Appendix C

REQUEST FOR PROPOSALS FOR PURCHASE OF ELECTIONS EQUIPMENT
BEST AND FINAL OFFER - PRICE FORM

Respondent Name: Hart InterCivic, Inc.

H. Price Summary: Election Management System, Central On-Demand Ballot Printing, Voting Devices, Central Scanning, Tabulation & General Costs

Price Summary: EMS, Central OD Ballot Printing, Voting Devices, Central Scanning, Tabulation, General Costs			
Component	Year 1	Year 2	Year 3
A. An Election Management System (EMS) where the election project is created and configured.	$ 125,396	$ 11,446	$ 11,446
B. On-Demand Ballot Printing system to generate Mail Ballots for voters who request them. This system will be used only at the main office of the Elections Administration.	Included in Section A	$ -	$ -
C. Voting devices for each type of solution	$ 13,403,792	$ 471,880	$ 471,880
D. A high speed central scanning solution to be used for processing ballots mailed back by voters that are accepted by the Ballot Board.	$ 133,730	$ 18,730	$ 18,730
E. A tabulation solution that is capable of processing all the results produced by the voting machines and generating all necessary reports. This system includes any and all components necessary for collecting results at temporary hubs on election night.	$ 15,122	$ 3,122	$ 3,122
F. General project costs.	Included	$ -	$ -
HVS System Trade-In / Customer Loyalty - Additional Discount	$ (4,158,043)	$ -	$ -
Total	$ 9,399,997	$ 505,178	$ 505,178
3-year TOTAL offer:	$		10,410,353

Exhibit C

Definitions

"*Hart*" means Hart InterCivic, Inc., a Texas corporation.

"*Verity Access™*" means the audio tactile interface (ATI) controller created by Hart as an add-on component to a Verity Touch™ that facilitates the performance of voting activities by disabled voters, for example, by providing an audio ballot presentation and/or accepting inputs from adaptive switch mechanisms that facilitate interaction with disabled voters, as needed.

"*Verity Print™*" means the device created by Hart for purposes of on-demand ballot printing; this device creates a blank paper ballot from the poll worker's selection of the voter's ballot style or precinct on the Verity Print interface.

"*Verity Controller™*" is a polling place management console capable of interacting with one or more Verity Touch™ devices by transmitting and receiving signals that manage an election, e.g., by opening and closing the polls, providing or recording an audit trail of system events during an election, storing cast ballot data, and applying data security and integrity algorithms.

"*Verity Scan™*" means the Verity Scan™ device created by Hart, consisting of an in-person digital ballot imaging device. The single-feed scanner transports and scans both sides of a ballot simultaneously, and it is securely attached to a ballot box that provides for secure ballot storage and transport.

"*Verity Election Office*" means Hart InterCivic's software platform that can accommodate a variety of election administration applications and is designed for interoperability with Verity Voting Hardware and Software.

"*Verity Touch™*" means the Verity Touch™ electronic voting device created by Hart. Verity Touch devices consist of hardware including an electronically configurable voting station that permits a voter to cast votes by direct interaction, which voting station in its present configuration created by Hart comprises an electronically configurable touchscreen liquid crystal display (LCD) panel for use in displaying ballot images, and options for tactile input buttons that facilitate voter options for selecting ballot choices and casting a ballot.

"*Verity Touch Writer™*" means the device created by Hart for ballot-marking functions. Touch Writer creates a paper marked ballot from the voter's selections on the electronic interface or the Verity Access ATI controller.

"*Verity Voting*" means Hart InterCivic's family of voting system components designed to conform to federal voting system standards.

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Exhibit D

HART PROPRIETARY SOFTWARE AND SUBLICENSED SOFTWARE

Hart Proprietary Software Licensed to County via annual subscription may include the following. Actual software and firmware licensed is indicated in the quote or response associated with this Agreement:

SOFTWARE/FIRMWARE NAME	VERSION NUMBER
Verity Data	2.3.1
Verity Build	2.3.1
Verity Count	2.3.1
Verity Central	2.3.1
Verity User Management	2.3.1
Verity Election Management	2.3.1
Verity Desktop	2.3.1
Verity Scan	2.3.1
Verity Controller	2.3.2
Verity Touch Writer Duo	2.3.1

Licensed Location is the jurisdiction named on the signature page of this Agreement. Any future releases or updates to the software versions listed above will be documented in Hart Release Notes and Version Verification documents. Such releases and updates shall be considered Hart Proprietary Software licensed under this Agreement.

Software Sublicensed to County via annual subscription:

None

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Exhibit A

Schedule A or County Signed Quote for Initial Order

REQUEST FOR PROPOSALS FOR PURCHASE OF ELECTIONS EQUIPMENT
BEST AND FINAL OFFER - PRICE FORM

Hybrid aka Ballot Marking

Price all components that complete the Election Management System – All prices to include shipping and delivery to 2700 Premier St. Fort Worth, 76111. Quantities are to be estimated to support 3,000 DRE's & 400 Scanners.

Respondent Name: Hart InterCivic, Inc.

A. Election Management System (EMS)

			Price breakdown per year								
			Year 1			Year 2 (Maintenance & Fees)			Year 3 (Maintenance & Fees)		
Component	Version	Description	Unit Price ($)	Est. Qty.	Total ($)	Unit Price ($)	Est. Qty.	Total ($)	Unit Price ($)	Est. Qty.	Total ($)
Verity Build Networked (Includes On-Demand Ballot Printing)	Verity 2.3	Election definition and ballot production software. Supports requirement for central on-demand ballot printing.	$ 20,000	2	$ 40,000						
Verity Relay	Verity 2.3	Election night results collection at temporary hubs.	$ 5,000	1	$ 5,000						
License & Support for		Annual License & Support Fee	$ 11,446	1	$ 11,446	$ 11,446	1	$ 11,446	$ 11,446	1	$ 11,446
Workstations & Monitor	HP Z240	HP Z240 Workstation for Verity Software. Includes 5-year warranty. Includes 23" Flat Panel Monitor.	$ 5,900	10	$ 59,000						

6. Optional Items Offered continued

Component	Version	Description	Price breakdown per year								
			Year 1			Year 2			Year 3		
			Unit Price ($)	Est. Qty.	Total ($)	Unit Price ($)	Est. Qty.	Total ($)	Unit Price ($)	Est. Qty.	Total ($)
Discount (5% Discount per line item total)					$ (6,685)						

Hybrid aka Ballot Marking

Price for Optional Items offered - will not be included in the total for price scoring. All prices to include shipping and delivery to 2700 Premier St. Fort Worth, 76111. Quantities are to be estimated to support 3,000 DRE's & 400 Scanners.

Respondent Name: Hart InterCivic, Inc.

G. Optional Items Offered

Component	Version	Description	Price breakdown per year								
			Year 1			Year 2			Year 3		
			Unit Price ($)	Est. Qty.	Total ($)	Unit Price ($)	Est. Qty.	Total ($)	Unit Price ($)	Est. Qty.	Total ($)
vDrives		Flash memory card/audio card for use with Verity devices	$ 66	750	$ 49,500						
Verity Voting Device Battery		Rechargeable battery for Verity voting device	$ 102	380	$ 38,760						
6 Bay Battery Charger		6 Bay battery charger for Verity voting device	$ 540	37	$ 19,980						
Verity Key		Electronic security token	$ 109	32	$ 3,488						
Secure Ballot Transport Bag		Bag for easy and secure removal and transport of ballots from ballot box	$ 50	400	$ 20,000						
vDrive Duplicator		Loads election data on up to 23 vDrives simultaneously	$ 1,975	1	$ 1,975						

A. Election Management System (EMS) continued

Component	Version	Description	Price breakdown per year								
			Year 1			Year 2 (Maintenance & Fees)			Year 3 (Maintenance & Fees)		
			Unit Price ($)	Est. Qty.	Total ($)	Unit Price ($)	Est. Qty.	Total ($)	Unit Price ($)	Est. Qty.	Total ($)
Printer w/ Starter Cartridge	Okidata B430 series	Laser Printer w/starter cartridge included with Verity Software for printing	$ 325	6	$ 1,950						
Ballot Printer w/ Starter Cartridges	Okidata C831	Ballot Printer	$ 4,000	2	$ 8,000						
TOTAL			$		125,396	$		11,446	$		11,446

REQUEST FOR PROPOSALS FOR PURCHASE OF ELECTIONS EQUIPMENT
BEST AND FINAL OFFER - PRICE FORM

Hybrid aka Ballot Marking

Price all components that complete a Voting Device for your system – All prices to include shipping and delivery to 2700 Premier St. Fort Worth, 76111. Quantities are to be estimated to support 3,000 DRE's & 400 Scanners.

Respondent Name: Hart InterCivic, Inc.

C. Voting Devices

			Price breakdown per year								
			Year 1			Year 2			Year 3		
Component	Version	Description	Unit Price ($)	Est. Qty.	Total ($)	Unit Price ($)	Est. Qty.	Total ($)	Unit Price ($)	Est. Qty.	Total ($)
Verity Duo	Verity 2.3	Hybrid touchscreen ballot marking device capable of producing a paper trail. Includes Verity Standard Booth, Transport Bag and Privacy Screens.	$ 3,000	3,000	$9,000,000						
Verity Controller	Verity 2.3	Precinct Management Device used by the poll workers facilitating faster results reporting and other administrative efficiencies.	$ 2,850	400	$1,140,000						

C. Voting Devices continued

			Price breakdown per year								
			Year 1			Year 2			Year 3		
Component	Version	Description	Unit Price ($)	Est. Qty.	Total ($)	Unit Price ($)	Est. Qty.	Total ($)	Unit Price ($)	Est. Qty.	Total ($)
Verity Scan	Verity 2.3	Precinct-based ballot scanner. Includes Ballot Box, Transport Bag & Privacy Screens.	$ 5,500	400	$ 2,200,000						
Verity Access	Verity 2.3	Detachable ATI module for use with Verity tablet. Includes Verity Duo Accessible Booth w/ Transport Bag and Privacy Screens.	$ 520	400	$ 208,000						
Verity Relay	Verity 2.3	Remote transmission station	$ 2,850	9	$ 25,650						
vDrives		Flash memory card/audio card for use with Verity devices	$ 66	850	$ 56,100						
Verity Ballot Box Lock Kit		Secondary lock kit for Verity Ballot Box	$ 23	70	$ 1,610						
6 Bay Battery Charger		6 Bay battery charger for Verity voting device	$ 540	43	$ 23,220						
Verity Key		Electronic security token	$ 109	48	$ 5,232						

C. Voting Devices continued

Component	Version	Description	Price breakdown per year								
			Year 1			Year 2			Year 3		
			Unit Price ($)	Est. Qty.	Total ($)	Unit Price ($)	Est. Qty.	Total ($)	Unit Price ($)	Est. Qty.	Total ($)
Relay Modem Kit		Modem kit required for electronic transmission from Verity Scan. May be shipped separately pending customer carrier selection; invoicing and testing will be independent if shipped separately.	$ 500	9	$ 4,500						
AutoBallot Kit		Barcode scanner kit for automatic Verity access code creation from VR/electronic poll book data	$ 419	400	$ 167,600						
License & Support for Verity Hardware		Annual License & Support Fee	$471,880	1	$ 471,880	$471,880	1	$471,880	$471,880	1	$ 471,880
TOTAL			$		13,303,792	$		471,880	$		471,880

REQUEST FOR PROPOSALS FOR PURCHASE OF ELECTIONS EQUIPMENT
BEST AND FINAL OFFER - PRICE FORM

Hybrid aka Ballot Marking

Price all components that complete a Central Scanning solution for your system – All prices to include shipping and delivery to 2700 Premier St. Fort Worth, 76111. Quantities are to be estimated to support 3,000 DRE's & 400 Scanners.

Respondent Name: Hart InterCivic, Inc.

D. Central Scanning

			Price breakdown per year								
			Year 1			Year 2			Year 3		
Component	Version	Description	Unit Price ($)	Est. Qty.	Total ($)	Unit Price ($)	Est. Qty.	Total ($)	Unit Price ($)	Est. Qty.	Total ($)
Verity Central	Verity 2.3	High-speed central scanning and onscreen	$ 45,000	1	$ 45,000						
Verity Central Client	Verity 2.3	High-speed central scanning and onscreen adjudication	$ 10,000	3	$ 30,000						
Central Scanner	Canon DR-G1130	High-Speed Scanner (for Central Count of Absentee Ballots)	$ 10,000	3	$ 30,000						
License & Support for Verity Central		Annual License & Support Fee	$ 18,730	1	$ 18,730	$ 18,730	1	$ 18,730	$ 18,730	1	$ 18,730
TOTAL			$		113,730	$		18,730	$		18,730

REQUEST FOR PROPOSALS FOR PURCHASE OF ELECTIONS EQUIPMENT
BEST AND FINAL OFFER - PRICE FORM

Hybrid aka Ballot Marking

Price all components that complete the Tabulation solution for your system – All prices to include shipping and delivery to 2700 Premier St. Fort Worth, 76111. Quantities are to be estimated to support 3,000 DRE's & 400 Scanners.

Respondent Name: Hart InterCivic, Inc.

E. Tabulation

			Price breakdown per year								
			Year 1			Year 2			Year 3		
Component	Version	Description	Unit Price ($)	Est. Qty.	Total ($)	Unit Price ($)	Est. Qty.	Total ($)	Unit Price ($)	Est. Qty.	Total ($)
Verity Count Networked	Verity 2.3	Tabulation and report software	$ 6,000	2	$ 12,000						
License & Support for Verity Count		Annual License & Support Fee	$ 3,122	1	$ 3,122	$ 3,122	1	$ 3,122	$ 3,122	1	$ 3,122
TOTAL			$		15,122	$		3,122	$		3,122

REQUEST FOR PROPOSALS FOR PURCHASE OF ELECTIONS EQUIPMENT
BEST AND FINAL OFFER - PRICE FORM

Hybrid aka Ballot Marking

Price all anticipated Project Costs for your system – All prices to include shipping and delivery to 2700 Premier St. Fort Worth, 76111. Quantities are to be estimated to support 3,000 DRE's & 400 Scanners.

Respondent Name: Hart InterCivic, Inc.

F. General Project Costs

			Price breakdown per year								
			Year 1			Year 2			Year 3		
Component	Version	Description	Unit Price ($)	Est. Qty.	Total ($)	Unit Price ($)	Est. Qty.	Total ($)	Unit Price ($)	Est. Qty.	Total ($)
Installation		Includes training, acceptance testing, project management, travel, and on-site support for the first election on the Verity voting system. Additional services, if required, may be purchased separately.			Included						
Warranty					Included						
Training					Included						
Testing					Included						
TOTAL			$		-	$		-	$		-

The State of Texas

Elections Division
P.O. Box 12060
Austin, Texas 78711-2060
www.sos.state.tx.us

Phone: 512-463-5650
Fax: 512-475-2811
TTY: 7-1-1
(800) 252-VOTE (8683)

Secretary of State

August 1, 2019

Heider Garcia
Elections Administrator
Tarrant County
2700 Premier Street
Fort Worth, Texas 76111

Dear Mr. Garcia,

We are in receipt of a copy of the proposed contract between Tarrant County and Hart InterCivic ("Hart"), which you have submitted to the Secretary of State pursuant to Section 123.035 of the Texas Election Code.

The contract indicates the county plans to acquire Hart's Verity 2.3.1 which includes Verity Controller, Verity Touch Writer Duo, Verity Scan, and Verity Central, firmware version 2.3.1. This letter will serve as confirmation from our office that these systems are currently certified for use in Texas. Enclosed is a copy of the certification order that pertains to these systems. Because the equipment identified in your proposed contract is currently certified for use in Texas, we officially approve the submitted contract for the purchase of these systems.

Pursuant to state law, this written approval of your voting system contract is required prior to your final execution of the contract, or it will be considered void.

If you need additional information, please contact the Elections Division toll-free at 1-800-252-2216.

Sincerely,

Keith Ingram
Director of Elections

Enclosures

KI:CA

The State of Texas

Elections Division
P.O. Box 12060
Austin, Texas 78711-2060
www.sos.texas.gov

Secretary of State

Phone: 512-463-5650
Fax: 512-475-2811
Dial 7-1-1 For Relay Services
(800) 252-VOTE (8683)

REPORT OF REVIEW OF HART INTERCIVIC VERITY VOTING 2.3 SYSTEM

PRELIMINARY STATEMENT

On May 22-23, 2019, Hart InterCivic Inc. (the "Vendor") presented Verity Voting 2.3 for examination and certification. The examination was conducted in Austin, Texas. Pursuant to Sections 122.035(a) and (b) of the Texas Election Code, the Secretary of State appointed the following examiners:

1. Mr. Tom Watson, an expert in electronic data communication systems;
2. Mr. Brian Mechler, an expert in electronic data communication systems;
3. Mr. Brandon Hurley, an expert in election law and procedure; and
4. Mr. Charles Pinney, an expert in election law and procedure.

Pursuant to Section 122.035(a), the Texas Attorney General appointed the following examiners:

1. Dr. Jim Sneeringer, an expert in electronic data communication systems; and
2. Mr. Ryan Vassar, an employee of the Texas Attorney General.

On May 22, 2019, Mr. Pinney, Mr. Mechler, and Dr. Sneeringer witnessed the installation of the Verity Voting 2.3 software and firmware that the Office of the Texas Secretary of State (the "Office") received directly from the Independent Testing Authority. Mr. Pinney and Ms. Heidi Martinez, a staff attorney with the Office, examined the accessibility components of the Verity Touch, the Verity Touch with Access, the Verity Touch Writer with Access, and the Verity Touch Writer Duo.

On May 23, 2019, the Vendor demonstrated the system and answered questions presented by the examiners. Test ballots were then processed on each voting device. The results were accumulated and later verified for accuracy by staff of the Secretary of State.

Examiner reports regarding the Verity Voting 2.3 system are attached hereto and incorporated herein by this reference.

On July 10, 2019, pursuant to Section 122.0371 of the Texas Election Code, the Office held a public hearing for interested persons to express views for or against the certification of the Verity Voting 2.3 system.

BRIEF DESCRIPTION OF VERITY VOTING 2.3

The Verity Voting 2.3 system is an updated version of the Verity Voting 2.0 system, which the Office certified in December 2016 for use in Texas elections. The updated version includes

software enhancements to the existing election management system and introduces a new voting device, the Verity Touch Writer Duo. The Touch Writer Duo is a ballot marking device that allows users to input their selections on a digital interface and prints a paper record of the vote that can be scanned and tabulated using a precinct or central scanner.

Verity Voting 2.3 has been evaluated at an accredited independent voting system testing laboratory for conformance to the 2005 Voluntary Voting System Guidelines (VVSG). Verity Voting 2.3 was certified by the U.S. Election Assistance Commission (EAC) on March 15, 2019.

The components of Verity Voting 2.3 are as follows:

Component	Version	Description
Verity Data	2.3.1	Data management software
Verity Build	2.3.1	Election definition software
Verity Count	2.3.1	Tabulation and reporting software
Verity Central	2.3.1	Central scanning software
Verity User Management	2.3.1	User management software
Verity Election Management	2.3.1	Election management software
Verity Desktop	2.3.1	Election management software
Verity Scan	2.3.1	Precinct scanner
Verity Touch Writer with Access	2.3.1	Ballot marking device with accessibility features
Verity Controller	2.3.2	Voting machine ballot activation device
Verity Touch	2.3.1	Direct-recording electronic voting machine
Verity Touch with Access	2.3.1	Direct-recording electronic voting machine with accessibility features
Verity Touch Writer Duo	2.3.1	Ballot marking device

FINDINGS

The following are the findings, based on written evidence submitted by the Vendor in support of its application for certification, oral evidence presented at the examination, and the written reports of the voting system examiners (all of whom recommended certifying the Verity Voting 2.3 system for use in Texas elections).

The Verity Voting 2.3 system, including its hardware and software components, meets the standards for certification as prescribed by Section 122.001 of the Texas Election Code. Specifically, the Verity Voting 2.3 system and its components, among other things:

1. Preserve the secrecy of the ballot;
2. Are suitable for the purpose for which they are intended;
3. Operate safely, efficiently, and accurately and comply with the voting system standards adopted by the Election Assistance Commission;
4. Are safe from fraudulent or unauthorized manipulation;
5. Permit voting on all offices and measures to be voted on at the election;
6. Prevent counting votes on offices and measures on which the voter is not entitled to vote;
7. Prevent counting votes by the same voter for more than one candidate for the same office or, in elections in which a voter is entitled to vote for more than one candidate for the same office, prevent counting votes for more than the number of candidates for whom the voter is entitled to vote;
8. Prevent counting a vote on the same office or measure more than once;
9. Permit write-in voting;
10. Are capable of permitting straight-party voting; and
11. Are capable of providing records from which the operation of the system may be audited.

CONDITIONS

In their written reports, some of the voting system examiners indicated that the Verity Voting 2.3 system does not provide a software solution to address the ballot-numbering requirements in Sections 51.006-.008, 52.062, and 62.009 of the Texas Election Code. However, the examiners noted that jurisdictions that adopt the Verity Voting 2.3 system can still comply with these requirements by following additional procedures provided by the Vendor. Therefore, the certification of system is conditioned on jurisdictions utilizing these additional procedures to comply with the Texas Election Code's ballot-numbering requirements when using the Verity Voting 2.3 system.

CONCLUSION

Accordingly, based upon the foregoing, I hereby certify Hart InterCivic's Verity Voting 2.3 system for use in Texas elections, subject to the above condition.

Signed under my hand and seal of office, this 22nd day of July 2019.

JOSE A. ESPARZA
DEPUTY SECRETARY OF STATE

TEXAS

State Participation:

Requires Testing to Federal Standards. TX requires that its voting systems meet the current FEC standards as well as state requirements.

Applicable Statute(s):

"A voting system may not be used in an election unless the system… operates safely, efficiently, and accurately and complies with the error rate standards of the voting system standards adopted by the Federal Election Commission…" TEX. ELEC. CODE ANN. §122.001(3) (Vernon 2007).

Applicable Regulation(s):

"For any voting machine … to be certified for use in Texas elections, the system shall have been certified, if applicable, by means of a qualified testing by a Nationally Recognized Test Laboratory (NTRL) and shall meet or exceed the minimum requirements set forth in the Performance and Test Standards for Punch Card, Mark Sense, and Direct Recording Electronic Voting Systems, or in any successor voluntary standard document developed and promulgated by the FEC." 1 TEX. ADMIN. CODE § 81.61 (2009).

State Certification Process:

The Secretary of State accepts applications to examine and certify voting systems and appoints four people to examine the voting system. While the Attorney General appoints two people as examiners. Each examiner inspects the voting system and submits a report to the Secretary of State. The Secretary of State will conduct a public hearing to provide interested persons an opportunity to express their views for or against the approval of the voting system. Following the public hearing, the Secretary of State shall prepare a written report stating why the voting system was approved or denied. 1 TEX. ADMIN. CODE § 81.61 (2009).

Fielded Voting Systems:

[After the EAC completes and issues the 2008 Election Administration and Voting Survey, information about fielded voting systems will be added to this document. In the meantime, readers may find information on the voting systems at the following website (if available)].
http://www.sos.state.tx.us/elections/laws/votingsystems.shtml

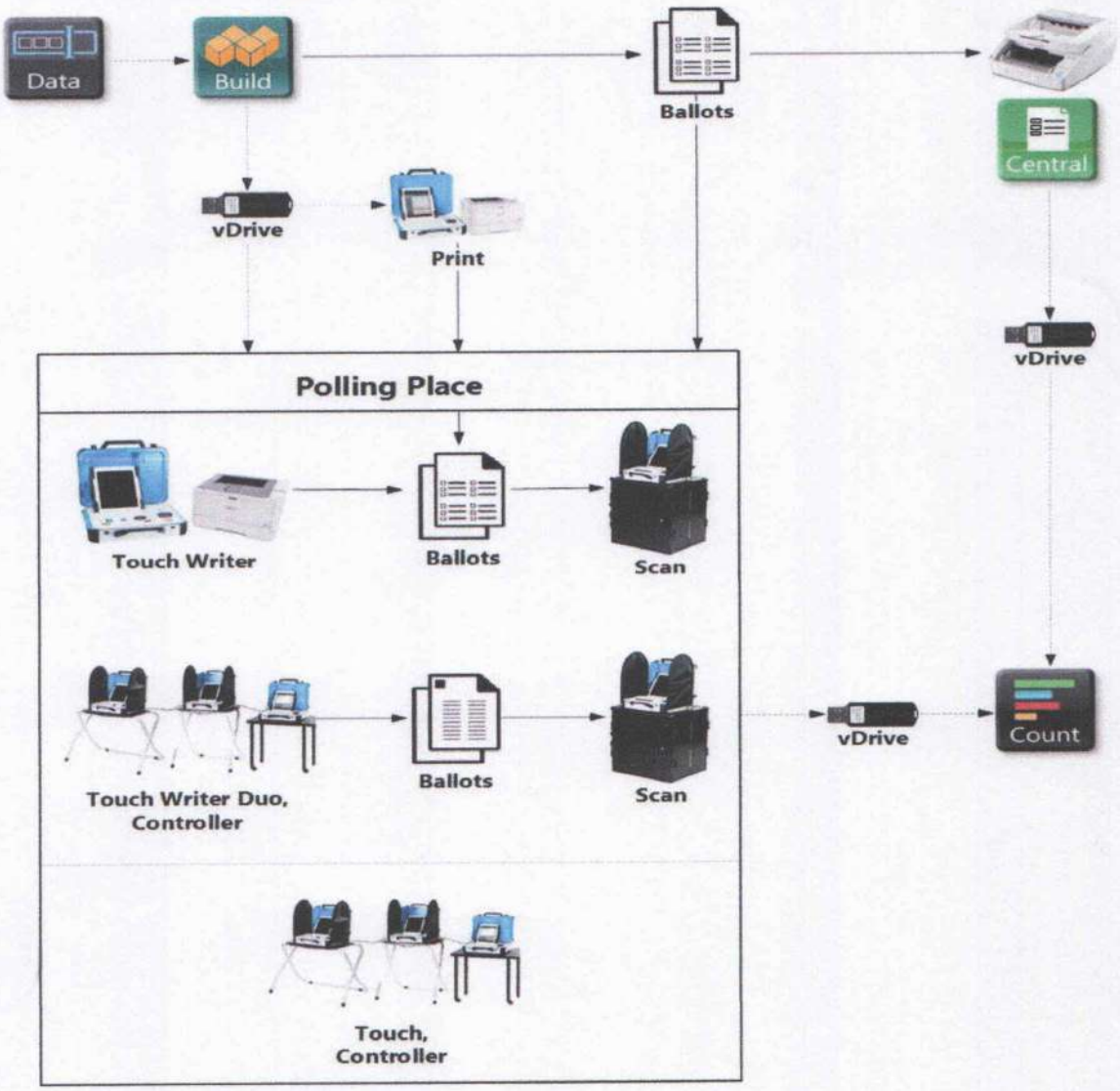
Hart will be required to provide all source code, documentation, equipment and supporting materials identified as part of the voting system.

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

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

1.6 Scope of Testing

1.6.1 Block Diagram



Overview of the diagram:

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

4.1.3 Hart State Specific Modifications

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

Pertinent Hart requirements are listed in Appendix A - Modifications

4.2 Hardware Configuration and Design

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

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

4.3 Test Suite Design

4.3.1 Software Functional Test Design and Data

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

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

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

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

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

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

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

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

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

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

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

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

Modifications test suite – The Modification test suite will explicitly examine each modification introduced into **Verity Voting 2.3** in order to verify that the modifications implemented, and the subsequent Trusted Build of the firmware, does not adversely affect operations.

- 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.

4.2 Documentation

The TDP documentation listed below are deliverables of the certified system delivered as part of the examined system, as follows:

Document Title	Version
All-In-One Code Framework Coding Standards	© 2014 Microsoft Corporation
Verity Voting 2.3 Change Notes: Update from 2.0 to 2.3.0	A.00
Verity Voting 2.3 Change Notes: Update from 2.3.0 to 2.3.1	A.00
Verity Voting 2.3 Change Notes: Verity Controller Update from 2.3.1 to 2.3.2	A.00
Configuration Management Process	D.01
Continual Improvement Process	E.02
Control of Nonconforming Product Procedure	B.02
DEVICE CONFIGURATION PROCESS DOCUMENT	B.00
DEVICE OS CREATION AND CONFIGURATION PROCESS DOCUMENT	A.01
DEVICE WES7 CREATION PROCESS DOCUMENT	A.01
Document Control Procedure	E.05
Factory TUV SUD inspection 2018 June report	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	H
Hardware 3005351-Controller Design.pdf	D
Hardware 3005352-Touch Writer Design.pdf	G
Hardware 3005353-Touch with Access Design.pdf	E
Hardware 3005355-Touch Design.pdf	D
Hardware 3005356-Print Design.pdf	D
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	A
Hardware 3005800-Scan Design.pdf	A
Hardware 3005801-Accessible Booth With ATI Tray Design.pdf	A
Hardware 3005825-Controller Design.pdf	A
Hardware Design and Development Procedure	D.01
Hardware PCB Photos	N/A
Hardware Verification and Validation Process	D.01
Hart NRTL Safety Certificate U8 17 10 90917 004	N/A
Hart Secure Ballot Stock Specification	A.01
Verity 2.3 Test Cases	N/A
Verity Voting 2.3 Notice of Protected Information	A.00
Quality Manual	D.04
Records Retention Matrix	E.02
Software Design and Development Procedure	D.02
Software Production Procedure	E.01
Software Test Design and Development Procedure	D.02
Software Verification and Validation Process	D.02
Software Versioning Procedure	C.04
Hart Requirements Management Requirements Management Process	A.02

Supplier Qualification and Management Procedure	C.02
THE VERITY ACCESS FIRMWARE BUILD PROCEDURE	A.01
THE VERITY MCU FIRMWARE BUILD PROCEDURE	A.02
THE CREATION AND CONFIGURATION OF THE TRUSTED BUILD ENVIRONMENT	A.03
Verity Voting 2.3 TDP Abstract	A.01
Verity 2.3 VVSG 1.0 TDP Trace	N/A
Verity 2.3.X COTS List	N/A
Airgap Interface for Portable Electronic Media Technical Reference	A.02
Verity Application Framework Technical Requirements Document (TRD)	A.00
THE VERITY APPLICATION BUILD PROCESS FOR VERITY 2.3.1	A.01
Verity Application Programming Interface Specification Technical Document	A.04
Verity Ballot Creation Technical Requirements Document (TRD)	A.00
Verity Base Station Microcontroller Specification	A.01
Verity Build Technical Requirements Document (TRD)	A.00
Verity Central Technical Requirements Document (TRD)	A.00
Verity Coding Standard Standards Document	A.14
Verity Controller Technical Requirements Document (TRD)	A.01
Verity Count Technical Requirements Document (TRD)	A.01
Verity Data Technical Requirements Document (TRD)	A.00
Verity Database Attributes	C.02
Verity Device Suite Technical Requirements Document (TRD)	A.00
Verity Election Definition Data Technical Requirements Document (TRD)	A.01
Verity Election Management Technical Requirements Document (TRD)	A.00
Verity System Design Verity Electronics Specification	A.15
Verity Entity Relationship Diagram Database - Devices	N/A

Verity Entity Relationship Diagram Database - Servers (Count Only)	N/A
Verity Entity Relationship Diagram Database - Servers (No Count)	N/A
Verity Key Design Technical Document	A.02
Verity Logging Design Technical Document	1.03
Verity Logging Technical Requirements Document (TRD)	A.00
Verity Voting Verity Operational Environment	C.05
PC Application Framework UI Design Document	5
Verity Voting Performance Characteristics	C.02
Verity Print Technical Requirements Document (TRD)	A.00
Verity Risk Assessment	B.01
Verity Scan Technical Requirements Document (TRD)	A.00
Verity Security Requirements Document	A.07
Verity Shared Device User Interface Design Document	7
Verity Software Architecture-Design 4005463 B01	B.01
Usability Test Report of Verity Touch/Touch Writer and Verity Scan	N/A
Verity Voting Summative Usability Test Plan	A.01
Verity – Supply Chain PRD Supply Chain / Operations / Services Planning Document	C.01
Verity Voting 2.3 System Limits	C.01
Verity Touch Technical Requirements Document (TRD)	A.00
Verity Touch Writer Duo Base Station Microcontroller Specification	A.00
Touch Writer Duo Technical Requirements Document (TRD)	A.00
Verity Touch Writer Technical Requirements Document (TRD)	A.00
Verity User Management Technical Requirements Document (TRD)	A.00
Verity Vote Counting and Cast Vote Records Technical Requirements Document (TRD)	A.00
Verity Voting 2.3 Implementation Statement	A.00

Application for Certification – Verity Voting 2.3 Usability Impact Statement	N/A
Verity Voting 2.3.1, 2.3.2 Source Documentation.zip	N/A
Verity Voting National Certification Test Specification	B.02
Verity Workstation Manufacturing Process Document	B.01
Administrator's Guide VERSION 2.3 (Build)	A.01
Administrator's Guide VERSION 2.3 (Central)	A.02
Administrator's Guide VERSION 2.3 (Count)	A.03
Administrator's Guide VERSION 2.3 (Data)	A.02
Device Troubleshooting Field Guide VERSION 2.3	A.03
Polling Place Field Guide VERSION 2.3 (CDS)	A.02
Polling Place Field Guide VERSION 2.3 (CT)	A.02
Polling Place Field Guide VERSION 2.3 (SW)	A.01
Support Procedures Guide VERSION 2.3	A.03
System Administrator's Guide VERSION 2.3	A.02
Verity Print Field Guide VERSION 2.3	A.01
VIRTEX ENTERPRISES LP QUALITY SYSTEM MANUAL	R
Voting System Implementation And Maintenance Process Document	C.02
VSTL Product Submission Procedure	D.02
Verity 2.3 Workstation Configuration Process Document	A.01
WORKSTATION WES7 CREATION PROCESS DOCUMENT	A.00

4.3 Software and Firmware

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

The software and firmware employed by **Hart Verity Voting 2.3** 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 COTS software and firmware was either obtained directly from the 3rd party manufacturer, or was verified against digital signatures obtained from the 3rd party manufacturer. No modified COTS were implemented.

Tables 3 and 4 below detail each application employed by the **Hart Verity Voting 2.3** voting system.

Table 3 – Hart Verity Voting 2.3 Custom Software and Firmware

Application	Version
Verity Data	2.3.1
Verity Build	2.3.1
Verity Central	2.3.1
Verity Count	2.3.1
Verity Print	2.3.1
Verity Scan	2.3.1
Verity Touch Writer	2.3.1
Verity Touch Writer Duo	2.3.1
Verity Controller	2.3.2
Verity Touch	2.3.1
Verity Touch with Access	2.3.1

Table 4 – COTS Software

Verity Data/Build	
Description	**Version**
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	6.1.1.369
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	6.1.1.369
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	6.1.1.369
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	6.1.1.369
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	6.1.1.369
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	6.1.1.369
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	6.1.1.369
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	6.1.1.369
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	6.1.1.369
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	6.1.1.369

4.4 Equipment (Hardware)

The hardware employed by **Hart Verity Voting 2.3** consists of 2 types, custom and commercial off the shelf (COTS). COTS hardware was verified to be unmodified, or was subjected to review for analysis of any modifications and verification of meeting the pertinent standards.

Tables 5 and 6 below detail each device employed by the **Hart Verity Voting 2.3** voting system.

Table 5 – Hart Verity Voting 2.3 Custom Voting Equipment

Description	Version
Verity Print – Ballot Printer	3005356 Rev D
Verity Scan – Paper Ballot Scanner	3005350 Rev H
Verity Scan – Paper Ballot Scanner – Update for scanner mechanism and tablet electronics obsolescence.	3005800 Rev A
Verity Touch Writer – Electronic BMD Device	3005352 Rev G
Verity Touch Writer Duo – Electronic BMD Device	3005700 Rev A
Verity Controller – Networked Centralized Management Device	3005351 Rev D
Verity Controller – Networked Centralized Management Device – Update for tablet electronics obsolescence.	3005825 Rev A
Verity Touch - Electronic DRE Device	3005355 Rev D
Verity Touch with Access - Electronic DRE Device	3005353 Rev E

Table 6 – Hart Verity Voting 2.3 COTS Equipment

Verity Data/Build	
Description	**Version**
Verity Central Applications and Workstation Kit • HP Z240 Workstation • HPZ230 Workstation supported for existing customers only • Verity Central Software (see below)	C
Canon DR G1100 High-Speed Scanner	M111181
Canon DR G1130 High-Speed Scanner	M111171
OKI Data B432dn Mono Printer Report printer	N22500A
OKI Data B431d Mono Printer for existing customers only Report printer	N22202A

8-port Ethernet Switch	1405-8GV3
Vinpower Digital USB Duplicator 7-targets	USBShark-7T-BK
Vinpower Digital USB Duplicator 23-targets	USBShark-23T-BK
Verity Central	
Verity Central Applications and Workstation Kit • HP Z240 Workstation • HPZ230 Workstation supported for existing customers only • Verity Central Software (see below)	C
Canon DR G1100 High-Speed Scanner	M111181
Canon DR G1130 High-Speed Scanner	M111171
OKI Data B432dn Mono Printer Report printer	N22500A
OKI Data B431d Mono Printer for existing customers only Report printer	N22202A
8-port Ethernet Switch	1405-8GV3
Verity Count	
Verity Count Applications and Workstation Kit • HP Z240 Workstation or HP Z230 Workstation • HPZ230 Workstation supported for existing customers only • Verity Count Software (see below)	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 Print	
OKI Data C831dn Color Printer	N35100A
OKI Data B432dn Mono Blank Ballot Printer	N22500A
OKI Data B431d Mono Printer for existing customers only	N22202A
Verity Scan – Paper Ballot Scanner	
Verity Ballot Box	B
Verity Touch Writer – Electronic BMD Device	
OKI Data B432dn Mono Marked Ballot Printer	N22500A
OKI Data B431d Mono Printer for existing customers only Report printer	N22202A

Accessible Voting Booth	D
Verity Touch Writer Duo – Electronic BMD Device	
Brother PJ700 Series Thermal Printer	PJ723
Accessible Voting Booth	D
Standard Voting Booth	D
Verity Touch - Electronic DRE Device	
Standard Voting Booth	D
Verity Touch with Access - Electronic DRE Device	
Accessible Voting Booth	D

4.5 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, and any other materials used in testing.

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

4.6 Requirements

4.6.1 VVSG Requirements

The **Verity Voting 2.3** modifications were tested to applicable 2005 VVSG 1.0 requirements. This section details the requirements reviewed for **Verity Voting 2.3**.

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

Volume I:

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

Volume II

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

4.6.2 Hardware Requirements

Volume I:

- 2.1.4 (b,c,d) Integrity
- 4.1.2.5-12 Environmental Requirements
- 4.1.7.1 Removable Storage Media
- 4.3.3 Reliability

Volume II:

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

4.7 Hart State Specific Modification Requirements

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

Pertinent Hart requirements are listed in Attachment J – Verity Voting 2.0 to 2.3 System Modifications.

5 Certification Test Results Summary

5.1 Source Code Review Summary

SLI reviewed the software source code for each application in the **Hart Verity Voting 2.3** voting system to determine the code's compliance with Volume I Sections 5, 9 and Volume II Section 5.4 of the VVSG 1.0 and for compliance with **Hart**'s internally developed coding standards. **Verity Voting 2.3** is implemented with the C, C++ and C# languages. Results of the source code review are detailed in *Attachment I – List of Source Code Reviewed and Results*.

5.1.1 Evaluation of Source Code

The source code was reviewed for compliance per the guidelines defined in *Volume II, Section 5.4* of the VVSG 1.0. As a modification project, the **Verity Voting 2.3** code base was reviewed using the final **Verity Voting 2.0** code base as the baseline, to which the initial **Verity Voting 2.3** 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 found to be in compliance with the terms of the VVSG 1.0, and Hart declared industry standards.

5.2 Technical Data Package Review Summary

SLI reviewed the ***Hart Verity Voting 2.3*** TDP, as detailed in sections 3.1 and 3.4, for compliance according to *Volume II Section 2* of the VVSG 1.0.
The review was conducted for the required content and format of:

- **System Change Notes:** Changes to certified system **Verity Voting 2.3.**
- **System Test and Verification Specifications:** Development and certification test specifications that **Hart** applied to their testing efforts. **Verity Voting 2.3**
- **Application Usability Impact statement**: Updated for **Verity Voting 2.3**
- **Performance Characteristics:** Updated for **Verity Voting 2.3**
- **System Description:** Updated for **Verity Voting 2.3**
- **Verity System Limits:** Updated for **Verity Voting 2.3**
- **Verity Operational Environment:** Updated for **Verity Voting 2.3**
- **Verity COTS List**: Updated for **Verity Voting 2.3**
- **Verity Data Technical Reference**: Updated for **Verity Voting 2.3.**
- **Verity Build Technical Reference Manual**: Updated for **Verity Voting 2.3**
- **Verity Central Technical Reference Manual**: Updated for **Verity Voting 2.3**
- **Verity Count Technical Reference Manual**: Updated for **Verity Voting 2.3**
- **Verity Service and Maintenance Operations Technical Reference Manual**: Updated for **Verity Voting 2.3**

5.2.1 Evaluation of TDP

The Technical Data Package for the **Hart Verity Voting 2.3** voting system was found to comply with the standards. A jurisdiction would be able to deploy the **Hart Verity Voting 2.3** voting system using the TDP.

5.3 Hardware Testing

Hardware testing was performed on **Verity Scan** and **Verity Controller/Touch Writer Duo**. Each device was subjected to: Electrical Power Disturbance, Electrical Fast Transient, Lightning Surge, Electrostatic Disruption, Electromagnetic Emissions, Electromagnetic Susceptibility, Conducted RF Immunity, Magnetic Fields Immunity, Bench Handling, Vibration, Low Temperature, High Temperature Test, Humidity Test, Temperature and Power Variation and Maintainability testing. Both devices successfully completed hardware testing.

5.4 Functional Testing Summary

Functionality was tested as identified below for the **Verity Voting 2.3** system.

5.4.1 Test Suites Utilized

The following test suites were executed:

Verity Data/Build test suite – The **Verity Data/Build** component was re-tested in depth in order to verify that the modifications implemented, and the subsequent Trusted Build of the software, did not adversely affect operations within this application. This testing was completed without issue.

Verity Desktop test suite – The **Verity Desktop** component was re-tested in depth in order to verify that the modifications implemented, and the subsequent Trusted Build of the software, did not adversely affect operations within this application. This testing was completed without issue.

Verity User Management test suite – The **Verity User Management** component was re-tested in depth in order to verify that the modifications implemented, and the subsequent Trusted Build of the software, did not adversely affect operations within this application. This testing was completed without issue.

Verity Touch Writer test suite – The **Verity Touch Writer** component was re-tested in depth in order to verify that the modifications implemented, and the subsequent Trusted Build of the firmware, did not adversely affect operations within this application. This testing was completed without issue.

Verity Touch Writer Duo test suite – The **Verity Touch Writer Duo** component was tested in depth in order to verify that the modifications implemented, and the subsequent Trusted Build of the firmware, did not adversely affect operations within this application. This testing was completed without issue. Note that basic functionality of this device mirrors that of **Verity Touch Writer**.

Verity Touch test suite – The **Verity Touch** component was re-tested in depth in order to verify that the modifications implemented, and the subsequent Trusted Build of the firmware, did not adversely affect operations within this application. This testing was completed without issue.

Verity Print test suite – The **Verity Print** component was re-tested in depth in order to verify that the modifications implemented, and the subsequent Trusted Build of the firmware, did not adversely affect operations within this application. This testing was completed without issue.

Verity Scan test suite – The **Verity Scan** component was re-tested in depth in order to verify that the modifications implemented, and the subsequent Trusted Build of the firmware, did not adversely affect operations within this application. This testing was completed without issue.

Verity Central test suite – The **Verity Central** application component was re-tested in depth in order to verify that the modifications implemented, and the subsequent Trusted Build of the software, did not adversely affect operations within this application. This testing was completed without issue.

Verity Count test suite – The **Verity Count** application component was re-tested in depth in order to verify that the modifications implemented, and the subsequent Trusted Build of the software, did not adversely affect operations within this application. This testing was completed without issue.

Modifications test suite – The Modification test suite explicitly examined each modification introduced into **Verity Voting 2.3** in order to verify that the modifications implemented, and the subsequent Trusted Build of the firmware, did not adversely affect operations. This testing was completed without issue

General Election test suite – The full **Verity Voting 2.3** voting system was reviewed in order to verify continued integration of the voting system and that all components continue to work as expected. This test was completed without issue.

Closed Primary Election test suite – The full **Verity Voting 2.3** voting system was reviewed in order to verify continued integration of the voting system and that all components continue to work as expected. This test was completed without issue.

Open Primary Election test suite – The full **Verity Voting 2.3** voting system was reviewed in order to verify continued integration of the voting system and that all components continue to work as expected. This test was completed without issue.

Language test suite – Testing was conducted to ensure the voting system is capable of presenting the ballot, ballot selections, review screens and instructions in the required languages. The system's ability to handle the prescribed foreign languages that have been declared to be supported, English, Spanish, Chinese, Japanese, Korean, Khmer, Thai, Vietnamese, Tagalog, Ilocano, and Hindi were validated. This test was completed without issue.

Accuracy test suite – **Verity Scan** was tested for accuracy of ballot marks reading in association with updated hardware. **Verity Central** was also tested to verify ability to read 8.5"x20" ballots accurately. This test was completed without issue.

Volume test suite – The full **Verity Voting 2.3** voting system was reviewed in order to verify compliance with the updated stated system limits. This test was completed without issue.

Stress test suite - The full **Verity Voting 2.3** voting system was reviewed in order to verify appropriate responses. This test was completed without issue.

5.5 Evaluation of Testing

The above tests were successfully conducted using the executables created in the Trusted Build, in association with the appropriate hardware versions as declared in this Test Report for the **Hart Verity Voting 2.3** voting system.

5.6 Quality Assurance and Configuration Management Audits

The review process verified that the manufacturer has written processes and procedures for Quality Assurance and Configuration Management. The processes and procedures were implemented within the software development life cycle used to produce the **Hart Verity Voting 2.3** system.

Coverage of tests employed by **Hart** was deemed satisfactory for meeting the requirements of the VVSG 1.0, as well Hart internal requirements for state specific feature implementations.

The CM portion of the review focused on the organization's understanding and implementation of the declared configuration management processes, procedures and policies. Deliverables were reviewed against all pertinent CM processes employed by **Hart**.

Implementation of the **Hart** configuration processes was adequately documented and followed throughout the course of the **Verity Voting 2.3** project, and no issues were encountered.

5.7 Discrepancies Found During Testing

Discrepancies found fall into 4 major categories, Hardware, Documentation, Source Code, and Functional.

Hardware discrepancies are issues that occur specifically in the hardware arena, and are usually found during the hardware testing phase.

Documentation discrepancies are issues that occur during the PCA documentation (TDP) review phase and are issues that are resolved by updates to the documentation.

Source Code discrepancies are issues that occur during source code review and are issues that must be fixed in the source code prior to the Trusted Build.

Functional discrepancies are issues that occur during functional testing and can be related to any software or firmware within the system. Functional discrepancies often lead to source code modifications, additional source code review and an additional Trusted Build.

5.7.1 Documentation Discrepancies

Twenty-nine documentation discrepancies were written during this campaign, all were satisfactorily resolved

5.7.2 Source Code Discrepancies

Six source code discrepancies were written during this campaign, all were satisfactorily resolved.

5.7.3 Hardware Discrepancies

Four hardware discrepancies were written during this campaign, all were satisfactorily resolved.

- Verity Scan Failed ESD Causing Display Screen to Freeze
  - Resolved by:
    - Debug/Development components that were indadvertently left on the assembly were removed. These components serve no purpose in the product functionality and were present only for the development portion of the project.
    - Shielding of sensitive signals on the PCB was implemented through additional metal shields and conductive metal shielding tape.
    - Insulating the LCD metal frame from the seam between the LCD and the plastic enclosure.

- Verity Controller / TW Duo Failed ESD Causing Display Screen to Freeze

  - Resolved by:
    - Debug/Development components that were indadvertently left on the assembly were removed. These components serve no purpose in the product functionality and were present only for the development portion of the project.
    - Shielding of sensitive signals on the PCB was implemented through additional metal shields and conductive metal shielding tape.
    - Insulating the LCD metal frame from the seam between the LCD and the plastic enclosure.
- Verity Scan Failed ESD, Scanner Diag Test Utility Lost Connection
  - Resolved by:
    - The test utility provided the scanning function for automation purposes during ESD testing. When the utility lost connection, it was able to be restarted. ESD testing was completed successfully with the anomaly noted, and all other applications and functions on the Verity Scan continued to operate without disruption. For future endeavors, however, Hart will develop an automated test utility in order to remove this occurrence.
- Verity Scan S1801828110 Fail Temperature and Power Variation Tests
  - Resolved by:
    - The scanner mechanism was determined to be part of an initial production run of the PageScan V scanner mechanism, in which the MSD boards were hand soldered. The less precise hand soldering method resulted in a cold solder joint on the MSD board, causing it to lose communication and cause the anomaly. All MSD boards after the initial production run are manufactured with a uniform and automated wave soldering process.

5.7.4 Functional Discrepancies

Four functional discrepancies were encountered during this campaign, all were satisfactorily resolved.

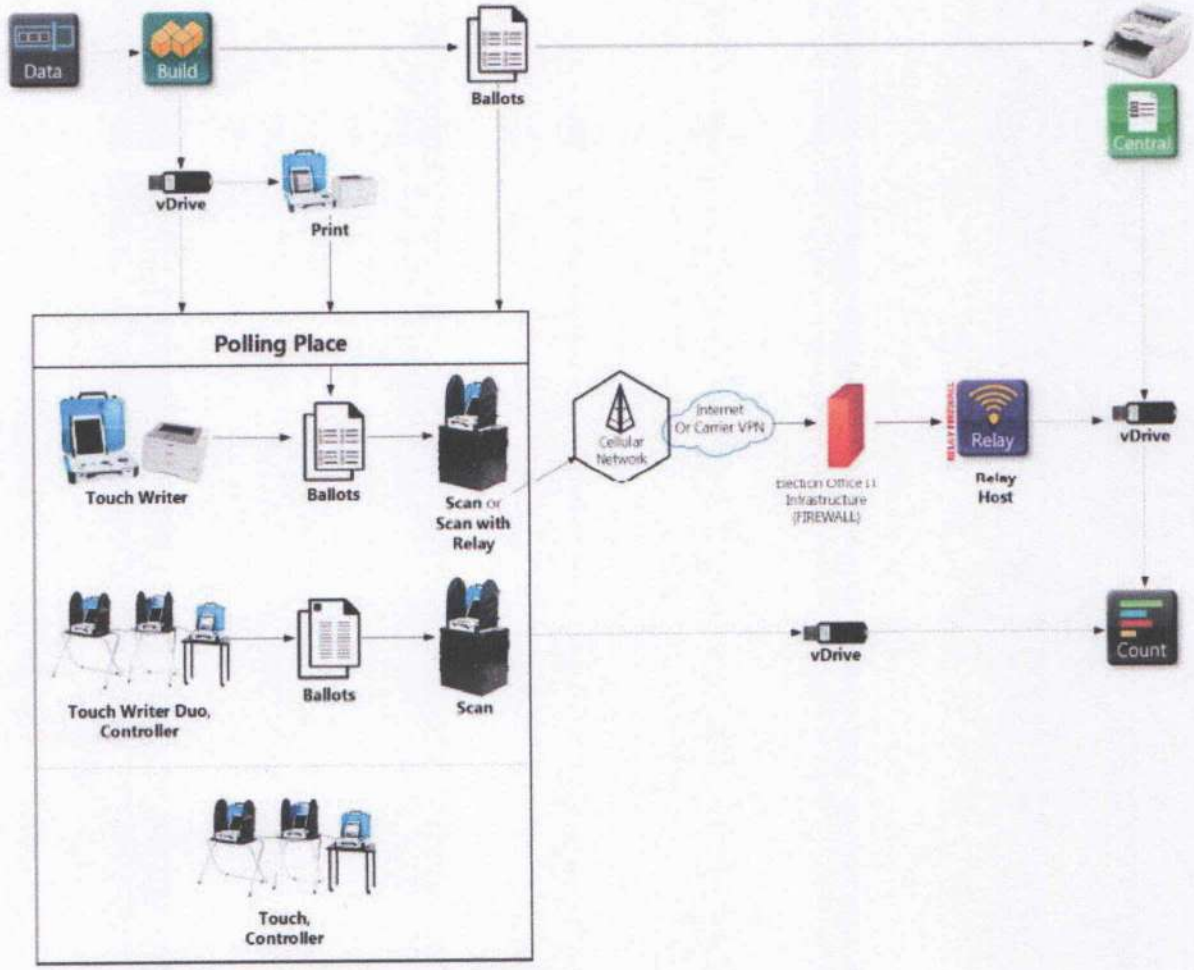
- In Data, Help incorrectly describes Add Party Selection
  - The Help menu now accurately describes the button that is available to the user. The "Add Party Selector" button is described as, "Click the Add Party Selector button to add a straight party selection contest."
- In Controller & Duo, Robustness Error does not accurately describe device
  - The warning message now displays the following: "WARNING: A device with an active voting session was disconnected and never reconnected. There may be a stranded ballot or unreported session on that device. This situation can be resolved by reconnecting the device while polls are still open.
    The polls cannot be reopened once they are closed."
- In Controller, Reset Booth numbering Incorrectly describes device
  - The controller screen was updated to no longer display the 'Touch' device and now states, "If you reset your booth numbers, you will need to reassign a booth number to each connected device before voting can continue. "

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.

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:

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 • 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 • 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 • 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 • 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: • 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: • Hart part number: 1003672 Motorola/Zebra part number: DS4308	B
Headphones • 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 • Brand: V7, part number HA300-2NP	2005230
Verity Controller	
Optional AutoBallot Barcode Scanner Kit Includes the following 2d barcode scanner: • Hart part number: 1003672 Motorola/Zebra part number: DS4308	B
Verity Touch - Electronic DRE Device	
Standard Voting Booth	D

  - 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.

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

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.

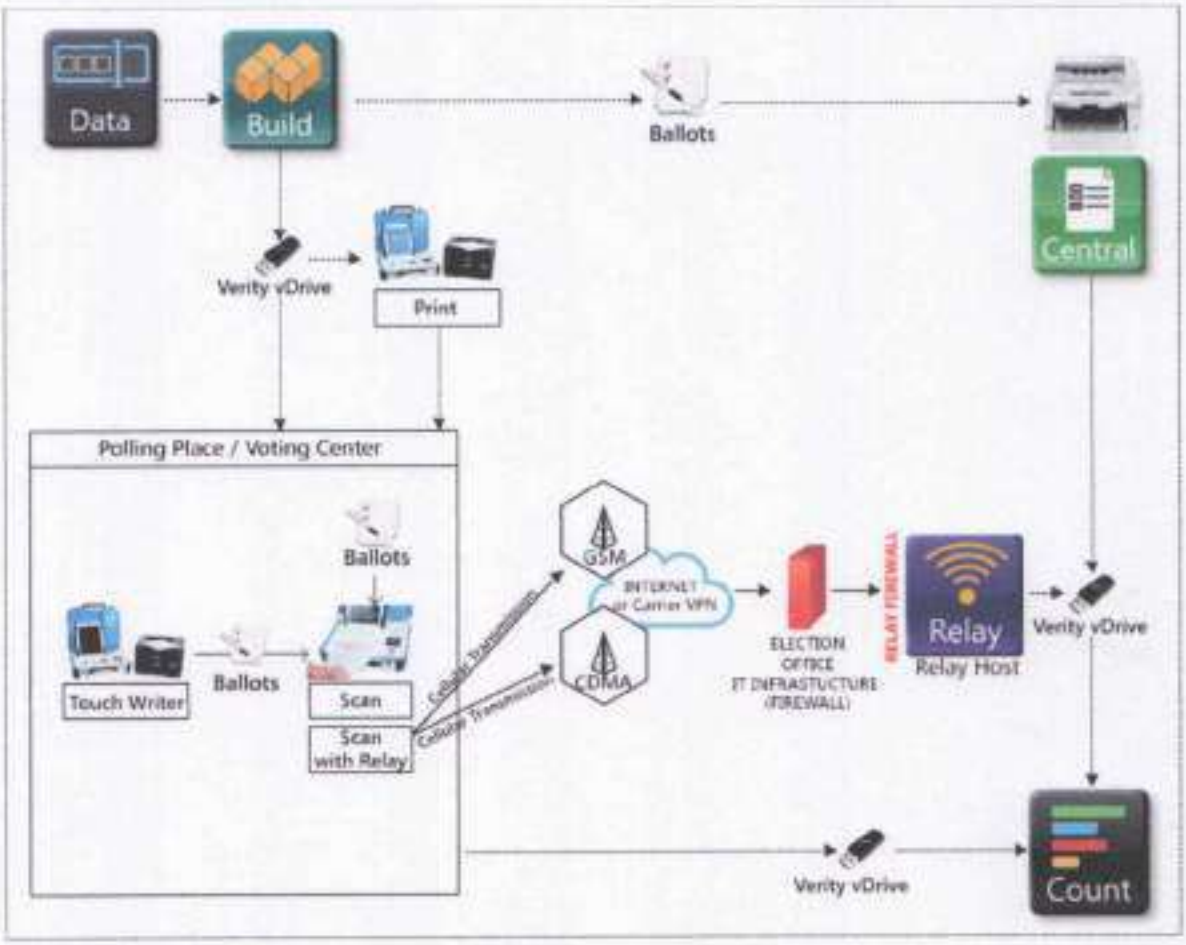
Communications between **Verity Relay** and **Verity Scan** were monitored after leaving the public cellular network. Network analysis tools were used to obtain network packet captures to examine communication and authentication attempts between devices, and to assess that appropriate encryption is utilized. 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

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**.
- **Verity Print** is a ballot production device that provides unmarked printed ballots.
- **Verity Touch Writer** and **Verity Scan** (Verity Voting devices) may be installed in Polling Places.
- **Verity Key** (not shown) is a USB device that is required for user access into components to load election elections, use features, and generate reports. Feature access depends on the roles applied to user accounts.
- **Verity Relay** is a transmission option within the Verity Voting system.