Voting System Test Report

Report Number: HIN-23003-TR-04

Hart InterCivic

Verity Vanguard 1.0 Voting System

Test Report Rev 4.0

June 17, 2025

Prepared for:

Manufacturer Name	Hart InterCivic
Manufacturer System	Verity Vanguard 1.0
EAC Application No.	*HRT-VV-1.0*

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NVLAP TESTING
NVLAP Lab Code 200733-0

Accredited by the National Institute of Standards and Technology (NIST) National Voluntary Lab Accreditation Program (NVLAP) and accredited by the Election Assistance Commission (EAC) for VSTL status

Revision History

Date	Release	Author	Revision Summary
May 5, 2025	1.0	M. Santos	Initial Draft
May 22, 2025	2.0	M. Santos	Updates for EAC comments
May 30, 2025	3.0	M. Santos	Updates for EAC comments
June 17, 2025	4.0	M. Santos	Update section 2.6.1, for requirement 8.1-J, update table 2.

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Disclaimer

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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 (current version). Regarding non-core hardware testing for this test campaign, this report contains data that were produced under subcontract by the following lab(s):

- Element Materials Technology Denver-Longmont, 1736 Vista View Drive Longmont, CO 80504 (A2LA certified for Electromagnetic Compatibility/ Interference (EMC/EMI), Lightning, Transient, and Surge tests) (Certificate Number 214.43)

- Element Materials Technology Denver-Longmont, 1601 Dry Creek Drive Longmont, CO 80503 (A2LA certified for mechanical including MIL STD 810H) (Certificate Number: 2582.02)

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1 System Identification and Overview

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

This effort included documentation review of the Technical Data Package, source code review, and testing of the Hart InterCivic Verity Vanguard 1.0 voting system. Testing consisted of the development of a test plan, managing system configurations, executing test suites of functional and system levels tests based on the system's functionality, and analysis of results. The review and testing were performed at SLI Compliance's Wheat Ridge, Colorado facility, from May 14, 2024, to April 24, 2025.

1.1 References

1. Election Assistance Commission Voluntary Voting System Guidelines (EAC VVSG), Version 2.0, 2021
2. VVSG Version 2.0 Test Assertions Version 1.3
3. NIST Handbook 150: 2020
4. NIST Handbook 50-22: 2021
5. EAC Voting System Testing and Certification Program Manual, United States Election Assistance Commission, v 3.0
6. SLI Compliance VSTL Quality System Manual, Rev 4.3, Dec. 17, 2024

1.2 Document Overview

This document contains the following sections:

- The "System Identification and Overview" discusses the system that was tested.
- The "Certification Test Background" section discusses the testing process.
- The "Test Findings and Recommendation" section contains the results and analysis of the testing effort.
- Attachments listed in the test report subsections, which include:
    - Attachment A – Verity Vanguard 1.0 Implementation Statement
    - Attachment B – Verity Vanguard 1.0 Technical Data Package Listing
    - Attachment C – Verity Vanguard 1.0 Warrant of Change Control
    - Attachment D – Hart InterCivic Verity Vanguard 1.0 Test Plan - As Run
    - Attachment E – Hart InterCivic Verity Vanguard 1.0 Test Case Matrix
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- Attachment H – Accredited Hardware Test Lab Certification
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1.3 System Identification

The Hart InterCivic Verity Vanguard 1.0 voting system was submitted for testing with the documentation, hardware and software listed in the following subsections.

1.3.1 Software and Firmware

The software and firmware employed by Hart InterCivic Verity Vanguard 1.0 consists of two types: custom and commercial off the shelf (COTS). The 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 Hart InterCivic Verity Vanguard 1.0 voting system.

Table 1 – Verity Vanguard 1.0 Software and Firmware

Component	Component Type	Software
Define (Pre-election EMS)	Workstation Software	1.0.1
Deploy (Pre-election EMS)	Workstation Software	1.0.1
Capture (Central Scanning)	Workstation Software	1.0.1
Results (Post-election EMS)	Workstation Software	1.0.1
Manage (EMS)	Workstation Software	1.0.1
Ranked Choice (EMS)	Workstation Software	1.0.1
Libraries (EMS)	Workstation Software	1.0.1
Test Decks (EMS)	Workstation Software	1.0.1
Boost (Polling Place Ballot Issue)	Polling Place Device	1.0.1
Flex (Polling Place BMD)	Polling Place Device	1.0.1

Component	Component Type	Software
Vault (Polling Place Scanner)	Polling Place Device	1.0.1
Adapt (Polling Place all-in-one accessible voting device)	Polling Place Device	1.0.1
Imprinter Firmware	Precinct Imprinter for use with Vault	REV 7
Touch Sensor Firmware	For use with all Polling Place Devices	REV 19
Verity Access Firmware	Accessibility Controller	1.0.1
Main MCU Firmware	For use with all Polling Place Devices	REV 47

Table 2 – Verity Vanguard 1.0 COTS Software and Firmware

Workstations (Define/Deploy, Capture, Results)		
Manufacturer	**Application**	**Version**
Microsoft	Windows 10 Enterprise 2021 LTSC, configured for kiosk operation	10.0.19044
Microsoft	SSRS - SQL Server Standard 2019	15.0.8270.42049
McAfee	McAfee Application Control for Devices ("Solidifier")	8.3.5.126
Maxim	1-Wire Driver	4.1.0
Open Source	OWdotNET	0.9.0.0
Microsoft	Visual Studio C++ 2015-2022 Redistributable x86	14.36.32532.0
Microsoft	Visual Studio C++ 2015-2022 Redistributable x64	14.36.32532.0
Open Source	Tesseract Open Source OCR Engine	4.5.2.411
Brother	Brother HL-L6400DWVS Printer Driver	1.8.168.8
HP	HP LaserJet Pro 4001 4002 4002 4004 PCL 6	8.00.2101.9302
OKI Data	OKI C844 (PCL)	1.0.0.0
Canon	DR-G2000 Series Driver	1.1.11807.24001SP2
NVIDIA	Z4G4 NVIDIA Graphics Driver	31.0.15.2748

NVIDIA	Z4G4 NVIDIA HD Audio Driver	1.3.39.16
Intel	Z2G9 Intel Graphics	31.0.101.4502
Microsoft	Help Viewer	2.3.28307
Microsoft	Visual Studio C++2013 Redistributable x64	12.0.30501.0
Microsoft	Visual Studio C++2013 Redistributable x86	12.0.30501.0
IntoPrint	SP1360(PCL6) Driver	1.0.0.0
empira Software GmbH	PDFSharp	1.50.5147.0
Open Source	Automapper	2.2.0.0
Open Source	MVVMLight	4.0.23.37706
Neodynamic ARL	Barcode Professional	11.0.23.223
Intel	Integrated Performance Primitives	2021.5.3.585
Open Source	NAudio	1.7.3.0
Open Source	NHibernate	3.3.1.4000
Prism Software, LLC	Prism	4.1.0.0
Open Source	SoundTouch	1.7.1.0
Microsoft	Unity	2.1.505.2
Open Source	OTP-Sharp	1.0.0
Open Source	Zxing.NET	0.16.4.0
Websupergoo	ABCpdf	12.3.0.0
Microsoft	Devcon	6.1.7600.16385
Telerik	UI for WPF	2023.2.606.45
Telerik	Reporting	18.1.24.709
Microsoft	Application .NET Runtime SDK	4.8.1
Okidata	OKIWinIO	1.8.2.2
Microsoft	SQLServer DTS	15.0.2000.5
Open Source	Math.NET Numerics	2.6.1.30

Devices (Vault, Flex, Adapt, Boost)		
Manufacturer	**Application**	**Version**
Microsoft	Windows 10 Enterprise 2021 LTSC, configured for kiosk operation	10.0.19044
Microsoft	Microsoft SQL Server Standard 2019	15.04345.5
Microsoft	SQLite	3.45.3
McAfee	McAfee Application Control for Devices ("Solidifier")	8.3.5.126
Maxim	1-Wire Driver	4.1.0
Open Source	OWdotNET	0.9.0.0
Microsoft	Visual Studio C++ 2015-2022 Redistributable x86	14.36.32532.0
Microsoft	Visual Studio C++ 2015-2022 Redistributable x64	14.36.32532.0
Seiko Instruments	SII IFD50x Driver	2.5.0.0
Open Source	Tesseract Open Source OCR Engine	4.5.2.411
Brother	Brother HL-L6400DWVS Printer Driver	1.8.168.8
PDI	PageScan Scanner SDK	7.2.17
PDI	PageScan USB Scanner Driver	4.0.0301.13
PDI	PDIPrintScanCut Driver for TPH850 Printer	4.1.0.0
HP	HP LaserJet Pro 4001 4002 4002 4004 PCL 6	8.00.2101.9302
HP	HP OfficeJet 200 Mobile Series	20.79.1.6738
OKI Data	OKI C844 (PCL)	1.0.0.0
Microsoft	Help Viewer	2.3.28307
empira Software GmbH	PDFSharp	1.50.5147.0
Open Source	Automapper	2.2.0.0
Open Source	MVVMLight	4.0.23.37706
Neodynamic ARL	Barcode Professional	11.0.23.223
Intel	Integrated Performance Primitives	2021.5.3.585
Open Source	Math.NET Numerics	2.6.1.30

Open Source	NAudio	1.7.3.0
Open Source	NHibernate	3.3.1.4000
Prism Software, LLC	Prism	4.1.0.0
Open Source	SoundTouch	1.7.1.0
Microsoft	Unity	2.1.505.2
Open Source	OTP-Sharp	1.0.0
Open Source	Zxing.NET	0.16.4.0
Open Source	Zxcvbn C#/.NET	7.0.92.0
Brother	brUSBMon Printer Interface, x64	1.0.0.0
Brother	brUSBMon Printer Interface, x86	1.0.1.0
Microsoft	Devcon	6.1.7600.16385
Telerik	Reporting	18.1.24.709
Microsoft	Application .NET Runtime SDK	4.8.1
Microsoft	Brother Ports Driver	01.02.00.00
SECO	Chipset Device	10.1.19222.8341
SECO	CSME_SW_2306.4.10.0_Consumer	2306.4.10.0
Intel	Intel Graphics Driver	31.0.101.2115
SECO	HID Event Filter	2.2.2.1
SECO	Programmable Services Engine Windows Drivers	1.0.10099.968
SECO	Serial IO	5.123.1.1025
SECO	Smart Sound Technology	10.30.00.7090
Okidata	OKIWinIO	1.8.2.2

1.3.2 Equipment (Hardware)

The hardware employed by Hart InterCivic Verity Vanguard 1.0 consists of two 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 Hart InterCivic Verity Vanguard 1.0 voting system.

Table 3 – Verity Vanguard 1.0 Custom Equipment

Manufacturer	Hardware	Model
Hart InterCivic	Precinct Scanner with optional Imprinter	Verity Vanguard Vault
Hart InterCivic	Ballot Marking Device (BMD)	Verity Vanguard Flex
Hart InterCivic	All-in-one accessible voting device (Limited Dexterity Mark, Verify, and Cast) device	Verity Vanguard Adapt
Hart InterCivic	Ballot Issuance device	Verity Vanguard Boost

Table 4 – Verity Vanguard 1.0 COTS Equipment

Component	Component Type	Associated COTS Hardware
Manage	Workstation Software	• Runs on the following COTS workstations: ○ HP Z2 SFF G9 workstation ○ HP Z4 G4 workstation ○ HP P24 G5, P24 G4, P244 monitors • Uninterruptible Power Supply for backup power: ○ Duracell DR660PSS ○ EATON 5P1500
Define	Workstation Software	• Runs on the following COTS workstations: ○ HP Z2 SFF G9 workstation ○ HP Z4 G4 workstation ○ HP P24 G5, P24 G4, P244 monitors • Uninterruptible Power Supply for backup power: ○ Duracell DR660PSS ○ EATON 5P1500 • Compatible with the following COTS printers: ○ Brother HL-L6400DW series mono laser printer ○ Brother HL-EX415DW series mono laser printer ○ HP LaserJet Pro 4001dn series mono laser printer • Supports local networked configuration for scale, compatible with the following COTS Ethernet switches: ○ HP 1405-8GV3 8-port Ethernet Switch ○ HPE R8R45A 8-port Ethernet Switch

Component	Component Type	Associated COTS Hardware
Deploy	Workstation Software	• Runs on the following COTS workstations: ○ HP Z2 SFF G9 workstation ○ HP Z4 G4 workstation ○ HP P24 G5, P24 G4, P244 monitors • Uninterruptible Power Supply for backup power: ○ Duracell DR660PSS ○ EATON 5P1500 • Compatible with the following COTS printers: ○ Brother HL-L6400DW series mono laser printer ○ Brother HL-EX415DW series mono laser printer ○ HP LaserJet Pro 4001dn series mono laser printer ○ OKI Data C831dn color laser printer ○ OKI Data C844dn color laser printer ○ OKI Data C911dn color laser printer ○ OKI Data C931e color laser printer ○ IntoPrint SP1360 color laser printer • Supports local networked configuration for scale, compatible with the following COTS Ethernet switches: ○ HP 1405-8GV3 8-port Ethernet Switch ○ HPE R8R45A 8-port Ethernet Switch • Supports duplication of blank vDrives: ○ VinPower Digital USBShark-7T-BK ○ VinPower Digital USBDupeBoxES-23T, USBShark-23T-BK
Capture	Workstation Software	• Runs on the following COTS workstations: ○ HP Z2 SFF G9 workstation ○ HP Z4 G4 workstation ○ HP P24 G5, P24 G4, P244 monitors • Uninterruptible Power Supply for backup power: ○ Duracell DR660PSS ○ EATON 5P1500 • Compatible with the following COTS printers: ○ Brother HL-L6400DW series mono laser printer ○ Brother HL-EX415DW series mono laser printer ○ HP LaserJet Pro 4001dn series mono laser printer • Compatible with the following COTS scanners ○ Canon DR-G2110 High-Speed scanner ○ Canon DR-G2140 High-Speed scanner • Supports local networked configuration for scale, compatible with the following COTS Ethernet switches: ○ HP 1405-8GV3 8-port Ethernet Switch ○ HPE R8R45A 8-port Ethernet Switch
Results	Workstation Software	• Runs on the following COTS workstations: ○ HP Z2 SFF G9 workstation ○ HP Z4 G4 workstation

Component	Component Type	Associated COTS Hardware
		○ HP P24 G5, P24 G4, P244 monitors • Uninterruptible Power Supply for backup power: ○ Duracell DR660PSS ○ EATON 5P1500 • Compatible with the following COTS printers: ○ Brother HL-L6400DW series mono laser printer ○ Brother HL-EX415DW series mono laser printer ○ HP LaserJet Pro 4001dn series mono laser printer • Supports local networked configuration for scale, compatible with the following COTS Ethernet switches: ○ HP 1405-8GV3 8-port Ethernet Switch ○ HPE R8R45A 8-port Ethernet Switch
Ranked Choice	Workstation Software	• Runs on the following COTS workstations: ○ HP Z2 SFF G9 workstation ○ HP Z4 G4 workstation ○ HP P24 G5, P24 G4, P244 monitors • Uninterruptible Power Supply for backup power: ○ Duracell DR660PSS ○ EATON 5P1500 • Compatible with the following COTS printers: ○ Brother HL-L6400DW series mono laser printer ○ Brother HL-EX415DW series mono laser printer ○ HP LaserJet Pro 4001dn series mono laser printer
Libraries	Workstation Software	• Runs on the following COTS workstations: ○ HP Z2 SFF G9 workstation ○ HP Z4 G4 workstation ○ HP P24 G5, P24 G4, P244 monitors • Uninterruptible Power Supply for backup power: ○ Duracell DR660PSS ○ EATON 5P1500
Test Decks	Workstation Software	• Runs on the following COTS workstations: ○ HP Z2 SFF G9 workstation ○ HP Z4 G4 workstation ○ HP P24 G5, P24 G4, P244 monitors • Uninterruptible Power Supply for backup power: ○ Duracell DR660PSS ○ EATON 5P1500
Boost	Polling Place Device	• Compatible with the following COTS printers: ○ Brother HL-L6400DW series mono laser printer ○ Brother HL-EX415DW series mono laser printer ○ HP LaserJet Pro 4001dn series mono laser printer ○ OKI Data C844dn color laser printer • Uninterruptible Power Supply for backup power for printers: ○ Duracell DR660PSS

Component	Component Type	Associated COTS Hardware
		• Supports AutoBallot which is compatible with the following COTS barcode scanners: ○ Motorola/Zebra DS4308 handheld barcode scanner ○ Zebra Technologies DS4608 handheld barcode scanner
Flex	Polling Place Device	• Supports AutoBallot which is compatible with the following COTS barcode scanners: ○ Motorola/Zebra DS4308 handheld barcode scanner ○ Zebra Technologies DS4608 handheld barcode scanner • Supports Polling Place devices: ○ Bausch & Lomb 819007 Full Page Framed Magnifier ○ Inclusion Solutions 436 Full Page Framed Magnifier
Adapt	Polling Place Device	• Utilizes the following COTS printer: ○ HP OfficeJet 200 inkjet printer • Supports AutoBallot which is compatible with the following COTS barcode scanners: ○ Motorola/Zebra DS4308 handheld barcode scanner ○ Zebra Technologies DS4608 handheld barcode scanner • Supports Polling Place devices: ○ Bausch & Lomb 819007 Full Page Framed Magnifier ○ Inclusion Solutions 436 Full Page Framed Magnifier

1.3.3 Engineering Changes

Verity Vanguard is the base release and does not currently have any Engineering Changes.

1.3.4 Test 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.

Manufacturer	Application	Version
Tenable	Nessus Professional	10.7.1
Wireshark Foundation	Wireshark	4.2.5
Mh-nexus	HxD	2.5.0.0
Kali	Kali Linux	2024.1
GCHQ	CyberChef	10.18.6
WebAIM.org	Contrast Checker	N/A

1.3.5 Technical Data Package (TDP) Documents

The Verity Vanguard 1.0 documents provided in the TDP are listed in " Attachment B – Verity Vanguard 1.0 Technical Data Package Listing".

1.4 System Overview

1.4.1 Scope of the Hart InterCivic Verity Vanguard 1.0 Voting System

The Hart InterCivic Verity Vanguard 1.0 voting system is a paper-based voting system comprised of both precinct and central count tabulators along with a Ballot Marking Device (BMD) and an all-in-one accessible voting device. All polling place devices are able to utilize Americans with Disabilities Act (ADA) components.

The Verity Vanguard 1.0 voting system's major components include Verity Vanguard Workspace, Verity Vanguard Define, Verity Vanguard Deploy, Verity Vanguard Capture, Verity Vanguard Results, Verity Vanguard Boost, Verity Vanguard Flex, Verity Vanguard Adapt, and Verity Vanguard Vault.

The Verity Vanguard Workspace (EMS)

Verity Vanguard Workspace is the Verity Vanguard workstation home screen. The Verity Vanguard workspace displays tiles for each of the installed Verity Vanguard components. The components displayed are based on the roles and permissions assigned to the current user by the System Administrator.

The Manage application is used to create new elections, archive and restore elections, and export signed elections.

The Users application is used to create and manage Verity Vanguard users and write security tokens.

The Settings application is used to perform additional workstation functions such as setting the clock and exporting file hashes.

Verity Vanguard Define (Pre-Election EMS)

Verity Vanguard Define is a component of the Verity Vanguard voting system used by election officials to enter election data for contests, candidates, proposition text, translations, and audio. Verity Vanguard Define also provides the user with controls for proofing of data and layout and performs validation prior to locking the data to ensure its readiness for use in Verity Vanguard Deploy, the election definition software.

Verity Vanguard Deploy (Pre-Election EMS)

Verity Vanguard Deploy is used by officials to complete pre-voting tasks for creating and generating an election definition, device user Security Tickets, and ballots. Verity Vanguard Deploy provides a ballot layout proofing process. The process establishes relationships between election data, jurisdiction, and polling place data, for the shared election definition. Verity Vanguard Deploy will create the portable media, vDrives, to provide a method of transferring the shared election definition to Verity Vanguard voting devices and workstations.

Note that Verity Vanguard Define and Verity Vanguard Deploy share the same environment, so are fielded on the same workstation.

Verity Vanguard Define/Deploy can include a stand-alone workstation or multiple Verity Vanguard Capture workstations that are networked on a closed LAN in a server/client configuration. The closed LAN cannot connect to other LANs or systems, ensuring the air gap remains for security of data.

Verity Vanguard Capture (Central Scan)

Verity Vanguard Capture is used by officials for paper ballot scanning, contest resolution, and conversion of voter selection marks to electronic Cast Vote Records (CVRs). The scanner can optionally print a unique identifier to the ballot following scanning. Once the CVRs are written to vDrive(s) they can be transferred into Verity Vanguard Results for vote tabulation and reporting of election results. Verity Vanguard Capture records cast vote records only; it does not tabulate.

Verity Vanguard Capture can include a stand-alone workstation or multiple Verity Vanguard Capture workstations that are networked on a closed LAN in a server/client configuration. The closed LAN cannot connect to other LANs or systems, ensuring the air gap remains for security of data.

Verity Vanguard Results (Post-Election EMS)

Verity Vanguard Results is used by officials to complete post-voting functionality to tabulate election results and generate reports. Verity Vanguard Results receives the CVRs from portable media devices (vDrives) used to record CVRs from Verity Vanguard Vault devices or Verity Vanguard Capture workstations. Verity Vanguard Results can be used by officials to resolve Vault or Verity Vanguard Capture write-in votes for paper ballots that were manually marked.

Verity Vanguard Results can also be used to collect and store all election logs from every Verity Vanguard device used in the election, allowing for complete election audit log reviews.

Verity Vanguard Results can include a stand-alone workstation or multiple Verity Vanguard Results workstations that are networked on a closed LAN in a server/client

configuration. The closed LAN cannot connect to other LANs or systems, ensuring the air gap remains for security of data.

Verity Vanguard Manage (EMS)

Verity Vanguard Manage is available only within server and standalone workstation software applications. This software enables authorized users to add, copy, import, export, archive, restore, and manage elections. Once an election is added or imported in the Election Management application, the election can be opened and handled per the features available within the Verity Vanguard software installed on that workstation.

Verity Vanguard Boost (Polling Place Ballot Issuance)

Verity Vanguard Boost is a poll worker-facing device designed to improve voter service by optimizing ballot issuance in the polling place. Verity Vanguard Boost can be utilized by poll workers in two ways. Boost may be used to print blank paper ballots on demand, using an attached ballot printer. Boost may also be used to issue VotePasses, which allow voters to access, mark, and print a printed vote record using Verity Vanguard Flex. Verity Vanguard Boost does not store vote data.

Verity Vanguard Flex (Polling Place BMD)

Verity Vanguard Flex is a universal ballot marking device that produces an auditable summary ballot of a voter's choices that does not encode voter selections in barcodes or QR codes. Voters can mark their ballots using the touchscreen interface or a wide variety of accessible controls. Printed summary ballots are then scanned in Verity Vault for tabulation.

Verity Vanguard Adapt (Polling Place Limited Dexterity Mark, Verify and Cast device)

Verity Vanguard Adapt is an all-in-one voting device that produces an auditable summary ballot of a voter's choices that does not encode voter selections in barcodes or QR codes. Voters can mark their ballots using the touchscreen interface or a wide variety of accessible controls. Verity Vanguard Adapt enables voters to mark, verify, and cast their ballot all without touching a piece of paper.

Verity Vanguard Vault (Polling Place Precinct Scanner)

Verity Vanguard Vault is a polling place scanning device that captures voter choices whether using ballots marked by hand or machine, including summary ballots [printed vote records (PVRs)], utilizing OCR technology to count/process summary ballots. Vault can print a unique identifier to the ballot following scanning using an optional purpose-built Imprinter.

Verity Vanguard Libraries (EMS)

Verity Vanguard Libraries is an application that can be unlocked on any Verity Vanguard Define/Deploy workstation. Libraries allows users to save translations and audio from any Verity Vanguard election and use them in future elections. Translations and audio in Verity Vanguard Libraries can be imported into any election in the Verity Vanguard Define application on the same workstation.

Verity Vanguard Test Decks (EMS)

Verity Vanguard Test Decks is an application that can be unlocked on any Verity Vanguard Define/Deploy workstation. Test Decks allows users to generate a pre-marked set of ballots (a “Test Deck”) that can be used for Logic and Accuracy Testing of the Verity Vanguard voting system. Test Decks allows users to select a marking pattern and generate a test deck which is then available to print and/or export within the Verity Vanguard Deploy software application.

Verity Vanguard Ranked Choice (EMS)

Verity Vanguard Ranked Choice is an application that can be unlocked on any Verity Vanguard Results workstation. Ranked Choice allows users to perform tabulation of ranked choice contest results that have been read into Verity Vanguard Results.

Auxiliary System Components

Verity Access (Polling Place)

Verity Access is an Audio-Tactile Interface (ATI) module that is optionally connected to Verity Vanguard Flex, Boost, and Vault. Verity Access is permanently tethered to Vanguard Adapt. Access has three tactile buttons, one audio port, and one port for external tactile buttons or sip and puff devices. Jacks for headphones and adaptive devices are located on the top edge of the device, and the device has grip surfaces on either side.

Verity AutoBallot (Polling Place)

AutoBallot is an optional barcode scanner kit for all instances of ballot activation, including Verity Vanguard Flex, Boost, and Adapt. AutoBallot allows air-gapped integration between an e-pollbook check-in process and the task of selecting the proper ballot style for the voting system. AutoBallot simplifies and automates the ballot style selection process in Vote Centers by allowing poll workers to scan a barcode output from an electronic poll book and activate the correct ballot style with the click of a button, thereby reducing human error. Once the ballot style has been input with the barcode scanner, the poll worker confirms the ballot style on the device display.

vDrive – Electronic Media

Verity vDrive is a required Verity Vanguard component, used as a portable media device generated by Verity Vanguard Deploy. The vDrive allows election definitions to be moved from Deploy to other devices and workstation software. vDrive supports the transfer of Cast Vote Records (CVRs) from Verity Vanguard Vault and Verity Vanguard Capture.

Verity Key

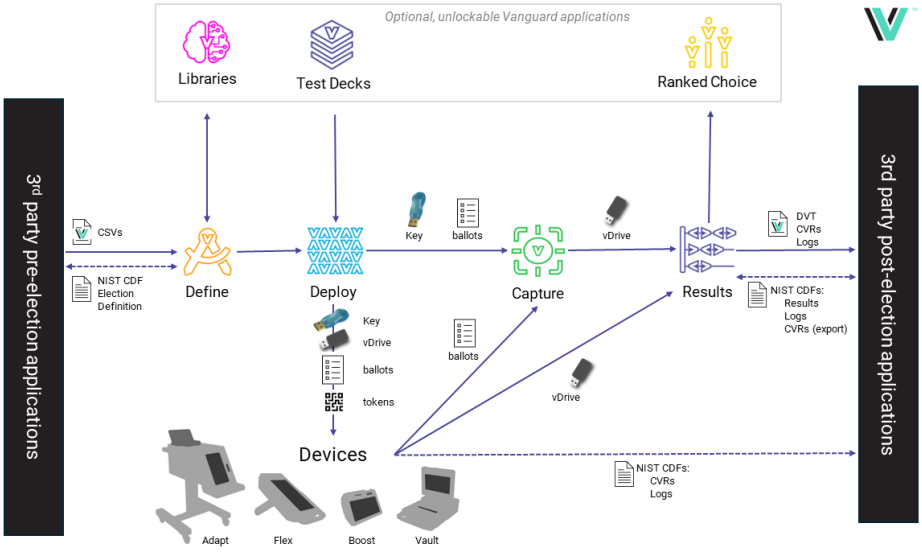
Verity Key is an electronic media that is created by Verity Deploy for a specific election. Verity Key is the electronic media that provides user authentication and configures election security throughout the Verity Vanguard system.

Security Token

The Verity Vanguard Security Token is a physical software security token for Multifactor Authentication. The Security Token is assigned to a workstation user and is used in conjunction with user credentials to allow secure access to Verity Vanguard voting system components.

1.4.2 Block Diagram

The following indicates the Verity Vanguard 1.0 voting system.



1.4.3 Supported Languages

Verity Vanguard 1.0 supports the following 19 languages: • English • Spanish • Mandarin Chinese • Japanese • Korean • Khmer • Thai • Vietnamese • Tagalog • Ilocano • Hindi • Haitian Creole • Gujarati • Hmong • Lao • Hawaiian • Cantonese Chinese • Punjabi • Bengali

1.4.4 Verify Vanguard 1.0 System Limits

Item	Upper Limit
Languages in a single election	19 (including English)
Precincts in an Election	3,000
Splits per Precinct	20
Total Precincts and Splits in an Election	3,000
Entities in an Election	99
Districts in an Election	400
Polling Places in an Election	3,050
Parties in a General Election	24
Parties in a Primary Election	10
Contests (incl. Propositions) in an Election	2,000
Contest Choices (voting positions) in a Contest	300
Total number of Contest Choices in an Election (independent from ballot size)	5,000
Unique write-in values per contest (Results)	500
Unique write-in values per task (Results)	40,000
Voting Types in an Election	10
Tasks per Election (Capture, Results)	15
Registered Voters per Precinct (Results)	99,999
Maximum Sheets per ballot	4
Ballot Stubs per ballot	2
Scan rate (Capture)	8.5”x11”: 60 PPM 8.5”x14”: 60 PPM 8.5”X17”: 50 PPM 8.5”x20”: 50 PPM 8.5”x22”: 50 PPM 11"x17": 40 PPM
Scan rate (Vault)	PVRs: Up to 6 PPM for PVRs (any size) Standard Ballots: Up to 8 PPM for 8.5”x11”, decreases linearly to 4 PPM for 8.5”x22

Item	Upper Limit
Ballots per vDrive: Vault (1 sheet ballot)	25,000*
Ballots per vDrive: Capture	20,000
Ballots per election: Capture & Results	1,750,000
vDrives per election: Results	3,050
Ballot Sizes - Deploy, Capture, Boost, Vault	8.5”x11”, 8.5”x14”, 8.5”x17”, 8.5”x20”, 8.5”x22”
Ballot Sizes - Deploy, Capture (also includes)	11"x17"
Printed Vote Record page size - Flex	8.5”x11”, 8.5”x14”,
Printed Vote Record page size - Adapt	8.5”x11”

**The ballot limit for Verity Vault is a recommended limit for the number of single-sheet ballots scanned on an individual Verity Vault during a single election. For a two-sheet ballot, divide this number by 2; for a 4-sheet ballot divide this number by 4.*

2 Certification Test Background

2.1 Revision History

Please see the Revision History table on pg. 2.

2.2 Implementation Statement

Please see “Attachment A – Verity Vanguard 1.0 Implementation Statement”

2.3 Terms and Abbreviations

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

Table 5 – Terms and Abbreviations

Term	Abbreviation	Description
American Association for Laboratory Accreditation	**A2LA**	A nonprofit, non-governmental, public service, membership society whose mission is to provide comprehensive services in laboratory accreditation and laboratory-related training.
Ballot Marking Device	**BMD**	An accessible computer-based voting system that produces a marked ballot (usually paper) that is the result of voter interaction with visual or audio prompts.
Central Count Scanner	**CCS**	A mark sense-based ballot and vote counting device typically located at a central count facility and is operated by an automated multi-sheet feeding capability.

Term	Abbreviation	Description
Compact Flash card	**CFast**	This is a type of flash memory card in a Serial ATA interface used in voting systems to store ballot and/or vote results data.
Commercial Off the Shelf	**COTS**	Term used to designate computer software, hardware or accessories that are ready-made and available for sale, lease, or license to the general public
Election Assistance Commission	**EAC**	An independent, bipartisan commission created by the Help America Vote Act (HAVA) of 2002 that operates the federal government's voting system certification program.
Election Management System	**EMS**	Typically, a database management system used to enter jurisdiction information (district, precincts, languages, etc.) as well as election specific information (races, candidates, voter groups (parties), etc.). In addition, the EMS is also used to 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.
Institute of Electrical and Electronics Engineers	**IEEE**	A non-profit professional association for the advancement of technology.
National Institute of Standards and Technology	**NIST**	A non-regulatory federal agency within the U.S. Dept. of Commerce. Its mission is to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve quality of life.
National Voluntary Laboratory Accreditation Program	**NVLAP**	A division of NIST that provides third-party accreditation to testing and calibration laboratories.
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 Interpretation	**RFI**	A means used by testing laboratories and manufacturers to request that the EAC provide an interpretation of a technical issue related to testing of voting systems.
Technical Data Package	**TDP**	The data package supplied by the vendor, which includes Functional Requirements, Specifications, End-user documentation, Procedures, System Overview, Configuration Management Plan, Quality Assurance Program, and manuals for each of the required hardware, software, firmware components of a voting system.

Term	Abbreviation	Description
Voluntary Voting System Guidelines	**VVSG**	A set of specifications and requirements against which voting systems can be tested to determine if the systems provide all of the basic functionality, accessibility and security capabilities required for EAC certification.
Voting System Test Lab	**VSTL**	An independent testing organization accredited by NVLAP and the EAC to conduct voting system testing for EAC certification.

2.4 Document and Source Code Reviews

The review of the Hart InterCivic Verity Vanguard 1.0 documentation submitted in the Technical Data Package (TDP) was reviewed in order to verify conformance with the Election Assistance Commission Voluntary Voting System Guidelines (EAC VVSG) 2.0.

Source code was reviewed for each software and firmware application declared within the Verity Vanguard 1.0 voting system.

All document reviews were conducted in accordance with the EAC VVSG 2.0, to demonstrate that the system meets the requirements. Issues in the documentation were identified to Hart in a Discrepancy Report for resolution. All issues were resolved by the end of the project.

All source code reviews were conducted in accordance with the EAC VVSG 2.0, to demonstrate that the system meets the requirements. Issues in the source code were identified to Hart in a Discrepancy Report for resolution. All issues were resolved by the end of the project.

2.5 Functional & System Testing

SLI Compliance's standard Test Suites were customized for the Hart InterCivic Verity Vanguard 1.0 voting system and conducted in accordance with EAC VVSG 2.0, in conjunction with the functional testing. Simulations of elections were conducted to demonstrate a beginning-to-end business use case process for the Hart InterCivic Verity Vanguard 1.0 voting system.

2.6 Testing Performed

2.6.1 VVSG 2.0 Requirements Not Supported in Verity Vanguard 1.0

The following requirements are not supported within the Vanguard voting system:

- 1.1.4-R Group voting contest, Casting
- 1.1.4-S Top-2 IRV contest (supplementary or contingent vote contest)
- 1.1.8-K Group voting contest, Tabulation
- 1.1.8-N Proportional voting contest (equal-and-even cumulative voting contest), Tabulation
- 2.1-B COTS language extensions are acceptable
- 7.2-F Voter speech
- 8.1-D Secondary ID and biometrics
- 8.1-G Telephone style handset
- 9.1.6 Cryptographic E2E verifiable
- 9.1.6-A Verified cryptographic protocol
- 9.1.6-B Independent evaluation of E2E cryptographic protocol implementation
- 9.1.6-C Cryptographic ballot selection verification by voter
- 9.1.6-D Methods for cryptographic ballot selection verification
- 9.1.6-E Ballot receipt
- 9.1.6-F Disputes involving ballot receipts
- 9.1.6-G Evidence export
- 9.1.6-H Mandatory ballot availability
- 9.1.6-I Verification of encoded votes documentation
- 9.1.6-J Verifier reference implementation
- 9.1.6-K Privacy preserving, universally verifiable ballot tabulation
- 10.2.1-B Indirect voter associations
- 10.2.1-C Use of indirect voter associations
- 10.2.1-D Isolated storage location

- 10.2.1-E Removal of indirect voter associations
- 10.2.1-F Confidentiality for ballots with indirect voter associations
- 10.2.4-A Voting information in receipts
- 13.3-B E2E Cryptographic voting protocols

2.6.2 Configurations Tested

Verity Vanguard polling place devices are all standalone devices, not being physically tethered to any other device.

These polling place devices include:

- Verity Vanguard Vault (ballot scanner)
- Verity Vanguard Adapt (All-in-one accessible device)
- Verity Vanguard Flex (ballot marking device)
- Verity Vanguard Boost (Ballot Issuance device)

Verity Vanguard "Election Management" and "Central Scanning" components are workstation based. These components were utilized in the following configurations.

- Define/Deploy as a Standalone workstation
- Results as a Standalone workstation
- Define/Deploy/Results as a Standalone workstation
- Define/Deploy as a Server/4 Client workstation configuration
- Results as a Server/4 Client workstation configuration
- Capture as a Standalone workstation
- Capture as a Server/8 Client workstation configuration

2.6.3 Component Level Test Suites Executed

- **Verity Vanguard Workspace (Manage, Users, Settings, Libraries, Test Decks, Rank Choice)** test suite: The **Verity Vanguard Workspace** component was examined in order to verify that the functionality presented in the component meets all applicable VVSG 2.0 requirements.
    - 93 test cases were examined in this test suite
    - 3.1.2-D, 11.2.2-D, 11.3.1-A

- **Verity Vanguard Define and Deploy (Pre-Election EMS)** test suite: The **Verity Vanguard Define and Deploy** component was examined in order to verify that the functionality presented in the component meets all applicable VVSG 2.0 requirements.
    - 259 test cases were examined in this test suite
    - The following requirements were examined within this test suite:
      1.1.1-A, 1.1.1-A.1, 1.1.1-A.2, 1.1.1-A.3, 1.1.1-A.4, 1.1.1-B, 1.1.1-B.1, 1.1.1-B.2, 1.1.1-C, 1.1.1-C.1-3, 1.1.1-D.1, 1.1.1-D.2, 1.1.1-D.3, 1.1.1-E, 1.1.1-F, 1.1.1-G, 1.1.1-H, 1.1.1-I, 1.1.1-J, 1.1.1-L, 1.1.1-M, 1.1.1-N, 1.1.2-A, 1.1.2-J.1-3, 1.1.2-J.4, 1.1.4-A, 1.1.4-B.1-2, 1.1.4-C, 1.1.4-D, 1.1.4-G.2, 1.1.4-H, 1.1.4-K, 1.1.4-L, 1.1.4-M, 1.1.4-Q, 1.1.8-F, 1.1.9-M, 3.1.2-D, 3.3-D, 5.1-B, 7.1-I, 7.1-J, 7.3-B, 7.3-B.1-2, 7.3-C, 7.3-C.1, 7.3-C.2, 7.3-C, 7.3-C.3, 7.3-C.6, 9.4-D, 10.2.1-A, 10.2.1-B, 11.2.2-D, 15.1-A, 15.1-B, 15.2-C, 15.2-D
- **Verity Vanguard Flex (BMD)** test suite: The **Verity Vanguard Flex** component was examined in order to verify that the functionality presented in the component meets all applicable VVSG 2.0 requirements.
    - 214 test cases were examined in this test suite
    - The following requirements were examined within this test suite:
      1.1.1-E, 1.1.1-F, 1.1.2-A, 1.1.2-B, 1.1.2-C, 1.1.2-F, 1.1.2-H, 1.1.2-H.1-5, 1.1.2-I, 1.1.2-I.1-4, 1.1.2-K, 1.1.2-K.1-3, 1.1.3-A, 1.1.3-B, 1.1.3-B.1-2, 1.1.4-A, 1.1.4-B, 1.1.4-B.1-3, 1.1.4-C, 1.1.4-D, 1.1.4-E, 1.1.4-F, 1.1.4-G, 1.1.4-G.1, 1.1.4-G.2, 1.1.4-H, 1.1.4-I, 1.1.4-J, 1.1.4-K, 1.1.4-L, 1.1.4-M, 1.1.4-N, 1.1.4-O, 1.1.4-P, 1.1.4-Q, 1.1.5-A, 1.1.5-B, 1.1.5-B.1-2, 1.1.5-C, 1.1.5-D, 1.1.5-D.1-4, 1.1.5-E, 1.1.5-E.1-4, 1.1.5-F, 1.1.5-F.1-3, 1.1.6-B.1-2, 1.1.7-A, 1.1.7-B, 1.1.7-C, 1.1.7-D, 1.1.7-E, 1.1.8-A, 1.1.8-M, 1.1.8-F, 1.1.9-M, 1.2-F, 10.1-A, 10.2.1-A, 10.2.3-B, 10.2.4-B, 10.2.4-C, 11.1-B, 12.1-B, 12.1-C, 12.1-D, 12.1-G, 12.1-G.1-3, 15.1-A, 15.1-B, 15.1-C, 15.1-C.1-2, 15.2-A 15.2-C, 15.2-D , 2.5.4-L, 2.5.4-L.1-2 , 2.5.4-M, 2.6-A, 2.6-A.1-3, 2.6-B, 2.6-C, 3.1.2-D.2, 5.1-A, 5.1-B, 5.1-C, 5.1-D, 5.1-E, 5.2-A, 5.2-B, 5.2-C, 5.2-D, 5.2-E, 5.2-E.1-2, 5.2-F, 6.1-A, 6.1-B, 6.1-C, 6.1-D, 6.2-A, 6.2-A.1, 7.1-A, 7.1-B, 7.1-C, 7.1-C.1, 7.1-C.2, 7.1-D, 7.1-D.1, 7.1-D.2, 7.1-D.2.a-c, 7.1-D.3, 7.1-E, 7.1-E.1-3, 7.1-F, 7.1-G, 7.1-G.1-2, 7.1-G.2.a-d, 7.1-H, 7.1-H.1, 7.1-H.2, 7.1-I, 7.1-J, 7.1-K, 7.1-K.1-3, 7.1-K.4, 7.1-K.5, 7.1-K.6, 7.1-K.7, 7.1-L, 7.1-M, 7.1-M.1-3, 7.1-N, 7.1-N.1-3, 7.1-O, 7.1-P, 7.2-A, 7.2-A.1, 7.2-A.2 , 7.2-A.3, 7.2-A.4, 7.2-A.5, 7.2-B, 7.2-C, 7.2-C.1-3, 7.2-C.4, 7.2-C.5, 7.2-D, 7.2-D.1.a-b, 7.2-D.1-2, 7.2-D.2.a-c, 7.2-D.3, 7.2-D.3.a-e, 7.2-E, 7.2-E.1-6, 7.2-F, 7.2-F.1-2, 7.2-G, 7.2-G.1-4, 7.2-H, 7.2-I, 7.2-I.1-2, 7.2-I.3, 7.2-J, 7.2-K, 7.2-L, 7.2-M, 7.2-N, 7.2-N.1.a-b, 7.2-N.1-3, 7.2-O, 7.2-O.1-4, 7.2-P, 7.2-P.1-2, 7.2-Q, 7.2-R, 7.2-R.1-2, 7.3-A, 7.3-B, 7.3-B.1-2, 7.3-C, 7.3-C.1-6, 7.3-D, 7.3-E, 7.3-F, 7.3-F.1-3, 7.3-G, 7.3-G.1.a-c, 7.3-G.1-3, 7.3-H, 7.3-H.1, 7.3-I, 7.3-I.1, 7.3-K, 7.3-K.1, 7.3-K.1.a-c, 7.3-K.2.a, 7.3-

K.2.b, 7.3-L, 7.3-M, 7.3-M.1-2, 7.3-N, 7.3-N.1-3, 7.3-O.1.a, 7.3-O.1.b, 7.3-O.2.a, 7.3-O.2.b, 7.3-O.2.c, 7.3-P, 8.1-A, 8.1-A.1.a-b, 8.1-A.1-3, 8.1-A.2.a-b, 8.1-A.3.a-b, 8.1-B, 8.1-C, 8.1-D, 8.1-E, 8.1-F, 8.1-G, 8.1-H, 8.1-I, 8.1-I.1-3, 8.1-J, 8.1-J.1-2, 9.1.2-A , 9.1.2-A.1-2, 9.1.3-B, 9.1.5-A, 9.1.5-B, 9.1.5-C, 9.1.5-D, 9.1.5-E, 9.1.5-G, 9.4-D, 15.1-D.1.a-k, 15.1-D.2.a, 15.1-D.3.a, 15.1-D.4.a, 15.1-D.4.c, 15.1-D.5.b

- **Verity Vanguard Adapt (all-in-one BMD**) test suite: The **Verity Vanguard Adapt** component was examined in order to verify that the functionality presented in the component meets all applicable VVSG 2.0 requirements.
    - 208 test cases were examined in this test suite
    - The following requirements were examined within this test suite:

      1.1.1-E, 1.1.1-F, 1.1.2-A, 1.1.2-B, 1.1.2-C, 1.1.2-F, 1.1.2-G, 1.1.2-H, 1.1.2-H.1-5, 1.1.2-I, 1.1.2-I.1-4, 1.1.2-K, 1.1.2-K.1-3, 1.1.3-A, 1.1.3-B, 1.1.3-B.1-2, 1.1.4-A, 1.1.4-B, 1.1.4-B.1-3, 1.1.4-C, 1.1.4-D, 1.1.4-E, 1.1.4-F, 1.1.4-G, 1.1.4-G.1, 1.1.4-G.2, 1.1.4-H, 1.1.4-I, 1.1.4-J, 1.1.4-K, 1.1.4-L, 1.1.4-M, 1.1.4-N, 1.1.4-O, 1.1.4-P, 1.1.4-Q, 1.1.5-A, 1.1.5-B, 1.1.5-B.1-2, 1.1.5-C, 1.1.5-C.1-2, 1.1.5-D, 1.1.5-D.1-4, 1.1.5-E, 1.1.5-E.1-4, 1.1.5-F, 1.1.5-F.1-3, 1.1.6-B.1-2, 1.1.7-A, 1.1.7-B, 1.1.7-C, 1.1.7-D, 1.1.7-E, 1.1.8-A, 1.1.8-M, 1.1.9-M, 1.2-F, 2.5.4-L, 2.5.4-L.1-2, 2.5.4-M, 2.6-A, 2.6-A.1-3, 2.6-B, 2.6-C, 3.1.2-D.2, 5.1-A, 5.1-B, 5.1-C, 5.1-D, 5.1-E, 5.2-A, 5.2-B, 5.2-C, 5.2-D, 5.2-E, 5.2-E.1-2, 5.2-F, 6.1-A, 6.1-B, 6.1-C, 6.1-D, 6.2-A, 6.2-A.1, 7.1-A, 7.1-B, 7.1-C, 7.1-C.1, 7.1-C.2, 7.1-D, 7.1-D.1, 7.1-D.2, 7.1-D.2.a-c, 7.1-D.3, 7.1-E, 7.1-E.1-3, 7.1-F, 7.1-G, 7.1-G.1-2, 7.1-G.2.a-d, 7.1-H, 7.1-H.1, 7.1-H.2, 7.1-I, 7.1-J, 7.1-K, 7.1-K.1-3, 7.1-K.4, 7.1-K.5, 7.1-K.6, 7.1-K.7, 7.1-L, 7.1-M, 7.1-M.1-3, 7.1-N, 7.1-N.1-3, 7.1-O, 7.1-P, 7.2-A, 7.2-A.1, 7.2-A.2, 7.2-A.3, 7.2-A.4, 7.2-A.5, 7.2-B, 7.2-C, 7.2-C.1-3, 7.2-C.4 7.2-C.5, 7.2-D, 7.2-D.1.a-b, 7.2-D.1-2, 7.2-D.2.a-c, 7.2-D.3, 7.2-D.3.a-e, 7.2-E, 7.2-E.1-6, 7.2-F, 7.2-F.1-2, 7.2-G, 7.2-G.1-4, 7.2-H, 7.2-I, 7.2-I.1, 7.2-I.2, 7.2-I.3, 7.2-J, 7.2-K, 7.2-L, 7.2-M, 7.2-N, 7.2-N.1.a-b, 7.2-N.1-3, 7.2-O, 7.2-O.1-4, 7.2-P, 7.2-P.1-2, 7.2-Q, 7.2-R, 7.2-R.1-2, 7.3-A, 7.3-B, 7.3-B.1-2, 7.3-C, 7.3-C.1-6, 7.3-D, 7.3-E, 7.3-F, 7.3-F.1-3, 7.3-G, 7.3-G.1.a-c, 7.3-G.1-3, 7.3-H, 7.3-H.1, 7.3-I, 7.3-I.1, 7.3-K, 7.3-K.1, 7.3-K.1.a-c, 7.3-K.2.a, 7.3-K.2.b, 7.3-L, 7.3-M, 7.3-M.1-2, 7.3-N, 7.3-N.1-3, 7.3-O.1.a-b, 7.3-O.2.a-c, 7.3-P, 8.1-A, 8.1-A.1.a-b, 8.1-A.1-3, 8.1-A.2.a-b, 8.1-A.3.a-b, 8.1- B, 8.1-C, 8.1-D, 8.1-E, 8.1-F, 8.1-H, 8.1-I, 8.1-I.1-3, 8.1-J, 8.1-J.1-2, 9.1.2-A, 9.1.2-A.1-2, 9.1.3-B, 9.1.5-A, 9.1.5-B, 9.1.5-C, 9.1.5-D, 9.1.5-E, 9.1.5-G, 9.4-D, 10.1-A, 10.2.1-A, 10.2.3-B, 10.2.4-B, 10.2.4-C, 11.1-B, 12.1-B, 12.1-C, 12.1-D, 12.1-G, 12.1-G.1-3, 15.1-A, 15.1-B, 15.1-C, 15.1-C.1-2, 15.1-D.1.a-k, 15.1-D.2.a, 15.1-D.3.a, 15.1-D.4.a, 15.1-D.4.c, 15.2-A, 15.2-C, 15.2-D

- **Verity Vanguard Boost (Ballot Issuance)** test suite: The **Verity Vanguard Boost** component was examined in order to verify that the functionality presented in the component meets all applicable VVSG 2.0 requirements.
    - 160 test cases were examined in this test suite

- The following requirements were examined within this test suite:

  1.1.2-A, 1.1.2-B, 1.1.2-F, 1.1.2-I, 1.1.2-I.1-4, 1.1.2-K, 1.1.2-K.1-3, 1.1.3-A, 1.1.3-B, 1.1.7-A, 1.1.7-C, 1.1.7-D, 1.1.9-M, 1.2-F, 2.5.4-L, 2.5.4-L.1-2, 2.5.4-M, 2.6-A, 2.6-A.1-3, 2.6-B, 2.6-C, 3.1.2-D, 5.1-A, 5.1-B, 5.1-D, 5.2-B, 5.2-C, 5.2-E, 5.2-E.1-2, 7.1-A, 7.1-C, 7.1-C.1, 7.1-C.2, 7.1-D, 7.1-D.1, 7.1-D.2, 7.1-D.2.a-c, 7.1-D.3, 7.1-E, 7.1-E.1-3, 7.1-F, 7.1-G, 7.1-G.1-2, 7.1-G.2.a-d, 7.1-H, 7.1-H.1, 7.1-H.2, 7.1-I, 7.1-J, 7.1-K, 7.1-K.1-3, 7.1-K.4, 7.1-K.5, 7.1-K.6, 7.1-K.7, 7.1-L, 7.1-M, 7.1-M.1-3, 7.1-N, 7.1-N.1-3, 7.1-O, 7.1-P, 7.2-A, 7.2-A.1, 7.2-A.2, 7.2-A.3, 7.2-A.4, 7.2-A.5, 7.2-D, 7.2-D.1.a-b, 7.2-D.1-2, 7.2-D.2.a-c, 7.2-E, 7.2-E.1-6, 7.2-H, 7.2-I, 7.2-I.1, 7.2-I.2, 7.2-I.3, 7.2-K, 7.2-L, 7.2-M, 7.2-N, 7.2-N.1.a-b, 7.2-N.1-3, 7.2-O, 7.2-O.1-4, 7.2-P, 7.2-P.1-2, 7.2-Q, 7.2-R, 7.2-R.1-2, 7.3-A, 7.3-E, 7.3-K, 7.3-K.1, 7.3-K.1.a-c, 7.3-K.2.a, 7.3-K.2.b, 7.3-L, 7.3-M, 7.3-M.1-2, 7.3-O.1.a, 7.3-O.1.b, 7.3-O.2.a, 7.3-O.2.b, 7.3-O.2.c, 7.3-P, 8.1-A, 8.1-A.1.a-b, 8.1-A.1-3, 8.1-A.2.a-b, 8.1-A.3.a-b, 8.1-B, 8.1-D, 8.1-E, 8.1-F, 9.1.2-A, 9.1.2-A.1-2, 9.1.5-A, 9.1.5-B, 9.1.5-C, 9.1.5-D, 9.1.5-E, 9.1.5-G, 9.4-D, 10.2.3-B, 10.2.4-C, 11.1-B, 12.1-B, 12.1-C, 12.1-D, 12.1-G, 12.1-G.1-3, 15.1-A, 15.1-B, 15.1-C, 15.1-C.1-2, 15.1-D.1.a, 15.1-D.1.b, 15.1-D.1.c, 15.1-D.1.d, 15.1-D.1.e, 15.1-D.1.f, 15.1-D.1.g, 15.1-D.1.h, 15.1-D.1.i, 15.1-D.1.j, 15.1-D.1.k, 15.1-D.2.a, 15.1-D.3.a, 15.1-D.4.a, 15.1-D.4.c, 15.1-D.5.b, 15.2-A, 15.2-C, 15.2-D

- **Verity Vanguard Vault (Precinct Scanner)** test suite: The **Verity Vanguard Vault** component was examined in order to verify that the functionality presented in the component meets all applicable VVSG 2.0 requirements.

  - 245 test cases were examined in this test suite

  - The following requirements were examined within this test suite:

    1.1.1-E, 1.1.1-F, 1.1.1-G, 1.1.2-A, 1.1.2-B, 1.1.2-C, 1.1.2-D, 1.1.2-E, 1.1.2-F, 1.1.2-G, 1.1.2-H.1-5, 1.1.2-I.1-4, 1.1.2-K.1-3, 1.1.2-L.1-7, 1.1.3-A, 1.1.3-B.1, 1.1.3-B.2, 1.1.4-A, 1.1.4-C, 1.1.4-D, 1.1.4-G, 1.1.4-G.2, 1.1.4-H, 1.1.4-I, 1.1.4-J, 1.1.4-K, 1.1.4-L, 1.1.4-M, 1.1.4-N, 1.1.4-O, 1.1.4-P, 1.1.4-Q, 1.1.5-A, 1.1.5-B.2, 1.1.5-C.1, 1.1.5-C.2, 1.1.5-D, 1.1.5-D.1-4, 1.1.5-E, 1.1.5-E.1-4, 1.1.5-F, 1.1.5-F.1-3, 1.1.5-G, 1.1.5-G.1-7, 1.1.5-H, 1.1.6-A, 1.1.6-B, 1.1.6-B.1, 1.1.6-B.2, 1.1.6-D, 1.1.6-D.1-4, 1.1.6-E, 1.1.6-E.1, 1.1.6-E.2, 1.1.6-G, 1.1.6-H, 1.1.6-H.1-3, 1.1.6-I, 1.1.6-J, 1.1.6-K, 1.1.7-A, 1.1.7-B, 1.1.7-C, 1.1.7-D, 1.1.7-E, 1.1.8-A, 1.1.8-A.1, 1.1.8-A.2, 1.1.8-A.3, 1.1.8-B.1-2, 1.1.8-B.3, 1.1.8-C.1, 1.1.8-C.2, 1.1.8-D, 1.1.8-E, 1.1.8-F, 1.1.8-G, 1.1.8-H, 1.1.8-I, 1.1.8-J, 1.1.8-J.1, 1.1.8-J.2, 1.1.8-L, 1.1.8-M, 1.1.9-A, 1.1.9-B, 1.1.9-B.1-5, 1.1.9-C.1-5, 1.1.9-D, 1.1.9-E, 1.1.9-F, 1.1.9-G, 1.1.9-H, 1.1.9-I, 1.1.9-J, 1.1.9-K 1.1.9-L, 1.1.9-M, 1.2-F, 1.2-G, 1.2-H, 2.5.4-L, 2.5.4-L.1-2, 2.5.4-M, 2.6-A, 2.6-A.1-3, 2.6-B, 2.6-C, 3.1.2-D.2, 3.3-C-D, 5.1-A, 5.1-B, 5.1-C, 5.1-D, 5.1-E, 5.2-A, 5.2-B, 5.2-C, 5.2-D, 5.2-F, 6.1-A, 6.1-B, 6.1-C, 6.1-D, 6.2-A, 6.2-A.1, 7.1-A, 7.1-B, 7.1-C, 7.1-C.1, 7.1-D, 7.1-D.1, 7.1-D.2, 7.1-D.2.a-c, 7.1-D.3, 7.1-E, 7.1-E.1-3, 7.1-F, 7.1-G, 7.1-G.1-2, 7.1-G.2.a-d, 7.1-H, 7.1-H.1, 7.1-H.2, 7.1-J, 7.1-M, 7.1-M.1-3, 7.1-N, 7.1-N.1-3, 7.1-O, 7.1-P, 7.2-A, 7.2-A.1, 7.2-A.2, 7.2-A.3, 7.2-A.4, 7.2-A.5, 7.2-E.1-6, 7.2-F, 7.2-F.1-2, 7.2-G, 7.2-G.1-4, 7.2-H, 7.2-I, 7.2-I.1-3, 7.2-K, 7.2-L, 7.2-M, 7.2-N, 7.2-N.1.a-b, 7.2-N.3, 7.2-O, 7.2-O.1-4, 7.2-P, 7.2-P.1-2, 7.2-Q, 7.2-R, 7.2-R.1, 7.2-R.2, 7.3-A, 7.3-E, 7.3-F, 7.3-F.2, 7.3-G, 7.3-G.1.a-c, 7.3-G.2-4, 7.3-H.1, 7.3-H.2, 7.3-I, 7.3-I.1, 7.3-I.2, 7.3-J, 7.3-J.1-2, 7.3-K, 7.3-K.1,

7.3-K.1.a-c, 7.3-K.2, 7.3-K.2.a, 7.3-K.2.b, 7.3-L, 7.3-M, 7.3-M.1-2, 7.3-N, 7.3-N.1, 7.3-N.3, 7.3-O.1.a, 7.3-O.1.b, 7.3-O.2.a, 7.3-O.2.b, 7.3-O.2.c, 7.3-P, 8.1-A, 8.1-A.1.a-b, 8.1-A.1-3, 8.1-A.2.a-b, 8.1-A.3.a-b, 8.1-B, 8.1-C, 8.1-E, 8.1-F, 8.1-G, 8.1-H, 8.1-I, 8.1-I.1-3, 8.1-J, 8.1-J.1-2, 8.2-A, 9.1.2-A, 9.1.2-A.1-2, 9.1.3-B, 9.1.5-A, 9.1.5-B, 9.1.5-C, 9.1.5-D, 9.1.5-E, 9.1.5-F, 9.1.5-G, 9.4-D, 10.1-A, 10.2.1-A, 10.2.1-B, 10.2.1-C,10.2.1-D, 10.2.1-E, 10.2.2-C, 10.2.2-D, 10.2.2-D.1-2, 10.2.3-A, 10.2.3-B, 10.2.4-B, 11.2.1-A, 11.2.1-C, 11.2.1-C.1-4, 12.1-B, 12.1-C, 12.1-D, 12.1-G, 12.1-G.1-3, 15.1-A, 15.1-B, 15.1-C, 15.1-C.1-2, 15.1-D.1.a, 15.1-D.1.b, 15.1-D.1.c, 15.1-D.1.d, 15.1-D.1.e, 15.1-D.1.f, 15.1-D.1.g, 15.1-D.1.h, 15.1-D.1.i, 15.1-D.1.j, 15.1-D.1.k, 15.1-D.2.a, 15.1-D.3.a, 15.1-D.4.a, 15.1-D.4.c, 15.1-D.5.b, 15.2-A, 15.2-C, 15.2-D

- **Verity Vanguard Capture (Central Scanning)** test suite: The **Verity Vanguard Capture** component was examined in order to verify that the functionality presented in the component meets all applicable VVSG 2.0 requirements.
    - 230 test cases were examined in this test suite
    - The following requirements were examined within this test suite:

      1.1.1-A, 1.1.1-A.4, 1.1.1-G, 1.1.2-A, 1.1.2-B, 1.1.2-C, 1.1.2-D, 1.1.2-E, 1.1.2-G, 1.1.2-H.1-5, 1.1.2-I, 1.1.2-I.1-4, 1.1.2-L.1-7, 1.1.3-A, 1.1.3-B, 1.1.3-B.1, 1.1.3-B.2, 1.1.4-H, 1.1.4-I, 1.1.4-J, 1.1.4-K, 1.1.4-L, 1.1.4-M, 1.1.4-N, 1.1.4-O, 1.1.4-P, 1.1.4-Q, 1.1.5-A, 1.1.5-C.1, 1.1.5-C.2, 1.1.5-D, 1.1.5-D.1-4, 1.1.5-E, 1.1.5-E.1-4, 1.1.5-F, 1.1.5-F.1-3, 1.1.5-G, 1.1.5-G.1-7, 1.1.5-H, 1.1.6-A, 1.1.6-B, 1.1.6-B.1, 1.1.6-B.2, 1.1.6-C, 1.1.6-C.1-4, 1.1.6-F, 1.1.6-F.1-2, 1.1.6-G, 1.1.6-H, 1.1.6-H.1-3, 1.1.6-I, 1.1.6-J, 1.1.6-K, 1.1.7-A, 1.1.7-B, 1.1.7-C, 1.1.7-D, 1.1.7-E, 1.1.8-A.1, 1.1.8-A.2, 1.1.8-A.3, 1.1.8-B.1-3, 1.1.8-C, 1.1.8-C.1-2, 1.1.8-D, 1.1.8-E, 1.1.8-F, 1.1.8-G, 1.1.8-H, 1.1.8-I, 1.1.8-J, 1.1.8-J.1, 1.1.8-L, 1.1.8-M, 1.1.9-A, 1.1.9-B, 1.1.9-B.1-5, 1.1.9-C.1-5, 1.1.9-D, 1.1.9-E, 1.1.9-F, 1.1.9-G, 1.1.9-H, 1.1.9-I, 1.1.9-L, 1.1.9-M, 1.2-H, 2.6-A, 2.6-A.1-3, 2.6-B, 2.6-C, 3.1.2-D, 5.1-C, 7.3-P, 8.1-A.1, 8.1-A.1.a-b, 8.1-B, 8.1-D, 9.1.5-F, 9.4-D, 10.1-A, 10.2.1-A, 10.2.1-B, 10.2.1-C, 10.2.1-D, 10.2.1-E, 10.2.2-C, 10.2.2-D, 10.2.2-D.1-2, 10.2.3-A, 10.2.3-B, 10.2.4-B, 15.1-A-C, 15.1-C.1-2, 15.1-D.1.a-k, 15.1-D.2.a, 15.1-D.3.a, 15.1-D.4.a, 15.1-D.4.c-e, 15.2-A, 15.2-C, 15.2-D

- **Verity Vanguard Results (Post Election EMS)** test suite: The **Verity Vanguard Results** component was examined in order to verify that the functionality presented in the component meets all applicable VVSG 2.0 requirements.
    - 322 test cases were examined in this test suite
    - The following requirements were examined within this test suite:

      1.1.1-A, 1.1.2-A, 1.1.2-B, 1.1.2-C, 1.1.2-D, 1.1.2-E, 1.1.2-F, 1.1.2-H.1-5, 1.1.3-B, 1.1.4-H, 1.1.4-I, 1.1.8-A.3, 1.1.8-B, 1.1.8-B.1, 1.1.8-B.2, 1.1.8-B.3, 1.1.8-C.1-2, 1.1.8-D, 1.1.8-E, 1.1.8-F, 1.1.8-G, 1.1.8-H, 1.1.8-I, 1.1.8-J, 1.1.8-

J.1-3, 1.1.8-L, 1.1.8-M, 1.1.9-A, 1.1.9-B, 1.1.9-B.1-5, 1.1.9-C.1-5, 1.1.9-D, 1.1.9-E, 1.1.9-F, 1.1.9-G, 1.1.9-H, 1.1.9-I, 1.1.9-J, 1.1.9-L, 1.1.9-M, 2.6-A, 2.6-A.1-3, 2.6-B, 2.6-C, 3.1.2-D.2, 9.1.4-A, 9.4-D, 10.1-A, 10.2.1-A, 10.2.1-B, 10.2.1-C, 10.2.1-D, 10.2.1-E, 10.2.1-F, 10.2.2-A, 10.2.2-B, 10.2.2-C, 10.2.2-D, 10.2.2-D.1-2, 10.2.3-A, 10.2.3-B, 10.2.4-B, 11.2.1-A, 15.1-A, 15.2-C, 15.2-D, 3.1.2-D, 4.1-B, 4.1-C, 4.1-D, 5.1-C, 7.3-O.1, 7.3-O.1.a, 7.3-O.2, 7.3-O.2.a-c, 7.3-P, 8.1-A, 8.1-A.1.a-b, 8.1-B, 8.1-D, 15.1-B, 15.1-C, 15.1-C.1-2, 15.1-D.1.a-k, 15.1-D.2.a-c, 15.1-D.3.a, 15.1-D.4.a-e, 15.1-E, 15.2-A

2.6.4 System Level Test Suites Executed

- **Accessibility** test suite**:** Accessibility testing examined the voting system's ability to take into account vision, varying degrees of vision, dexterity, mobility, aural issues, and speech and language proficiency.
    - 98 test cases were examined in this test suite
    - The following requirements were examined within this test suite:

      5.1-A, 5.1-B, 5.1-C, 5.1-D, 5.1-E, 5.1-F, 5.1-F.1-2, 5.2-A, 5.2-B , 5.2-C, 5.2-D, 5.2-E, 5.2-E.1-2, 5.2-F, 7.1-A, 7.1-M, 7.1-M.1-3, 7.1-N, 7.1-N.1, 7.1-N.2, 7.1-N.3, 7.1-O, 7.1-P, 7.2-A, 7.2-A.1, 7.2-A.2, 7.2-A.3, 7.2-A.4, 7.2-A.5, 7.2-G, 7.2-G.1-4, 7.2-P, 7.2-P.1, 7.2-P.2, 7.2-Q, 7.2-R.2, 8.1-C, 8.1-E, 8.1-F, 8.1-G, 8.1-H, 8.1-I,8.1-I.1, 8.1-I.2, 8.1-I.3, 8.2-A
- **Accuracy** test suite**:** Accuracy testing focused on the ability of the system to capture, record, store, consolidate and report the specific selections and absence of selections made by the voter for each ballot position without error. Required accuracy is defined in terms of an error rate that for testing purposes represents the maximum number of errors allowed while processing a specified volume of data. Accuracy testing is conducted at both the device level and the system level.
    - 29 test cases were examined in this test suite
    - The following requirements were examined within this test suite:

      1.2-A, 1.2-A.1, 1.2-A.2, 1.2-A.3, 1.2-B, 1.2-C, 3.1.6-K
- **Audit** test suite**:** Audit testing focused on validating the audit capability throughout the entire voting system, including availability, generation, integrity, and accuracy of the system's audit content capability to verify it meets the applicable requirements of VVSG 2.0.
    - 85 test cases were examined in this test suite
    - The following requirements were examined within this test suite:

      3.3-A, 3.3-A.1-2, 9.1.1-A, 9.1.1-A.1, 9.1.1-A.2, 9.1.2-A, 9.1.2-A.1-2, 9.1.2-B, 9.1.3-A, 9.1.4-A, 9.1.4-B, 9.1.5-A, 9.1.5-B, 9.1.5-C, 9.1.5-D, 9.1.5-E, 9.1.5-F, 9.1.5-G, 9.2-A, 9.3-A, 9.4-A, 9.4-B, 9.4-C, 10.2.2-E, 10.2.3-B, 10.2.4-B, 10.2.4-C, 11.1-A, 11.1-A.1-3, 11.1-B, 12.1-D, 12.2-E, 13.1.1-A, 13.1.1-B,

13.1.1-C, 13.1.2-A, 13.2-A, 13.2-B, 13.2-B.1-4, 15.1-A, 15.1-B, 15.1-C, 15.1-C.1-2, 15.1-E

- **Ballots** test suite: Examined both paper ballots and electronically displayed ballots.
    - Paper ballot test cases reviewed ballots for their use of contrast, color, text size, font, use of plain language, use of supported languages, ability to prevent split contests, and ability to support multipage ballots.
    - Electronic ballot testing established the ease of use by the common voter, including examination against screen requirements such as digital contrast, use of color, text size and scaling ability, font readability, use of plain language, and use of supported languages. In addition, some aspects of device functionality applicable to electronic ballots were verified to include the ability to prevent split contests, scroll, and establish a touch area for navigation and selection.
    - 53 test cases were examined in this test suite
    - The following requirements were examined within this test suite:

      2.1.1-C, 2.1.1-D, 3.1.6-M.1, 3.1.6-M.2, 3.1.6-N, 3.1.6-O, 5.1-B, 5.1-C, 5.2-B, 7.1-C, 7.1-C.1, 7.1-C.2, 7.1-D, 7.1-D.1, 7.1-D.2, 7.1-D.2.a-c, 7.1-D.2, 7.1-D.3, 7.1-E, 7.1-E.1-3, 7.1-F, 7.1-G, 7.1-G.1-2, 7.1-G.2.a-d, 7.1-H, 7.1-H.1, 7.1-H.2, 7.1-I, 7.1-J, 7.2-D, 7.2-D.1, 7.2-D.1.a-b, 7.2-I, 7.2-I.1-3, 7.2-J, 7.3-B, 7.3-B.1, 7.3-B.2, 7.3-P, 8.1-A, 8.1-A.1.a-b, 8.1-A.1-3, 8.1-A.2.a-b, 8.1-A.3.a- b, 9.4-D
- **Closed Primary** test suite**:** This primary election was created to confirm all related Closed Primary election voting variations.
    - 210 test cases were examined in this test suite
    - The following requirements were examined within this test suite:

      1.1.1-A, 1.1.1-A.1, 1.1.1-A.2, 1.1.1-A.3, 1.1.1-A.4, 1.1.1-B, 1.1.1-B.1, 1.1.1-B.2, 1.1.1-D.1, 1.1.1-D.2, 1.1.1-D.3, 1.1.1-E, 1.1.1-G, 1.1.1-H, 1.1.1-I, 1.1.1-J, 1.1.1-K, 1.1.1-L, 1.1.1-M, 1.1.1-N, 1.1.2-J.1-4, 1.1.3-A, 1.1.3-B, 1.1.3-B.1, 1.1.3-B.2, 1.1.4-A, 1.1.4-B, 1.1.4-B.1-3, 1.1.4-C, 1.1.4-D, 1.1.4-E, 1.1.4-G, 1.1.4-G.1, 1.1.4-H, 1.1.4-I, 1.1.4-J, 1.1.4-L, 1.1.4-M, 1.1.4-P, 1.1.4-Q, 1.1.5-A, 1.1.5-C.1, 1.1.5-C.2, 1.1.5-D, 1.1.5-D.1-4, 1.1.5-E.3-4, 1.1.6-D, 1.1.6-D.1-4, 1.1.6-E, 1.1.6-E.1, 1.1.6-E.2, 1.1.7-A, 1.1.8-A, 1.1.8-A.1, 1.1.8-A.2, 1.1.8-A.3, 1.1.8-B, 1.1.8-B.1, 1.1.8-C.1-2, 1.1.8-D, 1.1.8-F, 1.1.8-G, 1.1.8-H, 1.1.8-I, 1.1.8-L, 1.1.8-M, 1.1.9-A, 1.1.9-B, 1.1.9-B.1-5, 1.1.9-C.1-5, 1.1.9-D, 1.1.9-E, 1.1.9-F, 1.1.9-G, 1.1.9-H, 1.1.9-J, 1.1.9-M, 3.1.2-D, 3.3-D, 4.1-B, 4.1-C, 4.1-D, 5.1-B, 5.1-C, 7.1-I, 7.2-C, 7.2-C.1-3, 7.3-B, 7.3-B.1-2, 7.3-C, 7.3-C.1, 7.3-C.1, 7.3-C.2, 7.3-C.3, 7.3-C.6, 7.3-H, 7.3-H.1, 7.3-H.2, 7.3-I, 7.3-I.1, 7.3-I.2, 11.2.2-D, 15.1-B

- **Error Message/Recovery** test suite**:** The test suite focused on error messaging and recovery in key areas of the system identified from researching previous testing and voting system documentation to help identify potential failure points. Testing focused on the appropriate error messages being generated in response to a specific error and content of the message as well as error recovery.
    - 262 test cases were examined in this test suite
    - The following requirements were examined within this test suite:

      1.1.2-H, 1.1.2-H.1-5, 1.1.9-M, 1.2-H, 2.5.4-L, 2.5.4-L.1-2, 2.5.4-M, 2.6-A, 2.6-A.1-3, 2.6-B, 2.6-C, 7.2-O, 7.2-O.1-4, 7.3-A, 7.3-K, 7.3-K.1, 7.3-K.1.a-c, 9.1.2-A, 9.1.2-A.1-2, 9.1.4-A, 10.2.3-B, 10.2.4-B, 12.1-B, 12.1-C, 12.1-D, 12.1-G, 12.1-G.1-3, 15.1-A, 15.1-B, 15.1-C, 15.1-C.1-2, 15.1-D.1.a, 15.1-D.1.b, 15.1-D.1.c, 15.1-D.1.d, 15.1-D.1.e, 15.1-D.1.f, 15.1-D.1.g, 15.1-D.1.h, 15.1-D.1.i, 15.1-D.1.j, 15.1-D.1.k, 15.1-D.2.a, 15.1-D.2.b, 15.1-D.2.c, 15.1-D.3.a, 15.1-D.4.a, 15.1-D.4.b, 15.1-D.4.c, 15.1-D.4.d, 15.1-D.4.e, 15.1-D.5.a, 15.1-D.5.b, 15.1-E, 15.2-A, 15.2-B, 15.2-C, 15.2-D

- **GenGrid** test suite**:** Election definition was created, with a focus on a grid based ballot, validating N of M voting, partisan offices, non-partisan offices, cross-party, ballot formatting, precincts and districts, languages and tally and reporting functionality.
    - 248 test cases were examined in this test suite
    - The following requirements were examined within this test suite:

      1.1.1-A, 1.1.1-A.1, 1.1.1-A.2, 1.1.1-A.3, 1.1.1-A.4, 1.1.1-B, 1.1.1-B.1, 1.1.1-B.2, 1.1.1-D.1, 1.1.1-D.2, 1.1.1-E, 1.1.1-G, 1.1.1-H, 1.1.1-M, 1.1.1-N, 1.1.2-J.1-3, 1.1.2-J.4, 1.1.3-A, 1.1.3-B, 1.1.3-B.1, 1.1.3-B.2, 1.1.4-A, 1.1.4-C, 1.1.4-G, 1.1.4-G.2, 1.1.4-H, 1.1.4-I, 1.1.4-J, 1.1.5-A, 1.1.5-C.1, 1.1.5-C.2, 1.1.5-D, 1.1.5-D.1-4, 1.1.6-D, 1.1.6-D.1-4, 1.1.6-E, 1.1.6-E.1, 1.1.6-E.2, 1.1.7-A, 1.1.8-A.1, 1.1.8-A.2, 1.1.8-A.3, 1.1.8-C.1-2, 1.1.8-F, 1.1.8-G, 1.1.8-H, 1.1.9-A, 1.1.9-B, 1.1.9-B.1-5, 1.1.9-C.1-5, 1.1.9-D, 1.1.9-E, 1.1.9-G, 1.1.9-F, 1.1.9-H, 1.1.9-J, 1.1.9-M, 10.1-A, 10.2.1-A, 10.2.2-B, 10.2.2-C, 10.2.2-D, 10.2.2-D.1-2, 11.2.2-D, 15.1-A, 15.1-B, , 15.1-C, 15.1-D, 15.2-C, 15.2-D, 3.1.2-D, 3.3-D, 4.1-B, 5.1-B, 5.1-C, 7.2-C, 7.2-C.1-3, 7.3-B, 7.3-B.1-2, 7.3-C, 7.3-C.1, 7.3-C.2, 7.3-C.3, 7.3-C.6, 7.3-H, 7.3-H.1, 7.3-H.2, 7.3-I, 7.3-I.1, 7.3-I.2, 9.4-D

- **General Election 1** test suite**:** Election definition was created, with a focus on validating N of M voting, partisan offices, non-partisan offices, cumulative voting, straight party voting, ballot rotations, ballot formatting, precincts and districts, languages, and tally and reporting functionality.
    - 203 test cases were examined in this test suite

- The following requirements were examined within this test suite:

  1.1.1-A, 1.1.1-A.1, 1.1.1-A.2, 1.1.1-A.3, 1.1.1-A.4, 1.1.1-B, 1.1.1-B.1, 1.1.1-B.2, 1.1.1-D.1, 1.1.1-D.2, 1.1.1-D.3, 1.1.1-E, 1.1.1-G, 1.1.1-H, 1.1.1-I, 1.1.1-J, 1.1.1-L, 1.1.1-M, 1.1.1-N, 1.1.2-J.1, 1.1.2-J.2, 1.1.2-J.3, 1.1.1-J.4, 1.1.3-A, 1.1.3-B, 1.1.3-B.1, 1.1.3-B.2, 1.1.4-A, 1.1.4-B.1, 1.1.4-B.2, 1.1.4-C, 1.1.4-D, 1.1.4-G, 1.1.4-G.2, 1.1.4-H, 1.1.4-I, 1.1.4-J, 1.1.4-K, 1.1.4-L, 1.1.4-Q, 1.1.5-A, 1.1.5-C.1, 1.1.5-C.2, 1.1.5-D, 1.1.5-D.1, 1.1.5-D.2, 1.1.5-D.3, 1.1.5-D.4, 1.1.5-E, 1.1.5-E.1, 1.1.5-E.2, 1.1.5-E.3, 1.1.5-E.4, 1.1.6-D, 1.1.6-D.1, 1.1.6-D.2, 1.1.6-D.3, 1.1.6-D.4, 1.1.6-E, 1.1.6-E.1, 1.1.6-E.2, 1.1.7-A, 1.1.8-A, 1.1.8-A.1, 1.1.8-A.2, 1.1.8-A.3, 1.1.8-C, 1.1.8-C.1, 1.1.8-C.2, 1.1.8-D, 1.1.8-E, 1.1.8-F, 1.1.8-G, 1.1.8-H, 1.1.8-I, 1.1.8-M, 1.1.9-A, 1.1.9-B, 1.1.9-B.1, 1.1.9-B.2, 1.1.9-B.3, 1.1.9-B.4, 1.1.9-B.5, 1.1.9-C.1, 1.1.9-C.2, 1.1.9-C.3, 1.1.9-C.4, 1.1.9-C.5, 1.1.9-D, 1.1.9-E, 1.1.9-F, 1.1.9-G, 1.1.9-H, 1.1.9-J, 1.1.9-M, 3.3-D, 4.1-B, 4.1-C, 4.1-D, 5.1-B, 5.1-C, 7.2-C, 7.2-C.1, 7.2-C.2, 7.2-C.3, 7.3-B, 7.3-B.1, 7.3-B.2, 7.3-C, 7.3-C.1, 7.3-C.2, 7.3-C.3, 7.3-H, 7.3-H.1, 7.3-H.2, 7.3-I, 7.3-I.1, 7.3-I.2, 9.4-D, 10.1-A, 10.2.1-A, 10.2.1-B, 10.2.1-C, 10.2.1-F, 10.2.2-B, 10.2.2-C, 10.2.2-D, 10.2.2-D.1, 10.2.2-D.2, 15.1-A, 15.2-C, 15.2-D

- **General Election 2** test suite**:** Election definition was created, with a focus on validating recalls, cross party endorsement, ranked order voting, write-ins, languages, and tally and reporting functionality.
  - 208 test cases were examined in this test suite
  - The following requirements were examined within this test suite:

    1.1.1-A, 1.1.1-A.1, 1.1.1-A.2, 1.1.1-A.3, 1.1.1-A.4, 1.1.1-B, 1.1.1-B.1, 1.1.1-B.2, 1.1.1-D.1, 1.1.1-D.2, 1.1.1-D.3, 1.1.1-E, 1.1.1-G, 1.1.1-H, 1.1.1-I, 1.1.1-J, 1.1.1-L, 1.1.1-M, 1.1.1-N, 1.1.2-J.1, 1.1.2-J.2, 1.1.2-J.3, 1.1.2-J.4, 1.1.3-A, 1.1.3-B, 1.1.3-B.1, 1.1.3-B.2, 1.1.4-A, 1.1.4-B.1, 1.1.4-B.2, 1.1.4-C, 1.1.4-D, 1.1.4-G, 1.1.4-G.2, 1.1.4-H, 1.1.4-I, 1.1.4-J, 1.1.4-K, 1.1.4-L, 1.1.4-M, 1.1.4-Q, 1.1.5-A, 1.1.5-C.1, 1.1.5-C.2, 1.1.5-D, 1.1.5-D.1, 1.1.5-D.2, 1.1.5-D.3, 1.1.5-D.4, 1.1.6-D, 1.1.6-D.1, 1.1.6-D.2, 1.1.6-D.3, 1.1.6-D.4, 1.1.6-E, 1.1.6-E.1, 1.1.6-E.2, 1.1.7-A, 1.1.8-A, 1.1.8-A.1, 1.1.8-A.2, 1.1.8-A.3, 1.1.8-C, 1.1.8-C.1, 1.1.8-C.2, 1.1.8-D, 1.1.8-E, 1.1.8-F, 1.1.8-G, 1.1.8-H, 1.1.8-I, 1.1.8-J, 1.1.8-J.1, 1.1.8-J.2, 1.1.8-J.3, 1.1.8-M, 1.1.9-A, 1.1.9-B, 1.1.9-B.1, 1.1.9-B.2, 1.1.9-B.3, 1.1.9-B.4, 1.1.9-B.5, 1.1.9-C.1, 1.1.9-C.2, 1.1.9-C.3, 1.1.9-C.4, 1.1.9-C.5, 1.1.9-D, 1.1.9-E, 1.1.9-F, 1.1.9-G, 1.1.9-H, 1.1.9-I, 1.1.9-J, 1.1.9-M, 3.3-D, 4.1-B, 4.1-C, 4.1-D, 5.1-B, 5.1-C, 7.2-C, 7.2-C.1, 7.2-C.2, 7.2-C.3, 7.3-B, 7.3-B.1, 7.3-B.2, 7.3-C, 7.3-C.1, 7.3-C.2, 7.3-C.3, 7.3-H, 7.3-H.1, 7.3-H.2, 7.3-I, 7.3-I.1, 7.3-I.2, 9.4-D, 10.1-A, 10.2.1-A, 10.2.1-B, 10.2.1-C, 10.2.1-F, 10.2.2-B, 10.2.2-C, 10.2.2-D, 10.2.2-D.1, 10.2.2-D.2, 15.1-A, 15.2-C, 15.2-D
- **Interoperability** test suite: Dealt with the concept of interoperability, as defined by VVSG 2.0. Interoperability has two main areas of focus: common data formats, and common hardware interfaces/COTS products.
  - 104 test cases were examined in this test suite

- The following requirements were examined within this test suite:
  3.3-A.1, 3.3-A.2, 3.3-B.1-3, 3.3-C, 3.3-D, 4.1-A, 4.1-A.1, 4.1-A.2, 4.1-B, 4.1-C, 4.1-D, 4.1-E, 4.1-F, 4.2-A, 4.2-B, 4.3-A, 4.4-A, 9.1.5-E

- **OpenPrimary** test suite**:** This primary election was created to confirm all related Open Primary election voting variations.
  - 299 test cases were examined in this test suite
  - The following requirements were examined within this test suite:
    1.1.1-A, 1.1.1-A.1, 1.1.1-A.2, 1.1.1-A.3, 1.1.1-A.4, 1.1.1-B, 1.1.1-B.1, 1.1.1-B.2, 1.1.1-D.1, 1.1.1-D.2, 1.1.1-D.3, 1.1.1-E, 1.1.1-G, 1.1.1-H, 1.1.1-I, 1.1.1-J, 1.1.1-K, 1.1.1-L, 1.1.1-M, 1.1.1-N, 1.1.2-J.1-4, 1.1.3-A, 1.1.3-B, 1.1.3-B.1, 1.1.3-B.2, 1.1.4-A, 1.1.4-B, 1.1.4-C, 1.1.4-D, 1.1.4-F, 1.1.4-G, 1.1.4-G.1, 1.1.4-H, 1.1.4-I, 1.1.4-J, 1.1.4-L, 1.1.4-M, 1.1.4-N, 1.1.4-O, 1.1.5-A, 1.1.5-C.1, 1.1.5-C.2, 1.1.5-E.3, 1.1.5-E.4, 1.1.6-D, 1.1.6-D.1-4, 1.1.6-E, 1.1.6-E.1, 1.1.6-E.2, 1.1.7-A, 1.1.8-A.1, 1.1.8-A.2, 1.1.8-A.3, 1.1.8-B, 1.1.8-B.2, 1.1.8-B.3, 1.1.8-C.1, 1.1.8-C.2, 1.1.8-D, 1.1.8-E, 1.1.8-F, 1.1.8-G, 1.1.8-H, 1.1.8-I, 1.1.8-L, 1.1.8-M, 1.1.9-A, 1.1.9-B, 1.1.9-B.1-5, 1.1.9-C.1-5, 1.1.9-D, 1.1.9-E, 1.1.9-F, 1.1.9-G, 1.1.9-H, 1.1.9-J, 1.1.9-M, 3.1.2-D, 3.3-D, 4.1-B, 4.1-C, 4.1-D, 5.1-B, 5.1-C, 7.1-I, 7.2-C, 7.2-C.1-3, 7.3-B, 7.3-B.1-2, 7.3-C, 7.3-C.1, 7.3-C.2, 7.3-C.3, 7.3-C.6, 7.3-H, 7.3-H.1, 7.3-H.2, 7.3-I, 7.3-I.1, 7.3-I.2, 9.4-D, 10.1-A, 10.2.1-A, 10.2.1-B, 10.2.1-C, 10.2.1-F, 10.2.2-B, 10.2.2-C, 10.2.2-D, 10.2.2-D.1-2, 11.2.2-D, 15.1-A, 15.1-B, 15.2-C, 15.2-D

- **Stress** test suite**:** Stress testing verified Verity Vanguard's ability to gracefully respond to stressing of system limits, such that the system does not fail or halt operations suddenly.
  - 113 test cases were examined in this test suite
  - The following requirements were examined within this test suite:
    1.2-D, 1.2-E
- **Supply Chain Risk Management** test suite: Covered the requirement that a voting system's documentation contains a supply chain risk management strategy, a list of critical components defined by criticality analysis, and hardware and software information for the critical components.
  - 3 test cases were examined in this test suite
  - The following requirements were examined within this test suite:
    14.3-A.1-5, 14.3-B, 14.3-C, 14.3-C.1-4

- **System Identification and Installation** test suite: Focused on verification of the installation process for each component of the voting system, as well as obtaining and verifying the post-install signatures.
  - 20 test cases were examined in this test suite

- The following requirements were examined within this test suite:
  3.1.4-G, 3.1.4-H, 3.1.4-I

- **Usability** test suite**:** Testing was conducted to ensure voters are able to negotiate the process effectively, efficiently, and comfortably.
  - 136 test cases were examined in this test suite
  - The following requirements were examined within this test suite:
    1.1.6-B.1-2, 6.1-A, 6.1-B, 6.1-C, 6.1-D, 6.2-A, 6.2-A.1, 7.1-B, 7.1-C, 7.1-C.1, 7.1-C.2, 7.1-D, 7.1-D.1, 7.1-D.2, 7.1-D.2.a-c, 7.1-D.3, 7.1-E, 7.1-E.1-3, 7.1-F, 7.1-G, 7.1-G.1-2, 7.1-G.2.a-d, 7.1-H, 7.1-H.1, 7.1-H.2, 7.1-I, 7.1-J, 7.1-K, 7.1-K.1-3, 7.1-K.4, 7.1-K.5, 7.1-K.6, 7.1-K.7, 7.1-L, 7.2-B, 7.2-C, 7.2-C.1-3, 7.2-C.4, 7.2-C.5, 7.2-D, 7.2-D.1.a-b, 7.2-D.1-2, 7.2-D.2.a-c, 7.2-E, 7.2-E.1-6, 7.2-F, 7.2-F.1-2, 7.2-H, 7.2-I, 7.2-I.1, 7.2-I.2, 7.2-I.3, 7.2-J, 7.2-K, 7.2-L, 7.2-M, 7.2-N, 7.2-N.1.a-b, 7.2-N.1-3, 7.2-O, 7.2-O.1-4, 7.3-E, 7.3-F, 7.3-F.1-3, 7.3-G, 7.3-G.1.a-c, 7.3-G.1-3, 7.3-K.2.a, 7.3-K.2.b, 7.3-L, 7.3-M, 7.3-M.1-2, 7.3-N, 7.3-N.1-3, 8.1-A, 8.1-A.1.a-b, 8.1-A.1-3, 8.1-A.2.a-b, 8.1-A.3.a-b, 8.1-B, 8.3-A, 8.3-A.1.a-d, 8.3-A.1-2, 8.4-A, 8.4-A.1.a-g, 8.4-A.1-3

- **Volume** test suite**:** Volume testing verified the system's ability to handle maximum volume of activities, as prescribed in Verity Vanguard specifications.
  - 128 test cases were examined in this test suite
  - The following requirements were examined within this test suite:
    1.2-D, 1.2-G

2.6.5 Security Test Suites Executed

- **Security - Access Control** test suite: Access Control testing verified the voting system's ability to maintain authorization information and authentication capabilities for all systems, services, and users that interact with the voting system. All devices included in the test campaign received access control security testing.

  Device usernames and passwords were tested for proper authentication capabilities and that password requirements are sufficient. In addition, multi-factor authentication tested to verify the bolstering of user account security such that leaked credentials alone will not expose the voting system to account misuse. Each user account was tested for permissions and role assignments based on documented roles and proper role-based access control (RBAC) implementations.

  Minimum permission and access rules were tested to ensure the voting system provides each user with only the permissions relevant to the role's documented purpose. Voting system components were tested through interaction with devices and visual inspection of authentication during user login and user activity.

- 70 test cases were examined in this test suite
- The following requirements were examined within this test suite:

  10.2.3-A, 10.2.4-B, 11.1-A, 11.1-A.1, 11.1-A.2, 11.1-A.3, 11.1-B, 11.1-C, 11.1-C.1, 11.1-C.2, 11.1-C.3, 11.1-D, 11.2.1-A, 11.2.1-B, 11.2.1-C, 11.2.1-C.1, 11.2.1-C.2, 11.2.1-C.3, 11.2.1-C.4, 11.2.1-D, 11.2.1-E, 11.2.1-F, 11.2.2-A, 11.2.2-B, 11.2.2-C, 11.2.2-D, 11.3.1-A, 11.3.1-B, 11.3.1-B.1, 11.3.1-B.2, 11.3.1-B.3, 11.3.1-B.4, 11.3.1-B.5, 11.3.1-B.6, 11.3.1-C, 11.3.2-A, 11.3.2-B, 11.3.2-C, 11.3.2-D, 11.3.2-E, 11.4-A, 11.4-B, 11.5-A, 11.5-A.1, 11.5-A.2, 11.5-B, 11.5-C, 11.5-D, 15.1-E

- **Security - Data Protection** test suite: Data Protection testing verified that the end-to-end integrity of election system data guarantees the authenticity of the data. System and software cryptographic implementations were tested for computational security and efficacy of encrypting data. Cryptographic modules were verified against the Cryptographic Module Validation Program (CMVP) and evaluated concerning algorithm strength in bits and key lengths.

  In addition, configuration files were tested for accessibility restrictions. Testing was conducted through documentation review and simulation of documented events to identify key components. Necessary cryptographic artifacts were exfiltrated and analyzed externally to verify algorithm strengths and key lengths, while configuration files were reviewed locally on voting system components to verify alignment with documented configuration procedures.

  - 30 test cases were examined in this test suite
  - The following requirements were examined within this test suite:

    13.1.1-A, 13.1.1-B, 13.1.1-C, 13.1.2-A, 13.2-A, 13.2-B, 13.2-B.1, 13.2-B.2, 13.2-B.3, 13.2-B.4, 13.3-A, 13.3-A.1, 13.3-A.2, 13.3-B, 13.3-C, 13.3-D, 13.3-E, 13.4-A, 13.4-A.1, 13.4-A.2, 13.4-A.3, 15.2-A, 15.4-A, 15.4-B, 15.4-D

- **Security - Physical** test suite: Physical Security testing verified that the voting system has the required physical security controls implemented to prevent and deter unauthorized access and properly produce alerts if the system encounters errors.

  Connectivity or lack thereof was verified to be logged for all scanners, BMDs, and other voting system components during activated voting stages. Connections to device ports were verified to be logged and configured to minimally allow connectivity only to other voting system components for necessary documented procedures.

  All physical housing for voting system storage or transportation was verified to secure the system and produce evidence if tampering is experienced. All physical locks on the voting system support different keying schemes including a key owner-unique scheme.

- 59 test cases were examined in this test suite
- The following requirements were examined within this test suite:
  10.2.3-B, 12.1-A, 12.1-B, 12.1-C, 12.1-D, 12.1-E, 12.1-F, 12.1-G, 12.1-G.1, 12.1-G.2, 12.1-G.3, 12.2-A, 12.2-B, 12.2-C, 12.2-D, 12.2-E, 15.1-A, 15.1-D, 15.2-C

- **Security - System Integrity** test suite: System Integrity testing verified the overall security of the voting system with respect to environmental factors. This included consideration of supply chain attacks, attack surface analyses and limitations, and software verification. Documented risk assessments were evaluated for identified risks and associated acceptances or mitigations as well as procedural and operational security measures in place.

  Physical components of the voting system were tested to ensure that connections to logical components are properly disabled or limited to documented connections with other voting system components.

  In addition, software checks were completed to ensure all resident programs are verified with allow lists and that any errors or disallowed software triggered a display of obvious and accurate indications of the error.

  The system was examined to verify that no wireless capability is available.

  - 98 test cases were examined in this test suite
  - The following requirements were examined within this test suite:
    14.1-A, 14.1-B, 14.1-C, 14.1-C.1, 14.1-C.2, 14.1-C.3, 14.1-C.4, 14.1-D, 14.2-A, 14.2-B, 14.2-C, 14.2-D, 14.2-E, 14.2-E.1, 14.2-E.2, 14.2-F, 14.2-G, 14.2-H, 14.2-I, 14.2-J, 14.2-J.1, 14.2-J.2, 14.2-J.3, 14.2-J.4, 14.2-K, 14.3.1-A, 14.3.1-B, 14.3.1-C, 14.3.2-A, 14.3.2-B, 14.3.2-C, 14.3.2-D, 14.3-A, 14.3-A.1, 14.3-A.2, 14.3-A.3, 14.3-A.4, 14.3-A.5, 14.3-B, 14.3-C, 14.3-C.1, 14.3-C.2, 14.3-C.3, 14.3-C.4, 14.4-A, 14.4-B, 14.4-C, 15.3-A, 15.3-B, 15.3-C, 15.3-D, 15.3-E, 15.3-F, 15.3-G, 15.4-C

2.6.6 TDP Test Suites Executed

Adapt Documentation Review
Documentation related to the Adapt all in one device was reviewed for content that is supplied to jurisdictions that will use the Vanguard system, to verify sufficient content that will enable the jurisdiction to use the system. Areas of review included Overview, Performance, Security, Setup, Installation, Operations, Maintenance, Training and Public documentation.

- 170 test cases were examined in this test suite

- The following requirements were examined within this test suite:
  1.3-A.1, 1.3-A.2, 1.3-A.3, 1.3-A.4, 1.3-A.5, 1.3-A.6, 1.3-A.7, 1.3-A.8, 1.3-A.9, 1.3-B, 2.1.1-A.1, 2.1.1-A.2, 2.1.1-B.1, 2.1.1-B.2, 2.1.1-B.3, 2.1.1-B.4, 2.1.1-B.5, 2.1.1-C, 2.1.1-D, 2.1-D, 2.2-A, 2.2-A.1, 2.2-A.2, 2.2-A.3, 2.2-A.4, 2.6-A.3, 3.1.1-A, 3.1.1-B, 3.1.1-C.1, 3.1.1-C.2, 3.1.1-C.3, 3.1.1-C.4, 3.1.1-C.5, 3.1.1-C.6, 3.1.1-C.7, 3.1.1-C.8, 3.1.1-C.9, 3.1.1-D.1, 3.1.1-D.2, 3.1.1-D.3, 3.1.1-E, 3.1.2-A.1, 3.1.2-A.2, 3.1.2-A.3, 3.1.2-A.4, 3.1.2-A.5, 3.1.3-A, 3.1.3-B.1, 3.1.3-B.2, 3.1.3-B.3, 3.1.3-B.4, 3.1.3-C, 3.1.3-D, 3.1.4-A, 3.1.4-B.1, 3.1.4-B.2, 3.1.4-B.3, 3.1.4-B.4, 3.1.4-B.5, 3.1.4-B.6, 3.1.4-B.7, 3.1.4-B.8, 3.1.4-C, 3.1.4-D, 3.1.4-E, 3.1.4-F, 3.1.4-G, 3.1.4-H, 3.1.4-I.1-8, 3.1.4-J, 3.1.4-K, 3.1.4-L, 3.1.4-M, 3.1.5-A, 3.1.5-A.1, 3.1.5-A.2, 3.1.5-A.3, 3.1.5-A.4, 3.1.5-A.5, 3.1.5-A.6, 3.1.5-A.7, 3.1.5-A.8, 3.1.5-A.9, 3.1.5-B, 3.1.5-C, 3.1.5-D, 3.1.5-E, 3.1.5-F, 3.1.5-G.1-5, 3.1.5-H, 3.1.5-I.1, 3.1.5-I.2, 3.1.5-I.3, 3.1.5-I.4, 3.1.5-J.1, 3.1.5-J.2, 3.1.5-K.1, 3.1.5-K.2, 3.1.5-K.3, 3.1.6-A, 3.1.6-B, 3.1.6-C, 3.1.6-D.1, 3.1.6-D.2, 3.1.6-D.3, 3.1.6-D.4, 3.1.6-D.5, 3.1.6-D.6, 3.1.6-D.7, 3.1.6-D.8, 3.1.6-E, 3.1.6-F.1, 3.1.6-F.2, 3.1.6-F.3, 3.1.6-F.4, 3.1.6-G.1, 3.1.6-G.2, 3.1.6-G.3, 3.1.6-G.4, 3.1.6-G.5, 3.1.6-G.6, 3.1.6-H, 3.1.6-I, 3.1.6-J.1, 3.1.6-J.2, 3.1.6-J.3, 3.1.6-J.4, 3.1.6-J.5, 3.1.6-J.6, 3.1.6-K, 3.1.6-L, 3.1.6-M.1, 3.1.6-M.2, 3.1.6-N, 3.1.6-O, 3.1.6-P, 3.1.6-Q.1, 3.1.6-Q.2, 3.1.6-Q.3, 3.1.7-A, 3.1.7-B.1, 3.1.7-B.2, 3.1.7-B.4, 3.1.7-B.5, 3.1.7-B.6, 3.1.7-B.7, 3.1.7-C, 3.1.7-D, 3.2-A, 3.2-B.1-4, 3.2-C, 3.2-D, 3.2-E, 3.2-F, 3.2-G, 3.2-H, 3.2-I, 3.2-J, 3.2-K, 3.2-L, 3.2-M, 3.2-N, 3.2-O, 3.2-P.1-4, 3.2-Q.1-8, 3.3-A.1, 3.3-A.2, 3.3-B.1-3, 3.3-C, 5.1-F.1, 5.1-F.2, 7.3-O, 7.3-O.1.a, 7.3-O.1.b, 7.3-O.2.a, 7.3-O.2.b, 7.3-O.2.c, 8.1-A.1.b, 8.1-A.2.b, 8.1-A.3.b, 8.1-H, 8.1-K, 8.2-A, 8.3-A, 8.3-A.1, 8.3-A.1.a, 8.3-A.1.b, 8.3-A.1.c, 8.3-A.1.d, 8.3-A.2, 8.4-A, 8.4-A.1, 8.4-A.1.a, 8.4-A.1.b, 8.4-A.1.c, 8.4-A.1.d, 8.4-A.1.e, 8.4-A.1.f, 8.4-A.1.g, 8.4-A.2, 8.4-A.3, 9.1.3-C, 15.1-D.1.a, 15.1-D.1.b, 15.1-D.1.c, 15.1-D.1.d, 15.1-D.1.e, 15.1-D.1.f, 15.1-D.1.g, 15.1-D.1.h, 15.1-D.1.i, 15.1-D.1.j, 15.1-D.1.k, 15.1-D.2.a, 15.1-D.2.b, 15.1-D.2.c, 15.1-D.3.a, 15.1-D.4.a, 15.1-D.4.b, 15.1-D.4.c, 15.1-D.4.d, 15.1-D.4.e, 15.1-D.5.a, 15.1-D.5.b, 15.2-B, 15.3-C, 15.4-A, 15.4-B, 15.4-C

Boost Documentation Review
Documentation related to the Boost device was reviewed for content that is supplied to jurisdictions that will use the Vanguard system, to verify sufficient content that will enable the jurisdiction to use the system. Areas of review included Overview, Performance, Security, Setup, Installation, Operations, Maintenance, Training and Public documentation.

- 160 test cases were examined in this test suite
- The following requirements were examined within this test suite:
  1.3-A.1, 1.3-A.2, 1.3-A.3, 1.3-A.4, 1.3-A.5, 1.3-A.6, 1.3-A.7, 1.3-A.8, 1.3-A.9, 1.3-B, 2.1.1-A.1, 2.1.1-A.2, 2.1.1-B.1, 2.1.1-B.2, 2.1.1-B.3, 2.1.1-B.4, 2.1.1-B.5, 2.1.1-C, 2.1.1-D, 2.1-D, 2.2-A, 2.2-A.1, 2.2-A.2, 2.2-A.3, 2.2-A.4, 2.6-A.3, 3.1.1-A, 3.1.1-B, 3.1.1-C.1, 3.1.1-C.2, 3.1.1-C.3, 3.1.1-C.4, 3.1.1-C.5, 3.1.1-

C.6, 3.1.1-C.7, 3.1.1-C.8, 3.1.1-C.9, 3.1.1-D.1, 3.1.1-D.2, 3.1.1-D.3, 3.1.1-E, 3.1.2-A.1, 3.1.2-A.2, 3.1.2-A.3, 3.1.2-A.4, 3.1.2-A.5, 3.1.3-A, 3.1.3-B.1, 3.1.3-B.2, 3.1.3-B.3, 3.1.3-B.4, 3.1.3-C, 3.1.3-D, 3.1.4-A, 3.1.4-B.1, 3.1.4-B.2, 3.1.4-B.3, 3.1.4-B.4, 3.1.4-B.5, 3.1.4-B.6, 3.1.4-B.7, 3.1.4-B.8, 3.1.4-C, 3.1.4-D, 3.1.4-E, 3.1.4-F, 3.1.4-G, 3.1.4-H, 3.1.4-I.1-8, 3.1.4-J, 3.1.4-K, 3.1.4-L, 3.1.4-M, 3.1.5-A, 3.1.5-A.1, 3.1.5-A.2, 3.1.5-A.3, 3.1.5-A.4, 3.1.5-A.5, 3.1.5-A.6, 3.1.5-A.7, 3.1.5-A.8, 3.1.5-A.9, 3.1.5-B, 3.1.5-C, 3.1.5-D, 3.1.5-E, 3.1.5-F, 3.1.5-G.1-5, 3.1.5-H, 3.1.5-I.1, 3.1.5-I.2, 3.1.5-I.3, 3.1.5-I.4, 3.1.5-J.1, 3.1.5-J.2, 3.1.5-K.1, 3.1.5-K.2, 3.1.5-K.3, 3.1.6-A, 3.1.6-B, 3.1.6-C, 3.1.6-D.1, 3.1.6-D.2, 3.1.6-D.4, 3.1.6-D.5, 3.1.6-D.6, 3.1.6-D.7, 3.1.6-D.8, 3.1.6-E, 3.1.6-F.1, 3.1.6-F.2, 3.1.6-F.3, 3.1.6-F.4, 3.1.6-G.1, 3.1.6-G.2, 3.1.6-G.3, 3.1.6-G.4, 3.1.6-G.5, 3.1.6-G.6, 3.1.6-H, 3.1.6-I, 3.1.6-J.1, 3.1.6-J.2, 3.1.6-J.3, 3.1.6-J.4, 3.1.6-J.5, 3.1.6-J.6, 3.1.6-L, 3.1.6-O, 3.1.6-P, 3.1.6-Q.1, 3.1.6-Q.2, 3.1.6-Q.3, 3.1.7-A, 3.1.7-B.1, 3.1.7-B.2, 3.1.7-B.4, 3.1.7-B.5, 3.1.7-B.6, 3.1.7-B.7, 3.1.7-C, 3.1.7-D, 3.2-A, 3.2-B.1-4, 3.2-C, 3.2-D, 3.2-E, 3.2-F, 3.2-G, 3.2-H, 3.2-I, 3.2-J, 3.2-K, 3.2-L, 3.2-M, 3.2-N, 3.2-O, 3.2-P.1-4, 3.2-Q.1-8, 3.3-A.1, 3.3-A.2, 3.3-B.1-3, 3.3-C, 5.1-F.1, 5.1-F.2, 7.3-O, 7.3-O.1.a, 7.3-O.1.b, 7.3-O.2.a, 7.3-O.2.b, 7.3-O.2.c, 8.1-A.1.b, 8.1-A.2.b, 8.1-A.3.b, 8.1-H, 8.1-K, 8.2-A, 8.4-A, 8.4-A.1, 8.4-A.1.a, 8.4-A.1.b, 8.4-A.1.c, 8.4-A.1.d, 8.4-A.1.e, 8.4-A.1.f, 8.4-A.1.g, 8.4-A.2, 8.4-A.3, 9.1.3-C, 15.1-D.1.a, 15.1-D.1.b, 15.1-D.1.c, 15.1-D.1.d, 15.1-D.1.e, 15.1-D.1.f, 15.1-D.1.g, 15.1-D.1.h, 15.1-D.1.i, 15.1-D.1.j, 15.1-D.1.k, 15.1-D.2.a, 15.1-D.2.b, 15.1-D.2.c, 15.1-D.3.a, 15.1-D.4.a, 15.1-D.4.b, 15.1-D.4.c, 15.1-D.4.d, 15.1-D.4.e, 15.1-D.5.a, 15.1-D.5.b, 15.2-B, 15.3-C, 15.4-A, 15.4-B, 15.4-C

Capture Documentation Review

Documentation related to the Capture device was reviewed for content that is supplied to jurisdictions that will use the Vanguard system, to verify sufficient content that will enable the jurisdiction to use the system. Areas of review included Overview, Performance, Security, Setup, Installation, Operations, Maintenance, Training and Public documentation.

- 165 test cases were examined in this test suite
- The following requirements were examined within this test suite:

  1.3-A.1, 1.3-A.2, 1.3-A.3, 1.3-A.4, 1.3-A.5, 1.3-A.6, 1.3-A.7, 1.3-A.8, 1.3-A.9, 1.3-B, 2.1.1-A.1, 2.1.1-A.2, 2.1.1-B.1, 2.1.1-B.2, 2.1.1-B.3, 2.1.1-B.4, 2.1.1-B.5, 2.1.1-C, 2.1.1-D, 2.1-D, 2.2-A, 2.2-A.1, 2.2-A.2, 2.2-A.3, 2.2-A.4, 2.6-A.3, 3.1.1-A, 3.1.1-B, 3.1.1-C.1, 3.1.1-C.2, 3.1.1-C.3, 3.1.1-C.4, 3.1.1-C.5, 3.1.1-C.6, 3.1.1-C.7, 3.1.1-C.8, 3.1.1-C.9, 3.1.1-D.1, 3.1.1-D.2, 3.1.1-D.3, 3.1.1-E, 3.1.2-A.1, 3.1.2-A.2, 3.1.2-A.3, 3.1.2-A.4, 3.1.2-A.5, 3.1.2-B, 3.1.2-C.1, 3.1.2-C.2, 3.1.2-C.3, 3.1.2-D.1-5, 3.1.3-A, 3.1.3-B.1, 3.1.3-B.2, 3.1.3-B.3, 3.1.3-B.4, 3.1.3-C, 3.1.3-D, 3.1.4-A, 3.1.4-B.1, 3.1.4-B.2, 3.1.4-B.3, 3.1.4-B.4, 3.1.4-B.5, 3.1.4-B.6, 3.1.4-B.7, 3.1.4-B.8, 3.1.4-C, 3.1.4-D, 3.1.4-E, 3.1.4-F, 3.1.4-G, 3.1.4-H, 3.1.4-I.1-8, 3.1.4-J, 3.1.4-K, 3.1.4-L, 3.1.4-M, 3.1.5-A, 3.1.5-A.1,

3.1.5-A.2, 3.1.5-A.3, 3.1.5-A.4, 3.1.5-A.5, 3.1.5-A.6, 3.1.5-A.7, 3.1.5-A.8, 3.1.5-A.9, 3.1.5-B, 3.1.5-C, 3.1.5-D, 3.1.5-E, 3.1.5-F, 3.1.5-G.1-5, 3.1.5-H, 3.1.5-I.1, 3.1.5-I.2, 3.1.5-I.3, 3.1.5-I.4, 3.1.5-J.1, 3.1.5-J.2, 3.1.5-K.1, 3.1.5-K.2, 3.1.5-K.3, 3.1.6-A, 3.1.6-B, 3.1.6-C, 3.1.6-D.1, 3.1.6-D.2, 3.1.6-D.3, 3.1.6-D.4, 3.1.6-D.5, 3.1.6-D.6, 3.1.6-D.7, 3.1.6-D.8, 3.1.6-E, 3.1.6-F.1, 3.1.6-F.2, 3.1.6-F.3, 3.1.6-F.4, 3.1.6-G.1, 3.1.6-G.2, 3.1.6-G.3, 3.1.6-G.4, 3.1.6-G.5, 3.1.6-G.6, 3.1.6-H, 3.1.6-I, 3.1.6-J.1, 3.1.6-J.2, 3.1.6-J.3, 3.1.6-J.4, 3.1.6-J.5, 3.1.6-J.6, 3.1.6-L, 3.1.6-M.1, 3.1.6-M.2, 3.1.6-N, 3.1.6-O, 3.1.6-P, 3.1.6-Q.1, 3.1.6-Q.2, 3.1.6-Q.3, 3.1.7-A, 3.1.7-B.1, 3.1.7-B.2, 3.1.7-B.3, 3.1.7-B.4, 3.1.7-B.5, 3.1.7-B.6, 3.1.7-B.7, 3.1.7-C, 3.1.7-D, 3.2-A, 3.2-B.1-4, 3.2-C, 3.2-D, 3.2-E, 3.2-F, 3.2-G, 3.2-H, 3.2-I, 3.2-J, 3.2-K, 3.2-L, 3.2-M, 3.2-N, 3.2-O, 3.2-P.1-4, 3.2-Q.1-8, 3.3-A.1, 3.3-A.2, 3.3-B.1-3, 3.3-C, 5.1-F.2, 7.3-O, 7.3-O.1.a, 7.3-O.2.a, 7.3-O.2.b, 7.3-O.2.c, 8.1-A.1.b, 8.1-A.3.b, 8.1-K, 8.2-A, 8.4-A, 8.4-A.1, 8.4-A.1.a, 8.4-A.1.b, 8.4-A.1.c, 8.4-A.1.d, 8.4-A.1.e, 8.4-A.1.f, 8.4-A.1.g, 8.4-A.2, 8.4-A.3, 9.1.3-C, 15.1-D.1.a, 15.1-D.1.b, 15.1-D.1.c, 15.1-D.1.d, 15.1-D.1.e, 15.1-D.1.f, 15.1-D.1.g, 15.1-D.1.h, 15.1-D.1.i, 15.1-D.1.j, 15.1-D.1.k, 15.1-D.2.a, 15.1-D.2.b, 15.1-D.2.c, 15.1-D.3.a, 15.1-D.4.a, 15.1-D.4.b, 15.1-D.4.c, 15.1-D.4.d, 15.1-D.4.e, 15.1-D.5.a, 15.1-D.5.b, 15.2-B, 15.3-C, 15.4-A, 15.4-B, 15.4-C

Define Documentation Review

Documentation related to the Define application was reviewed for content that is supplied to jurisdictions that will use the Vanguard system, to verify sufficient content that will enable the jurisdiction to use the system. Areas of review included Overview, Performance, Security, Setup, Installation, Operations, Maintenance, Training and Public documentation.

- 142 test cases were examined in this test suite
- The following requirements were examined within this test suite:

  1.3-A.1, 1.3-A.2, 1.3-A.3, 1.3-A.4, 1.3-A.5, 1.3-A.6, 1.3-A.7, 1.3-A.8, 1.3-A.9, 1.3-B, 2.1.1-A.1, 2.1.1-A.2, 2.1.1-B.1, 2.1.1-B.2, 2.1.1-B.3, 2.1.1-B.4, 2.1.1-B.5, 2.1.1-C, 2.1.1-D, 2.1-D, 2.2-A, 2.2-A.1, 2.2-A.2, 2.2-A.3, 2.2-A.4, 2.6-A.3, 3.1.1-A, 3.1.1-B, 3.1.1-C.1, 3.1.1-C.2, 3.1.1-C.3, 3.1.1-C.4, 3.1.1-C.5, 3.1.1-C.6, 3.1.1-C.7, 3.1.1-C.8, 3.1.1-C.9, 3.1.1-D.1, 3.1.1-D.2, 3.1.1-D.3, 3.1.1-E, 3.1.2-A.1, 3.1.2-A.3, 3.1.2-A.4, 3.1.2-A.5, 3.1.3-A, 3.1.3-B.1, 3.1.3-B.2, 3.1.3-B.3, 3.1.3-B.4, 3.1.3-C, 3.1.3-D, 3.1.4-A, 3.1.4-B.1, 3.1.4-B.2, 3.1.4-B.3, 3.1.4-B.4, 3.1.4-B.5, 3.1.4-B.6, 3.1.4-B.7, 3.1.4-B.8, 3.1.4-C, 3.1.4-D, 3.1.4-E, 3.1.4-F, 3.1.4-G, 3.1.4-H, 3.1.4-I.1-8, 3.1.4-J, 3.1.4-K, 3.1.4-L, 3.1.4-M, 3.1.5-A, 3.1.5-A.1, 3.1.5-A.2, 3.1.5-A.3, 3.1.5-A.4, 3.1.5-A.5, 3.1.5-A.6, 3.1.5-A.7, 3.1.5-A.8, 3.1.5-A.9, 3.1.5-B, 3.1.5-C, 3.1.5-D, 3.1.5-E, 3.1.5-F, 3.1.5-G.1-5, 3.1.5-H, 3.1.5-I.1, 3.1.5-I.2, 3.1.5-I.3, 3.1.5-I.4, 3.1.5-J.1, 3.1.5-J.2, 3.1.5-K.1, 3.1.5-K.2, 3.1.5-K.3, 3.1.6-A, 3.1.6-B, 3.1.6-C, 3.1.6-D.1, 3.1.6-D.4, 3.1.6-D.5, 3.1.6-D.6, 3.1.6-D.7, 3.1.6-D.8, 3.1.6-E, 3.1.6-F.1, 3.1.6-F.2, 3.1.6-F.3, 3.1.6-F.4, 3.1.6-G.1, 3.1.6-G.2, 3.1.6-G.3, 3.1.6-G.4, 3.1.6-G.5, 3.1.6-G.6, 3.1.6-H, 3.1.6-I, 3.1.6-J.1, 3.1.6-J.2, 3.1.6-J.3, 3.1.6-J.4, 3.1.6-J.5, 3.1.6-J.6, 3.1.6-L,

3.1.6-O, 3.1.6-P, 3.1.6-Q.1, 3.1.6-Q.2, 3.1.6-Q.3, 3.1.7-A, 3.1.7-B.1, 3.1.7-B.4, 3.1.7-B.5, 3.1.7-B.6, 3.1.7-B.7, 3.1.7-C, 3.1.7-D, 3.2-A, 3.2-B.1-4, 3.2-C, 3.2-D, 3.2-E, 3.2-F, 3.2-G, 3.2-H, 3.2-I, 3.2-J, 3.2-K, 3.2-L, 3.2-M, 3.2-N, 3.2-O, 3.2-P.1-4, 3.2-Q.1-8, 3.3-A.1, 3.3-A.2, 3.3-B.1-3, 3.3-C, 5.1-F.2, 7.3-O, 8.1-A.1.b, 8.1-A.3.b, 8.1-K, 8.2-A, 8.4-A, 8.4-A.1, 8.4-A.2, 8.4-A.3, 9.1.3-C, 15.1-D.1.a, 15.1-D.1.b, 15.1-D.1.c, 15.1-D.1.d, 15.1-D.1.e, 15.1-D.1.f, 15.1-D.1.g, 15.1-D.1.h, 15.1-D.1.i, 15.1-D.1.j, 15.1-D.1.k, 15.1-D.2.a, 15.1-D.2.b, 15.1-D.2.c, 15.1-D.3.a, 15.1-D.4.a, 15.1-D.4.b, 15.1-D.4.c, 15.1-D.4.d, 15.1-D.4.e, 15.1-D.5.a, 15.1-D.5.b, 15.2-B, 15.3-C, 15.4-A, 15.4-B, 15.4-C

Deploy Documentation Review

Documentation related to the Deploy application was reviewed for content that is supplied to jurisdictions that will use the Vanguard system, to verify sufficient content that will enable the jurisdiction to use the system. Areas of review included Overview, Performance, Security, Setup, Installation, Operations, Maintenance, Training and Public documentation.

- 146 test cases were examined in this test suite
- The following requirements were examined within this test suite:

  1.3-A.1, 1.3-A.2, 1.3-A.3, 1.3-A.4, 1.3-A.5, 1.3-A.6, 1.3-A.7, 1.3-A.8, 1.3-A.9, 1.3-B, 2.1.1-A.1, 2.1.1-A.2, 2.1.1-B.1, 2.1.1-B.2, 2.1.1-B.3, 2.1.1-B.4, 2.1.1-B.5, 2.1.1-C, 2.1.1-D, 2.1-D, 2.2-A, 2.2-A.1, 2.2-A.2, 2.2-A.3, 2.2-A.4, 2.6-A.3, 3.1.1-A, 3.1.1-B, 3.1.1-C.1, 3.1.1-C.2, 3.1.1-C.3, 3.1.1-C.4, 3.1.1-C.5, 3.1.1-C.6, 3.1.1-C.7, 3.1.1-C.8, 3.1.1-C.9, 3.1.1-D.1, 3.1.1-D.2, 3.1.1-D.3, 3.1.1-E, 3.1.2-A.1, 3.1.2-A.3, 3.1.2-A.4, 3.1.2-A.5, 3.1.3-A, 3.1.3-B.1, 3.1.3-B.2, 3.1.3-B.3, 3.1.3-B.4, 3.1.3-C, 3.1.3-D, 3.1.4-A, 3.1.4-B.1, 3.1.4-B.2, 3.1.4-B.3, 3.1.4-B.4, 3.1.4-B.5, 3.1.4-B.6, 3.1.4-B.7, 3.1.4-B.8, 3.1.4-C, 3.1.4-D, 3.1.4-E, 3.1.4-F, 3.1.4-G, 3.1.4-H, 3.1.4-I.1-8, 3.1.4-J, 3.1.4-K, 3.1.4-L, 3.1.4-M, 3.1.5-A, 3.1.5-A.1, 3.1.5-A.2, 3.1.5-A.3, 3.1.5-A.4, 3.1.5-A.5, 3.1.5-A.6, 3.1.5-A.7, 3.1.5-A.8, 3.1.5-A.9, 3.1.5-B, 3.1.5-C, 3.1.5-D, 3.1.5-E, 3.1.5-F, 3.1.5-G.1-5, 3.1.5-H, 3.1.5-I.1, 3.1.5-I.2, 3.1.5-I.3, 3.1.5-I.4, 3.1.5-J.1, 3.1.5-J.2, 3.1.5-K.1, 3.1.5-K.2, 3.1.5-K.3, 3.1.6-A, 3.1.6-B, 3.1.6-C, 3.1.6-D.1, 3.1.6-D.2, 3.1.6-D.4, 3.1.6-D.5, 3.1.6-D.6, 3.1.6-D.7, 3.1.6-D.8, 3.1.6-E, 3.1.6-F.1, 3.1.6-F.2, 3.1.6-F.3, 3.1.6-F.4, 3.1.6-G.1, 3.1.6-G.2, 3.1.6-G.3, 3.1.6-G.4, 3.1.6-G.5, 3.1.6-G.6, 3.1.6-H, 3.1.6-I, 3.1.6-J.1, 3.1.6-J.2, 3.1.6-J.3, 3.1.6-J.4, 3.1.6-J.5, 3.1.6-J.6, 3.1.6-K, 3.1.6-L, 3.1.6-M.1, 3.1.6-M.2, 3.1.6-N, 3.1.6-O, 3.1.6-P, 3.1.6-Q.1, 3.1.6-Q.2, 3.1.6-Q.3, 3.1.7-A, 3.1.7-B.1, 3.1.7-B.4, 3.1.7-B.5, 3.1.7-B.6, 3.1.7-B.7, 3.1.7-C, 3.1.7-D, 3.2-A, 3.2-B.1-4, 3.2-C, 3.2-D, 3.2-E, 3.2-F, 3.2-G, 3.2-H, 3.2-I, 3.2-J, 3.2-K, 3.2-L, 3.2-M, 3.2-N, 3.2-O, 3.2-P.1-4, 3.2-Q.1-8, 3.3-A.1, 3.3-A.2, 3.3-B.1-3, 3.3-C, 5.1-F.2, 7.3-O, 7.3-O.1.a, 7.3-O.1.b, 8.1-A.1.b, 8.1-A.3.b, 8.1-K, 8.2-A, 8.4-A, 8.4-A.2, 8.4-A.3, 9.1.3-C, 15.1-D.1.a, 15.1-D.1.b, 15.1-D.1.c, 15.1-D.1.d, 15.1-D.1.e, 15.1-D.1.f, 15.1-D.1.g, 15.1-D.1.h, 15.1-D.1.i, 15.1-D.1.j, 15.1-D.1.k, 15.1-D.2.a, 15.1-D.2.b, 15.1-D.2.c, 15.1-D.3.a, 15.1-D.4.a, 15.1-D.4.b, 15.1-D.4.c, 15.1-D.4.d, 15.1-D.4.e, 15.1-D.5.a, 15.1-D.5.b, 15.2-B, 15.3-C, 15.4-A, 15.4-B, 15.4-C

Flex Documentation Review

Documentation related to the Flex BMD device was reviewed for content that is supplied to jurisdictions that will use the Vanguard system, to verify sufficient content that will enable the jurisdiction to use the system. Areas of review included Overview, Performance, Security, Setup, Installation, Operations, Maintenance, Training and Public documentation.

- 170 test cases were examined in this test suite
- The following requirements were examined within this test suite:

  1.3-A.1, 1.3-A.2, 1.3-A.3, 1.3-A.4, 1.3-A.5, 1.3-A.6, 1.3-A.7, 1.3-A.8, 1.3-A.9, 1.3-B, 2.1.1-A.1, 2.1.1-A.2, 2.1.1-B.1, 2.1.1-B.2, 2.1.1-B.3, 2.1.1-B.4, 2.1.1-B.5, 2.1.1-C, 2.1.1-D, 2.1-D, 2.2-A, 2.2-A.1, 2.2-A.2, 2.2-A.3, 2.2-A.4, 2.6-A.3, 3.1.1-A, 3.1.1-B, 3.1.1-C.1, 3.1.1-C.2, 3.1.1-C.3, 3.1.1-C.4, 3.1.1-C.5, 3.1.1-C.6, 3.1.1-C.7, 3.1.1-C.8, 3.1.1-C.9, 3.1.1-D.1, 3.1.1-D.2, 3.1.1-D.3, 3.1.1-E, 3.1.2-A.1, 3.1.2-A.2, 3.1.2-A.3, 3.1.2-A.4, 3.1.2-A.5, 3.1.3-A, 3.1.3-B.1, 3.1.3-B.2, 3.1.3-B.3, 3.1.3-B.4, 3.1.3-C, 3.1.3-D, 3.1.4-A, 3.1.4-B.1, 3.1.4-B.2, 3.1.4-B.3, 3.1.4-B.4, 3.1.4-B.5, 3.1.4-B.6, 3.1.4-B.7, 3.1.4-B.8, 3.1.4-C, 3.1.4-D, 3.1.4-E, 3.1.4-F, 3.1.4-G, 3.1.4-H, 3.1.4-I.1-8, 3.1.4-J, 3.1.4-K, 3.1.4-L, 3.1.4-M, 3.1.5-A, 3.1.5-A.1, 3.1.5-A.2, 3.1.5-A.3, 3.1.5-A.4, 3.1.5-A.5, 3.1.5-A.6, 3.1.5-A.7, 3.1.5-A.8, 3.1.5-A.9, 3.1.5-B, 3.1.5-C, 3.1.5-D, 3.1.5-E, 3.1.5-F, 3.1.5-G.1-5, 3.1.5-H, 3.1.5-I.1, 3.1.5-I.2, 3.1.5-I.3, 3.1.5-I.4, 3.1.5-J.1, 3.1.5-J.2, 3.1.5-K.1, 3.1.5-K.2, 3.1.5-K.3, 3.1.6-A, 3.1.6-B, 3.1.6-C, 3.1.6-D.1, 3.1.6-D.2, 3.1.6-D.3, 3.1.6-D.4, 3.1.6-D.5, 3.1.6-D.6, 3.1.6-D.7, 3.1.6-D.8, 3.1.6-E, 3.1.6-F.1, 3.1.6-F.2, 3.1.6-F.3, 3.1.6-F.4, 3.1.6-G.1, 3.1.6-G.2, 3.1.6-G.3, 3.1.6-G.4, 3.1.6-G.5, 3.1.6-G.6, 3.1.6-H, 3.1.6-I, 3.1.6-J.1, 3.1.6-J.2, 3.1.6-J.3, 3.1.6-J.4, 3.1.6-J.5, 3.1.6-J.6, 3.1.6-K, 3.1.6-L, 3.1.6-M.1, 3.1.6-M.2, 3.1.6-N, 3.1.6-O, 3.1.6-P, 3.1.6-Q.1, 3.1.6-Q.2, 3.1.6-Q.3, 3.1.7-A, 3.1.7-B.1, 3.1.7-B.2, 3.1.7-B.4, 3.1.7-B.5, 3.1.7-B.6, 3.1.7-B.7, 3.1.7-C, 3.1.7-D, 3.2-A, 3.2-B.1-4, 3.2-C, 3.2-D, 3.2-E, 3.2-F, 3.2-G, 3.2-H, 3.2-I, 3.2-J, 3.2-K, 3.2-L, 3.2-M, 3.2-N, 3.2-O, 3.2-P.1-4, 3.2-Q.1-8, 3.3-A.1, 3.3-A.2, 3.3-B.1-3, 3.3-C, 5.1-F.1, 5.1-F.2, 7.3-O, 7.3-O.1.a, 7.3-O.1.b, 7.3-O.2.a, 7.3-O.2.b, 7.3-O.2.c, 8.1-A.1.b, 8.1-A.2.b, 8.1-A.3.b, 8.1-H, 8.1-K, 8.2-A, 8.3-A, 8.3-A.1, 8.3-A.1.a, 8.3-A.1.b, 8.3-A.1.c, 8.3-A.1.d, 8.3-A.2, 8.4-A, 8.4-A.1, 8.4-A.1.a, 8.4-A.1.b, 8.4-A.1.c, 8.4-A.1.d, 8.4-A.1.e, 8.4-A.1.f, 8.4-A.1.g, 8.4-A.2, 8.4-A.3, 9.1.3-C, 15.1-D.1.a, 15.1-D.1.b, 15.1-D.1.c, 15.1-D.1.d, 15.1-D.1.e, 15.1-D.1.f, 15.1-D.1.g, 15.1-D.1.h, 15.1-D.1.i, 15.1-D.1.j, 15.1-D.1.k, 15.1-D.2.a, 15.1-D.2.b, 15.1-D.2.c, 15.1-D.3.a, 15.1-D.4.a, 15.1-D.4.b, 15.1-D.4.c, 15.1-D.4.d, 15.1-D.4.e, 15.1-D.5.a, 15.1-D.5.b, 15.2-B, 15.3-C, 15.4-A, 15.4-B, 15.4-C

Results Documentation Review

Documentation related to the Results application was reviewed for content that is supplied to jurisdictions that will use the Vanguard system, to verify sufficient content that will enable the jurisdiction to use the system. Areas of review included Overview, Performance, Security, Setup, Installation, Operations, Maintenance, Training and Public documentation.

- 138 test cases were examined in this test suite
- The following requirements were examined within this test suite:

  1.3-A.1, 1.3-A.2, 1.3-A.3, 1.3-A.4, 1.3-A.5, 1.3-A.6, 1.3-A.7, 1.3-A.8, 1.3-A.9, 1.3-B, 2.1.1-A.1, 2.1.1-A.2, 2.1.1-B.1, 2.1.1-B.2, 2.1.1-B.3, 2.1.1-B.4, 2.1.1-B.5, 2.1.1-C, 2.1.1-D, 2.1-D, 2.2-A, 2.2-A.1, 2.2-A.2, 2.2-A.3, 2.2-A.4, 2.6-A.3, 3.1.1-A, 3.1.1-B, 3.1.1-C.1, 3.1.1-C.2, 3.1.1-C.3, 3.1.1-C.4, 3.1.1-C.5, 3.1.1-C.6, 3.1.1-C.7, 3.1.1-C.8, 3.1.1-C.9, 3.1.1-D.1, 3.1.1-D.2, 3.1.1-D.3, 3.1.1-E, 3.1.2-A.1, 3.1.2-A.2, 3.1.2-A.3, 3.1.2-A.4, 3.1.2-A.5, 3.1.2-D.1-5, 3.1.3-A, 3.1.3-B.1, 3.1.3-B.2, 3.1.3-B.3, 3.1.3-B.4, 3.1.3-C, 3.1.3-D, 3.1.4-A, 3.1.4-B.1, 3.1.4-B.2, 3.1.4-B.3, 3.1.4-B.4, 3.1.4-B.5, 3.1.4-B.6, 3.1.4-B.7, 3.1.4-B.8, 3.1.4-C, 3.1.4-D, 3.1.4-E, 3.1.4-F, 3.1.4-G, 3.1.4-H, 3.1.4-I.1-8, 3.1.4-J, 3.1.4-K, 3.1.4-L, 3.1.4-M, 3.1.5-A, 3.1.5-A.1, 3.1.5-A.2, 3.1.5-A.3, 3.1.5-A.4, 3.1.5-A.5, 3.1.5-A.6, 3.1.5-A.7, 3.1.5-A.8, 3.1.5-A.9, 3.1.5-B, 3.1.5-C, 3.1.5-D, 3.1.5-E, 3.1.5-F, 3.1.5-G.1-5, 3.1.5-H, 3.1.5-I.1, 3.1.5-I.2, 3.1.5-I.3, 3.1.5-I.4, 3.1.5-J.1, 3.1.5-J.2, 3.1.5-K.1, 3.1.5-K.2, 3.1.5-K.3, 3.1.6-A, 3.1.6-B, 3.1.6-C, 3.1.6-D.1, 3.1.6-D.4, 3.1.6-D.5, 3.1.6-D.6, 3.1.6-D.7, 3.1.6-D.8, 3.1.6-E, 3.1.6-F.1, 3.1.6-F.2, 3.1.6-F.3, 3.1.6-F.4, 3.1.6-G.1, 3.1.6-G.2, 3.1.6-G.3, 3.1.6-G.4, 3.1.6-G.5, 3.1.6-G.6, 3.1.6-H, 3.1.6-I, 3.1.6-J.1, 3.1.6-J.2, 3.1.6-J.3, 3.1.6-J.4, 3.1.6-J.5, 3.1.6-J.6, 3.1.6-L, 3.1.6-O, 3.1.6-P, 3.1.6-Q.1, 3.1.6-Q.2, 3.1.6-Q.3, 3.1.7-A, 3.1.7-B.4, 3.1.7-B.5, 3.1.7-B.6, 3.1.7-B.7, 3.1.7-C, 3.1.7-D, 3.2-A, 3.2-B.1-4, 3.2-C, 3.2-D, 3.2-E, 3.2-F, 3.2-G, 3.2-H, 3.2-I, 3.2-J, 3.2-K, 3.2-L, 3.2-M, 3.2-N, 3.2-O, 3.2-P.1-4, 3.2-Q.1-8, 3.3-A.1, 3.3-A.2, 3.3-B.1-3, 3.3-C, 8.1-A.1.b, 8.1-K, 8.2-A, 8.4-A.2, 8.4-A.3, 9.1.3-C, 15.1-D.1.a, 15.1-D.1.b, 15.1-D.1.c, 15.1-D.1.d, 15.1-D.1.e, 15.1-D.1.f, 15.1-D.1.g, 15.1-D.1.h, 15.1-D.1.i, 15.1-D.1.j, 15.1-D.1.k, 15.1-D.2.a, 15.1-D.2.b, 15.1-D.2.c, 15.1-D.3.a, 15.1-D.4.a, 15.1-D.4.b, 15.1-D.4.c, 15.1-D.4.d, 15.1-D.4.e, 15.1-D.5.a, 15.1-D.5.b, 15.2-B, 15.3-C, 15.4-A, 15.4-B, 15.4-C

Vault Documentation Review

Documentation related to the Vault precinct scanning device was reviewed for content that is supplied to jurisdictions that will use the Vanguard system, to verify sufficient content that will enable the jurisdiction to use the system. Areas of review included Overview, Performance, Security, Setup, Installation, Operations, Maintenance, Training and Public documentation.

- 174 test cases were examined in this test suite
- The following requirements were examined within this test suite:

  1.3-A.1, 1.3-A.2, 1.3-A.3, 1.3-A.4, 1.3-A.5, 1.3-A.6, 1.3-A.7, 1.3-A.8, 1.3-A.9, 1.3-B, 2.1.1-A.1, 2.1.1-A.2, 2.1.1-B.1, 2.1.1-B.2, 2.1.1-B.3, 2.1.1-B.4, 2.1.1-B.5, 2.1.1-C, 2.1.1-D, 2.1-D, 2.2-A, 2.2-A.1, 2.2-A.2, 2.2-A.3, 2.2-A.4, 2.6-A.3, 3.1.1-A, 3.1.1-B, 3.1.1-C.1, 3.1.1-C.2, 3.1.1-C.3, 3.1.1-C.4, 3.1.1-C.5, 3.1.1-C.6, 3.1.1-C.7, 3.1.1-C.8, 3.1.1-C.9, 3.1.1-D.1, 3.1.1-D.2, 3.1.1-D.3, 3.1.1-E, 3.1.2-A.1, 3.1.2-A.2, 3.1.2-A.3, 3.1.2-A.4, 3.1.2-A.5, 3.1.2-B, 3.1.2-C.1, 3.1.2-C.2, 3.1.2-C.3, 3.1.2-D.1-5, 3.1.3-A, 3.1.3-B.1, 3.1.3-B.2, 3.1.3-B.3, 3.1.3-B.4, 3.1.3-C, 3.1.3-D, 3.1.4-A, 3.1.4-B.1, 3.1.4-B.2, 3.1.4-B.3, 3.1.4-B.4, 3.1.4-B.5, 3.1.4-B.6, 3.1.4-B.7, 3.1.4-B.8, 3.1.4-C, 3.1.4-D, 3.1.4-E, 3.1.4-F, 3.1.4-G, 3.1.4-H, 3.1.4-I.1-8, 3.1.4-J, 3.1.4-K, 3.1.4-L, 3.1.4-M, 3.1.5-A, 3.1.5-A.1, 3.1.5-A.2, 3.1.5-A.3, 3.1.5-A.4, 3.1.5-A.5, 3.1.5-A.6, 3.1.5-A.7, 3.1.5-A.8, 3.1.5-A.9, 3.1.5-B, 3.1.5-C, 3.1.5-D, 3.1.5-E, 3.1.5-F, 3.1.5-G.1-5, 3.1.5-H, 3.1.5-I.1, 3.1.5-I.2, 3.1.5-I.3, 3.1.5-I.4, 3.1.5-J.1, 3.1.5-J.2, 3.1.5-K.1, 3.1.5-K.2, 3.1.5-K.3, 3.1.6-A, 3.1.6-B, 3.1.6-C, 3.1.6-D.1, 3.1.6-D.2, 3.1.6-D.3, 3.1.6-D.4, 3.1.6-D.5, 3.1.6-D.6, 3.1.6-D.7, 3.1.6-D.8, 3.1.6-E, 3.1.6-F.1, 3.1.6-F.2, 3.1.6-F.3, 3.1.6-F.4, 3.1.6-G.1, 3.1.6-G.2, 3.1.6-G.3, 3.1.6-G.4, 3.1.6-G.5, 3.1.6-G.6, 3.1.6-H, 3.1.6-I, 3.1.6-J.1, 3.1.6-J.2, 3.1.6-J.3, 3.1.6-J.4, 3.1.6-J.5, 3.1.6-J.6, 3.1.6-L, 3.1.6-M.1, 3.1.6-M.2, 3.1.6-N, 3.1.6-P, 3.1.6-Q.1, 3.1.6-Q.2, 3.1.6-Q.3, 3.1.7-A, 3.1.7-B.1, 3.1.7-B.2, 3.1.7-B.4, 3.1.7-B.5, 3.1.7-B.6, 3.1.7-B.7, 3.1.7-C, 3.1.7-D, 3.2-A, 3.2-B.1-4, 3.2-C, 3.2-D, 3.2-E, 3.2-F, 3.2-G, 3.2-H, 3.2-I, 3.2-J, 3.2-K, 3.2-L, 3.2-M, 3.2-N, 3.2-O, 3.2-P.1-4, 3.2-Q.1-8, 3.3-A.1, 3.3-A.2, 3.3-B.1-3, 3.3-C, 5.1-F.1, 5.1-F.2, 7.3-O, 7.3-O.1.a, 7.3-O.1.b, 7.3-O.2.a, 7.3-O.2.b, 7.3-O.2.c, 8.1-A.1.b, 8.1-A.2.b, 8.1-A.3.b, 8.1-H, 8.1-K, 8.2-A, 8.3-A, 8.3-A.1, 8.3-A.1.a, 8.3-A.1.b, 8.3-A.1.c, 8.3-A.1.d, 8.3-A.2, 8.4-A, 8.4-A.1, 8.4-A.1.a, 8.4-A.1.b, 8.4-A.1.c, 8.4-A.1.d, 8.4-A.1.e, 8.4-A.1.f, 8.4-A.1.g, 8.4-A.2, 8.4-A.3, 9.1.3-C, 15.1-D.1.a, 15.1-D.1.b, 15.1-D.1.c, 15.1-D.1.d, 15.1-D.1.e, 15.1-D.1.f, 15.1-D.1.g, 15.1-D.1.h, 15.1-D.1.i, 15.1-D.1.j, 15.1-D.1.k, 15.2-B, 15.3-C, 15.4-A, 15.4-B, 15.4-C

2.6.7 Hardware Testing

SLI Compliance and their hardware test subcontractor, Element Materials Technology, performed an analysis and review of the Verity Vanguard 1.0 voting system hardware components, namely **Verity Vanguard: Flex (BMD), Adapt (all-in-one accessible voting device), Vault (precinct scanner)** and **Capture (central scanners)** (with the Canon DR-G2110 and Cannon DR-G2140 high speed ballot scanners)

During the execution of testing performed at Element Materials Technology, an SLI Compliance representative was present to oversee the testing.

Hardware testing conducted specifically for this test campaign involved the **Verity Vanguard Vault with optional Imprinter, Verity Vanguard Boost, Verity Vanguard Adapt** and **Verity Vanguard Flex**. That testing involved verification of the following Environmental and Electrical requirements:

Element Materials Technology, 1736 Vista View Drive Longmont, (A2LA certified for testing performed).

EMC / EMI Tests:

- Radiated Emissions
- Conducted Emissions
- ESD
- Electromagnetic Susceptibility
- Electrical Fast Transient
- Lightning Surge
- Conducted RF Immunity
- Electrical Power Disturbance (Voltage Dips)
- Element Materials Technology, 1601 Dry Creek Drive Longmont, (A2LA certified for mechanical including MIL STD 810H)

MIL-STD-810H Tests:

- Bench Handling, Vibration
- Low Temperature
- High Temperature
- Continuous Operation – Varied Envir. Conditions Low / High Temp / Humidity
- Reliability

Additionally, hardware testing conducted specifically for this test campaign involved the **Verity Vanguard Capture** (COTS) central scanning systems, inclusive of the Verity Vanguard polling place devices described above. That testing involved verification of the following requirements:

- Continuous Operation – Varied Environment Conditions Low / High Temp / Humidity
    - 150 test cases were examined in this test suite

- The following requirements were examined within this test suite:
  1.2-I 1, 1.2-I 2, 1.2-J, 1.2-K, 1.2-L, 2.1.2-A, 2.1.2-A.1-3, 2.1.2-B, 2.1.2-B.1-5, 2.1.2-C, 2.1.2-C.1-3, 2.7-A, 2.7-A.1-3, 2.7-B, 2.7-C, 2.7-D, 2.7-E, 2.7-F, 2.7-G, 2.7-H, 2.7-I, 2.7-J, 2.7-K, 8.1-J, 8.1-J.1-2

The test methodologies for all tests are identified in the hardware test plans and hardware test reports, found in "Attachment I – Hardware Test Plans" and "Attachment J – Hardware Testing Results".

3 Test Findings and Recommendation

3.1 Summary Findings and Recommendation

SLI Compliance has successfully completed the testing of the Hart InterCivic Verity Vanguard 1.0 voting system. It has been determined that the Verity Vanguard 1.0 voting system meets the required acceptance criteria of the Election Assistance Commission's Voluntary Voting System Guidelines v2.0.

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

3.1.1 Source Code Review Summary

SLI Compliance has reviewed the software source code for each application in the Hart InterCivic Verity Vanguard 1.0 voting system to determine the code's compliance with VVSG v2.0 and for compliance with Hart's internally developed coding standards. "Attachment K - Source Code Reviewed and Results – PROPRIETARY" details specific information on the source code review.

3.1.1.1 Evaluation of Source Code

The source code was reviewed for compliance per the guidelines defined in the VVSG v2.0. The source code was written adequately in terms of VVSG v2.0. The code is modular and there is sufficient error handling. Readability is sufficient and supports maintainability. All source code requirements were met.

3.1.2 Technical Data Package Review Summary

SLI Compliance has reviewed the Hart InterCivic Verity Vanguard 1.0 TDP for compliance with VVSG v2.0, as detailed in section 2.6.6. The specific documents are listed in "Attachment B – Verity Vanguard 1.0 Technical Data Package Listing".

3.1.2.1 Evaluation of TDP

The Technical Data Package for the Hart InterCivic Verity Vanguard 1.0 voting system was found to sufficiently comply with the VVSG 2.0 standards such that a jurisdiction would be able appropriately deploy the Hart InterCivic Verity Vanguard 1.0 voting system.

The test suites, as listed in section "2.6.6 TDP Test Suites Executed", were executed against the Verity Vanguard 1.0 voting system.

3.1.3 Functional Testing Summary

SLI Compliance performed tests on each of the system configurations identified in section "2.6.2 Configurations Tested". The testing incorporated end-to-end election scenarios testing the functionality supported by Hart, as identified in "Attachment A - Verity Vanguard 1.0 Implementation Statement."

3.1.3.1 Evaluation of Testing

The test suites, as listed in sections 2.6.3, 2.6.4 and 2.6.5, were executed against the Verity Vanguard 1.0 voting system. All test suites were based on SLI VVSG 2.0 test methods (see Attachment M – SLI Test Methods Listing PROPRIETARY) which were validated prior utilization in a project

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

Any relevant issues found in preliminary executions were reported, resolved and re-tested. "Attachment L – Test Suites - Proprietary", provides specific information on the tests performed.

3.1.4 Hardware Test Summary

Based upon an examination of the equipment listed in

Table 4 – COTS Equipment and Hart's Hardware Specification, SLI Compliance concluded that the hardware listed is COTS. As such, it is not subject to Environmental Hardware Testing.

SLI Compliance oversaw execution of Environmental and Electrical Hardware testing on the non-COTS hardware listed in Table 3 – Verity Vanguard 1.0 Custom Equipment.

As per the "Voting System Test Lab Program Manual, version 3.0",

- Section "2.12.1 Test Report Package" prescribes, "Test reports must also document any prescribed maintenance or modifications, performed by the manufacturer, to a voting system in testing.".

It is noted that Hart personnel did perform an initial prescribed maintenance in order to demonstrate cleaning procedures to SLI Compliance personnel.

- Section "2.16.1.3 Testing Independence" prescribes, "Any unscheduled maintenance that is performed is documented in the discrepancy report and included as part of the test report materials.".

  It is noted that during the 104 hour Continuous Operation test ballots were being processed multiple times which resulted in smudging from the imprinter during the high temperature periods. Hart personnel diagnosed the issue and performed unscheduled maintenance on the COTS central scanners, with oversight by SLI personnel. Informational discrepancy HVV10-144 was created.

3.1.4.1 Evaluation of Hardware Testing

Any issues found were reported, resolved and re-tested. "Attachment J – Hardware Testing Results" contain the hardware reports from SLI Compliance's EAC approved Hardware Environmental Test Subcontractors. These reports detail specific information on the environmental hardware testing.

All Verity Vanguard 1.0 components comply with VVSG 2.0 standards.

3.2 Anomalies

No anomalies were identified other than those identified as discrepancies and addressed.

3.3 Correction of Deficiencies

All deficiencies identified in source code, documentation, hardware and functionality were corrected.

4 Signature

SLI Compliance attests that:

- All testing prescribed by the test plan or amended test plan was performed as identified or the divergence from the test plan was properly documented;
- all identified voting system anomalies or failures were reported and resolved, and;
- The test report is accurate and complete.

Michael Santos

Michael Santos

Director, VSTL, SLI Compliance

June 17, 2025

End of Voting System Test Report