pdf	E
Hardware 3005356-Print Design.pdf	E



Document Title	Version
Hardware 3005357-Ballot Box Design.pdf	D
Hardware 3005358-Standard Booth Design.pdf	C
Hardware 3005359-Accessible Booth Design.pdf	D
Hardware 3005700-Touch Writer Duo Design.pdf	B
Hardware 3005800-Scan Design.pdf	B
Hardware 3005801-Accessible Booth With ATI Tray Design.pdf	A
Hardware 3005825-Controller Design.pdf	B
Hardware 3005852-Touch Writer Design.pdf	B
Hardware 3005853-Touch with Access Design.pdf	B
Hardware 3005854-Touch Design.pdf	B
Hardware 3005856-Print Design.pdf	B
Hardware Design Development Procedure 1000513 D01.pdf	D.01
Hardware PCB Photos.pdf	N/A
Hardware Verification and Validation Process 1000514 D01.pdf	D.01
Hart Safety Certificate U8 17 10 90917 004.pdf	N/A
Hart Safety Certificate U8 090917 0006.pdf	N/A
Hart Secure Ballot Stock Specification 4005526 A01.pdf	A.01
HPQC Test Cases	N/A
Quality Manual 1000490 D04.pdf	D.04
Record Retention Matrix 1000510 E02.pdf	E.02
Software Design Development Procedure 1000566 D02.pdf	D.02
Software Production 1000551 E01.pdf	E.01
Software Test Design Development 1000508 D02.pdf	D.02
Software Verification and Validation Process 1000560 D02.pdf	D.02
Software Versioning Procedure 1001070 C04.pdf	C.04
SQA Requirements Management Process 1000540 A02.pdf	A.02
Supplier Qualification and Management 1000563 C02.pdf	C.02
The Creation and Configuration of the Access Build Environment 4005517 A01.pdf	A.01



Document Title	Version
The Creation and Configuration of the MCU Build Environment 4005519 A02.pdf	A.02
The Creation and Configuration of the Trusted Build Environment 4005518 A03.pdf	A.03
Verity 2.4 Implementation Statement 4005652 A05.pdf	A.05
Verity 2.4 Notice of Protected Information 1000778 A00.pdf	A.00
Verity 2.4 TDP Abstract 1000779 A04.pdf	A.04
Verity 2.4 VVSG 1.0 TDP Trace.pdf	N/A
Verity 2.4.X COTS List.pdf	N/A
Verity Airgap Interface Technical Reference 4005512 A02.pdf	A.02
Verity Application Framework TRD 4005634 A00.pdf	A.00
Verity Application Installer Build Process Document Verity 2.4.2 4005656 A03.pdf	A.03
Verity Application Programming Interface Specification 4005604 A04.pdf	A.04
Verity Ballot Creation TRD 4005636 A00.pdf	A.00
Verity Base Station Microcontroller Specification 4005462 A01.pdf	A.01
Verity Build TRD 4005628 A00.pdf	A.00
Verity Central TRD 4005632 A00.pdf	A.00
Verity Coding Standard 4005498 A14.pdf	A.14
Verity Controller TRD 4005624 A01.pdf	A.01
Verity Count TRD 4005629 A01.pdf	A.01
Verity Data TRD 4005627 A00.pdf	A.00
Verity Database Attributes 4005543 C03.pdf	C.03
Verity Device Suite TRD 4005621 A00.pdf	A.00
Verity Election Definition Data TRD 4005639 A01.pdf	A.01
Verity Election Management TRD 4005631 A00.pdf	A.00
Verity Electronics Specification 4005461 A18.pdf	A.18
Verity Entity Relationship Diagram Database - Devices.pdf	N/A



Document Title	Version
Verity Entity Relationship Diagram Database - Servers (Count Only).pdf	N/A
Verity Entity Relationship Diagram Database - Servers (No Count).pdf	N/A
Verity Key Design 4005514 A02.pdf	A.02
Verity Logging Design NR 103.pdf	1.03
Verity Logging TRD 4005635 A00.pdf	A.00
Verity Omni Modification TRD 4005655 A01.pdf	A.01
Verity Operational Environment 4005515 C13.pdf	C.13
Verity PC Application Framework User Interface Design Document.pdf	5
Verity Performance Characteristics 4005497 C03.pdf	C.03
Verity Print TRD 4005626 A00.pdf	A.00
Verity Relay Theory of Operations 4005571 A04.pdf	A.04
Verity Risk and Threat Assessment 4005513 C04.pdf	C.04
Verity Scan TRD 4005623 A00.pdf	A.00
Verity Security Requirements 4005464 A07.pdf	A.07
Verity Shared Device User Interface Design Document.pdf	7
Verity Software Architecture-Design 4005463 B01.pdf	B.01
Verity Summative Usability Report 4005496 A00.pdf	A.00
Verity Summative Usability Test Plan 4005495 A01.pdf	A.01
Verity Supply Chain PRD 4005302 C01.pdf	C.01
Verity System Limits 4005470 C02.pdf	C.02
Verity Touch TRD 4005633 A00.pdf	A.00
Verity Touch Writer Duo Base Station Microcontroller Specification 4005638 A00.pdf	A.00
Verity Touch Writer Duo TRD 4005625 A00.pdf	A.00
Verity Touch Writer TRD 4005622 A00.pdf	A.00
Verity User Management TRD 4005630 A00.pdf	A.00
Verity Vote Counting and Cast Vote Records TRD 4005640 A00.pdf	A.00



Document Title	Version
Verity Voting 2.4 Change Notes 4005653 A05.pdf	A.05
Verity Voting 2.4 Usability Impact Statement.pdf	N/A
Verity Voting 2.4.2 Source Documentation.zip	N/A
Verity Voting National Certification Test Specification 4005527 B03.pdf	B.03
Verity Workstation Manufacturing 4005525 B02.pdf	B.02
Verity_2.4_Verity_Relay Implementation Process 6673-010 D.pdf	D
Verity_2.4_Administrators Guide_Build 6641-031 A02.pdf	A.02
Verity_2.4_Administrators Guide_Central 6641-032 A02.pdf	A.02
Verity_2.4_Administrators Guide_Count 6641-033 A02.pdf	A.02
Verity_2.4_Administrators Guide_Data 6641-030 A02.pdf	A.02
Verity_2.4_Administrators Guide_Relay 6641-034 A03.pdf	A.03
Verity_2.4_Device Troubleshooting Field Guide 6653-007 A02.pdf	A.02
Verity_2.4_Polling Place Field Guide - CDS 6651-021 A00.pdf	A.00
Verity_2.4_Polling Place Field Guide - CT 6651-023 A00.pdf	A.00
Verity_2.4_Polling Place Field Guide - SW 6651-022 A00.pdf	A.00
Verity_2.4_Polling Place Field Guide - SW-Relay 6651-024 A00.pdf	A.00
Verity_2.4_Support Procedures Guide 6643-007 A03.pdf	A.03
Verity_2.4_System Administrators Guide 6641-035 A02.pdf	A.02
Verity_2.4_Verity Print Field Guide 6651-025 A02.pdf	A.02
Verity_2.4_Verity Scan Field Guide - Central 6651-026 A00.pdf	A.00
VirTex Q01 Quality Manual Rev R.pdf	R
Voting System Implementation and Maintenance 1000745 C02.pdf	C.02
VSTL Product Submission Procedure 1000565 D02.pdf	D.02
Workstation Configuration Process Document Verity 2.4 4005564 A02.pdf	A.02
Workstation WES7 Creation Process Document Verity 2.0 4005565 A00.pdf	A.00



2.5 Materials

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

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

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

3 System Overview

3.1 Scope of the Hart Verity Voting 2.4 Voting System

This section provides a description of the scope of **Verity Voting 2.4** voting system components.

The **Verity Voting 2.4** system represents a set of software applications for pre-voting, voting and post-voting election project activities for jurisdictions of various sizes and political division complexities.

Verity Voting 2.4 functions include:

- Defining the political divisions of the jurisdiction and organizing the election with its hierarchical structure, attributes and associations.
- Defining the election events with their attributes such as the election name, date and type, as well as contests, candidates, referendum questions, voting locations and their attributes.
- Preparing and producing ballots for polling place and absentee voting or by-mail voting.
- Preparing media for precinct voting devices and central count devices.
- Configuring and programming the **Verity Scan** digital scanners for marked paper ballots and Verity Touch Writer printed vote records.
- Configuring and programming the **Verity Touch Writer** BMD devices.
- Configuring and programming the **Verity Controller** with **Verity Touch Writer Duo** BMD devices.
- Configuring and programming the **Verity Controller** with **Verity Touch and Touch Writer Duo** DRE devices.
- Configuring and programming the **Verity Print** on-demand ballot production device.



- Transmission of the election results via **Verity Relay**.
 - Producing the election definition and auditing reports.
 - Providing administrative management functions for user, database, networking and system management.
 - Import of the Cast Vote Records from **Verity Scan** devices and **Verity Central**.
 - Preview and validation of the election results.
 - Producing election results tally according to voting variations and election system rules.
 - Producing a variety of reports of the election results in the desired format.
 - Publishing of the official election results. Auditing of election results including ballot images and log files.
- **Verity Scan** is a digital scan precinct ballot counter (tabulator) that is used in conjunction with an external ballot box. The unit is designed to scan marked paper ballots or Verity Touch Writer Duo printed vote records, interpret and record voter marks on the marked paper ballot or record voter selections on the printed vote records, and deposit the ballots into the secure ballot box.
 - **Verity Relay** provides remote transmission capability to the **Verity Voting 2.4** system. Utilizing an optional modem with **Verity Scan**, at close of polls, results are transmitted from the polling place device to the **Verity Relay** workstation.
 - The **Verity Touch Writer** is a standalone precinct level Ballot Marking Device (BMD) which also includes an Audio Tactile Interface (ATI), which allows voters who cannot complete a paper ballot to generate a machine-readable and human readable paper ballot, based on vote selections made, using the ATI.
 - The **Verity Touch Writer Duo** is a daisy chained configuration of a **Verity Controller** device configured with up to twelve **Verity Touch Writer Duo** BMD devices, which allows voters to utilize the touchscreen or optional Audio Tactile Interface to generate a machine-readable and human readable printed vote record, based on vote selections made.
 - The **Verity Touch** is a Direct Recording Electronic (DRE) device chained configuration of a **Verity Controller** device configured with up to twelve **Verity Touch** devices, which allows voters to cast their vote electronically via a touchscreen.
 - The **Verity Touch with Access** is a DRE device chained configuration of a **Verity Controller** device configured with up to twelve **Verity Touch** or **Touch with Access** devices, which allows voters to cast their vote electronically via a touchscreen or Audio Tactile Interface (ATI).
 - **Verity Print** is an on-demand ballot production device for unmarked paper ballots.



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

3.2 Engineering Changes

Verity Voting 2.4 is a modification of the EAC certified **Verity Voting 2.3** system and includes features from the EAC certified **Verity Voting 2.2.2** and **2.3.4** voting systems.

The modifications to **Verity Voting 2.4** address multiple aspects of the system, including state specific features, new features for all devices and applications, security enhancements, completion of the "Smart Panel" tablet hardware rollout, corrections to defects, as well as associated documentation updates.



The following modifications are implemented in this release:

Features for all devices and workstations

- Security enhancements:
 - Added feature for authorized Hart personnel to change the Certificate Set on devices and workstations. The feature will require a valid Certificate Key and Certificate Key password.
 - Feature is activated from a new “Additional Functions” menu on devices.
 - Feature is activated from “Desktop” tile on workstations when user has “Desktop Full Access” permissions.
 - Updated Whitelisting tool, McAfee Application Control for Devices (McAfee Solidifier), on OS images from version 6.1.1.369 to 8.2.1-143.

Michigan-specific features

- The following features included in Verity 2.2.2 are now supported as an option configurable in Verity Build:
 - Support for MI straight party rules.
 - Support for Uncommitted Candidates.
 - Reopen Polls, supported on all devices except Verity Print, Verity Touch, and Verity Touch Writer Duo.
 - Clear Ballots, supported on all devices except Verity Print, Verity Touch, and Verity Touch Writer Duo.
- Support for the Relay kit for Verity Scan and Relay receiving workstation.

Pennsylvania-specific features

- The following features included in Verity 2.3.4 are now supported as a configurable option in Verity Build:
 - Straight party deselection behavior for Touch Writer and Touch Writer Duo.
 - Straight Party Interface and Messaging on Touch Writer.

Features for Devices with Tally Reports

- New Tally Report Quantity election setting in Build for how many copies of the Tally report should automatically print when polls are closed, if the polling place is configured to allow printing of Tally reports.
 - When Scan is equipped with a Relay kit, the device will print one copy of the Tally report, enable the modem and transmit results, then print the remaining copies of the Tally Report.

Improvements to Ballot Unique Identifiers

- Ballot unique identifiers are now shown in both base-36 (13 digit) and base 10 (19 digit).
 - Affects both standard paper ballots and Printed Vote Records.



- Previously only base-36 (13-digit) representation was shown.
- The contents of the barcode have not changed. The barcode has always contained the unique identifier in base-10 (19-digit with one random checksum digit at the end).
- New “Ballots Issued Report” on Touch Writer, Controller (when used with Duo), and Print that lists every unique ID issued from the device, with unique IDs reordered so the order cannot be reconstructed.

Additional Features for Verity Devices

All Verity Devices

- Devices now display a “Cancelling” screen when the user requests that a report be cancelled.
- Unnecessary Help button removed when navigating within device menu screens.
- Included a new “Additional Functions” menu on all devices at boot up, activated using the blue Validation button. Menu includes the following functions:
 - “Validate”, to produce device hash files
 - “Change Certificate Set”

Complete the Rollout of Updated Smart Panel

- Rollout of updated COTS Smart Panel that started with the Verity 2.3 release to be completed. Smart Panel is updated by the manufacturer due to Intel chipset obsolescence. The following devices will be updated:
 - Verity Print
 - Verity Touch/Touch with Access
 - Verity Touch Writer

Features for devices with the Precinct Selection Screen

- The device keyboard used on the Precinct selection screen now includes a hyphen (-) key. This screen is used on Controller, Touch Writer, and Print.

Features for Verity Scan

- Relay now includes the ability to manually re-initiate results transmission even when the initial transmission was successful. The feature is protected by an admin passcode and is only available if polls are closed.

Features for Verity Print

- Added support for OKI C844dn due to the manufacturer obsolescence of existing model OKI C831dn.

Features for Verity Controller:



- Added the “Connectivity Report,” which presents information and status about all devices currently assigned a booth number.

Additional Features for Verity Workstation Software

Features for All Workstation Software

- Added support for printing a specific range of pages from most reports.

Features for Workstation Software with Ballot Preview

- The Ballot Preview screen in Verity Data and Verity Build does NOT automatically load the first Precinct/Split when the screen is loaded.

Features for Verity Desktop

- The “Enter Access Code” screen now displays the current date and time and Workstation ID.

Features for Verity Build

- Extended the Device Reports Signature Text maximum length from 300 to 500 characters.
- Removed redundant Data Validation screen.
- Removed redundant Proof Audio screen.
- Added support for following COTS ballot printers due to manufacturer obsolescence of the existing certified models:
 - OKI C844dn
 - OKI C931e

Features for Verity Central

- Added support for up to 8 networked clients per server.
- All networked clients have access to all Central application functionality.
- Added support for the following COTS central scanners due to manufacturer obsolescence of the existing certified models:
 - Canon DR-G2110
 - Canon DR-G2140
- Changed reporting engine for the Scanned Batch Report for consistency.

Features for Verity Count

- Improved “Write-in Candidates” screen.
- Redesigned “Write-in Assignment” workflow
- Supports the following write-in assignment features:
 - Reject all write-ins for a contest
 - Revert all assigned or rejected write-ins in a contest
- Added a proofing report for Write-in assignments. This report lists each entered write-in for a specific contest, ordered by tabulation time. Each write-in includes the following:



- The Write-in image snippet
- The Write-in image ID
- The Write-in status
- If assigned to a Write-in Candidate, the Write-in Candidate name
- Count will now ask if the user wants to check for additional ballots on the vDrive when a duplicate vDrive is read. The user must enter administrator credentials to add those ballots to the vote totals if additional ballots are found.
- Performance improvements to Provisional ballot resolution.
- Changed reporting engine for the Residual Votes Report for consistency.

Corrected Defects

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

Product	Description of Defect	Resolution/Results in Verity Voting 2.4
Verity Data	Newly created polling places are not associated with any parties in a CPE election. This has a usability impact as most users will associate all polling places with all parties.	All newly created polling places are now associated with all parties by default.
Verity Data	When navigating to the Translations screen, the spinner starts spinning and then pauses until the translation screen is loaded	Spinner now continues to spin during screen load, as expected.
Verity Build	After an election is selected, the spinner stops prior to the election opening	Corrected. The election now opens immediately after the spinner goes down.
Verity Central	The Accept button at the bottom of the screen is disabled for Voter intent issue ballots on the Ballot review window at page level. The user instead must click on the Action drop down then click Accept Page to proceed.	The Accept button at the bottom of the screen is now active and usable.
Polling Place	There are situations where the period (".") symbol appears at the end of a sentence for languages that	A hardcoded period symbol has been removed, which has corrected the double sentence ending symbols.



Devices (all)	do not use this punctuation, resulting in two sentence ending symbols.	
Verity Scan (with Verity Relay)	The modem name is preceded by the word "Retransmit" on the Power On Self-Test (POST) report printed at boot-up.	The modem model name on the Power On Self-Test (POST) report no longer has any characters preceding it.
Accessible Voting Devices (all)	Audio may be difficult to understand when set to the fast speed.	Audio now plays clearly at all speeds without issue.
Verity Data	The save button should become enabled after any additional text has been added to active fields during the election creation process.	A procedure that would previously result in the proposition text not saving now accurately enables the save button and prompts the user to save the changes if they navigate away from the screen without saving.

4 Certification Test Background

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

4.1 PCA - Document and Source Code Reviews

The Physical Configuration Audit (PCA) review of the **Verity Voting 2.4** documentation submitted in the Technical Data Package (TDP) was performed in order to verify conformance with the Election Assistance Commission Voluntary Voting System Guidelines 1.0 (EAC VVSG 1.0). Source code was reviewed for each software and firmware application declared within the voting system.

All PCA document reviews were conducted in accordance with Vol. 2 Section 2 of the EAC VVSG 1.0, to demonstrate that the system meets the requirements. Results of the PCA documentation review can be found in section 5.2.1 of this document. Inconsistencies or errors in documentation were identified to **Hart** in a Discrepancy Report for resolution or comment. This Discrepancy Report is included as Attachment G in this document.

All PCA source code reviews were conducted in accordance with Vol. 1 Section 5.2 and Vol. 2 Section 5 of the EAC VVSG 1.0, to demonstrate that the system meets the requirements. Results of the PCA source code reviews can be found in section 5.1.1



of this document. Inconsistencies or errors in the source code were identified to **Hart** for resolution or comment.

4.2 FCA - Functional & System Testing

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

SLI's standard Test Suites were customized for the **Verity Voting 2.4** system and conducted in accordance with Vol. 2 Section 6 of the VVSG 1.0. Simulations of elections were conducted to demonstrate a beginning-to-end business use case process for the **Verity Voting 2.4** system.

4.2.1 Test Methods

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

Table 7 – Test Methods

SLI VSTL Test Method Name
TM_Accumulating_and_Transmitting_Results
TM_Accuracy
TM_Ballot Formatting and Production
TM_Ballot_Formatting_and_Production
TM_Error Message and Recovery
TM_HW_Integrity
TM_Pre-Voting_Capabilities
TM_Readiness
TM_Security_Access_Control
TM_Security_Access_Control_Measures
TM_Security_Physical_Security_Measures
TM_Security_Software_Security
TM_Security_Telecommunications_and_Data_Transmission
TM_Security_Transmission_of_Official_Data_over_Public_Networks
TM_Security_Wireless_Communications
TM_Straight_Party_Voting
TM_Tally_and_Reporting
TM_Telecommunications
TM_Voting_Capabilities
TM_Voting_Straight_Party

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



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

4.3 Hardware Testing

Hardware testing was conducted by certified third-party hardware test laboratories to verify the voting system devices that have been modified in the **Verity Voting 2.4** voting system are compliant with the EAC VVSG 1.0 hardware requirements.

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

Laboratory	Address	Test(s)	Date(s)
NTS – EMI / EMC	1736 Vista View Dr. Longmont, CO 80504	EMC / EMI Tests: Radiated Emissions, Conducted Emissions, ESD, Electromagnetic Susceptibility, Electrical Fast Transient, Lightning Surge, Conducted RF Immunity, Magnetic Fields Immunity, Electrical Power Disturbance	9/23/2019 – 10/2/2019
NTS – Environmental / Dynamic	1601 Dry Creek Dr. Suite 200 Longmont, CO 80503	MIL-STD-810D Tests: Temperature/Power Variation	10/15/2019 – 10/18/2019

5 Certification Test Results Summary

5.1 Source Code Review Summary

SLI has reviewed the modified software source code for each application in the **Verity Voting 2.4** voting system to determine the code’s compliance with the EAC VVSG 1.0, *Volume 1 Sections 5, 9* and *Volume 2 Section 5.4* and for compliance with **HART’s** internally developed coding standards. **Verity Voting 2.4** is implemented with the C, C++, and C# languages.

5.1.1 Evaluation of Source Code

As a modification project, the **Verity Voting 2.4** code base was reviewed using the final **Verity Voting 2.3** code as the baseline, to which the initial **Verity Voting 2.4** code base was compared. The differences found between those two code bases served as the starting point of the code review.

The source code was written adequately in terms of the VVSG 1.0. The code is modular and there is sufficient error handling. Readability is sufficient and supports maintainability.



No discrepancies were observed during the review of delivered source code. The source code was found to be compliant to the VVSG 1.0 and **Hart** declared industry standards.

5.2 Technical Data Package Review Summary

As this is a modification project, SLI reviewed the **Verity Voting 2.4** TDP against the final TDP for **Verity Voting 2.3**. The differences between the two TDPs were reviewed for compliance with the EAC VVSG 1.0 according to *Volume 2 Section 2*. The documents that are a part of the **Verity Voting 2.4** system are detailed in section 2.4 of this document.

5.2.1 Evaluation of TDP

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

In all instances, the discrepancies were addressed and resolved with updated documentation prior to the writing of this report. Once all identified discrepancies were resolved, the Technical Data Package for the **Verity Voting 2.4** voting system was found to comply with all applicable standards.

5.3 Functional Testing Summary

5.3.1 Test Suites Utilized

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

5.3.1.1 Modification

The Modification test suite explicitly examined each modification introduced into **Verity Voting 2.4** in order to verify that the modifications implemented, and the subsequent Trusted Build of the firmware, did not adversely affect operations. This test suite also incorporated variations of general elections that were executed in order to verify proper functionality of the Michigan and Pennsylvania modifications detailed in Section 3.2.

5.3.1.2 General Election

The full **Verity Voting 2.4** system was reviewed in order to verify proper integration of the voting system and that all components continue to work as expected.

5.3.1.3 Open Primary Election

The full **Verity Voting 2.4** system was reviewed in order to verify proper integration of the voting system and that all components continue to work as expected.



5.3.1.4 Accuracy

Due to the updated COTS scanner models introduced in this configuration of the system, **Verity Central** was tested for accuracy. Pre-marked ballots in all supported ballot sizes were utilized. Results were processed through **Verity Count** and examined for completeness and correctness.

5.3.1.5 Verity Relay

The **Verity Relay** application was fully tested in order to verify all functional features in conjunction with the **Verity Scan** device, using all supported relay kits. Telecommunications and security aspects specific to the transmission functionality were reviewed in the Security test suite.

5.3.1.6 Security

A security test suite was designed and executed to examine various security enhancements to the **Verity Voting 2.4** system as a primary focus. Beyond the review of modifications and enhancements to the system, additional testing was performed to verify the security posture of the system.

The updated McAfee Whitelisting tool version was reviewed to ensure it was properly implemented. All attempts to circumvent or render the whitelisting ineffective were unsuccessful.

Software access controls were tested. All attempts to circumvent or manipulate the kiosk mode were unsuccessful. All user roles and authentication mechanisms were properly implemented per the vendor documentation. Attempts for user privilege escalation in attempts to access unauthorized or restricted system functionality were unsuccessful.

Automated vulnerability scans were taken of all networked machines, to establish system vulnerabilities as well as identify any open networking ports.

The ability to change Verity 2.4 Certificate sets was examined. All attempts to utilize elections or systems from a different security set were unsuccessful.

Communications between **Verity Relay** and **Verity Scan** were monitored after leaving the public cellular network. Network analysis tools were used to obtain network packet captures to examine communication and authentication attempts between devices, and to assess that appropriate encryption is utilized. Vulnerability scans were conducted of all devices that were connected via public or proprietary networking.

5.3.1.7 Data Retention and Hardware Integrity

Due to the rollout of new “Smart Panel” tablets for **Verity Touch/Touch with Access** and **Verity Touch Writer**, a data retention and hardware integrity test suite was executed for those devices. Testing verified prevention of failure of data input or storage, as well as confirming that audit records cannot be modified. **Hart** has



also provided an attestation that all data is able to be maintained for a minimum of 22 months.

5.3.2 Evaluation of Functional Testing

In this test campaign, the **Verity Voting 2.4** voting system was subjected to examination for changes, updates, and modifications made from the previously certified system, **Verity Voting 2.3**, against applicable requirements within the EAC VVSG 1.0.

Through the duration of testing, two functional discrepancies were written. Details of these discrepancies can be found in Attachment G. These discrepancies were reported, resolved, and re-tested as applicable. Once the discrepancies were addressed, no violation of conformance to EAC VVSG 1.0 requirements was observed. All components of the **Verity Voting 2.4** voting system have successfully passed all tests.

5.4 Hardware Test Summary

SLI and their certified third-party hardware test laboratory, National Technical Systems (NTS), performed an analysis and review of the modified **Verity Voting 2.4** system hardware components. During execution of testing performed at NTS, an SLI representative was present to oversee the testing.

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

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

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

The hardware testing consisted of the following operational environmental tests for the **Verity Central** updated COTS scanner models Canon DR-G2110 and DR-G2140:

- Temperature/Power Variation - similar to the low temperature and high temperature tests of MIL-STD-810-D, Method 502.2 and Method 501.2.



- Reliability – Vol. 1, Section 4 for the acceptable Mean Time Between Failure (MTBF).

5.4.1 Evaluation of Hardware Testing

As this test campaign was a modification of an EAC certified voting system, only modified hardware components of the **Verity Voting 2.4** voting system were evaluated against applicable hardware requirements.

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

6 Recommendation

SLI has successfully completed the testing of the **Hart Verity Voting 2.4** voting system. It has been determined that the system meets the required acceptance criteria of the Election Assistance Commission's Voluntary Voting System Guidelines 1.0.

This recommendation reflects the opinion of SLI Compliance based on testing scope and results. It is SLI's recommendation based on this testing effort that the EAC grant certification of the **Hart Verity Voting 2.4** voting system.

SLI:

Traci Mapps
Director
February 3rd, 2020

7 Appendix – Ancillary Products

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

Ancillary systems include:

- Optional ATI Device
Manufacturer: AbleNet
Device: Dual Jelly Bean Switch

End of Certification Test Report
