



Test Report

**Dominion Voting Systems
Democracy Suite (D-Suite) System
Version 5.4-E
Certification Testing**

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1 Introduction

The purpose of this Test Report is to document the procedures that Pro V&V, Inc. followed to evaluate the Dominion Democracy Suite (D-Suite) 5.4-E Voting System to the requirements set forth for voting systems in the U.S. Election Assistance Commission (EAC) 2005 Voluntary Voting System Guidelines (VVSG), Version 1.0.

1.1 References

The documents listed below were utilized in the development of this Test Report:

- Election Assistance Commission (EAC) 2005 Voluntary Voting System Guidelines (VVSG) Version 1.0, Volume I, “Voting System Performance Guidelines”, and Volume II, “National Certification Testing Guidelines”
- Election Assistance Commission Testing and Certification Program Manual, Version 2.0
- Election Assistance Commission Voting System Test Laboratory Program Manual, Version 2.0
- National Voluntary Laboratory Accreditation Program NIST Handbook 150-2016, “NVLAP Procedures and General Requirements (NIST Handbook 150)”, dated July 2016
- National Voluntary Laboratory Accreditation Program NIST Handbook 150-22, 2008 Edition, “Voting System Testing (NIST Handbook 150-22)”, dated May 2008
- United States 107th Congress Help America Vote Act (HAVA) of 2002 (Public Law 107-252), dated October 2002
- Pro V&V, Inc. Quality Assurance Manual, Version 7.0
- EAC Requests for Interpretation (RFI) (listed on www.eac.gov)
- EAC Notices of Clarification (NOC) (listed on www.eac.gov)
- Pro V&V Test Report No. TR-01-01-DVS-2016-01.01, Rev. D, “Test Report for EAC 2005 VVSG 1.0 Certification Testing Dominion Voting Systems Democracy Suite (D-Suite) Version 5.0-A Voting System”, EAC Project Number DVS1601, dated 2/7/17
- Pro V&V Test Report No. TR-01-02-DVS-012-2017.01, “Test Report for Dominion Voting Systems Democracy Suite (D-Suite) System Version 5.2 Gap Analysis Testing”, dated 7/31/17
- Dominion Voting Systems Democracy Suite 5.4 Technical Data Package (*A listing of the D-Suite 5.4 documents submitted for this test campaign is listed in Section 2.4 of this Test Plan*)

1.2 Terms and Abbreviations

The terms and abbreviations applicable to the development of this Test Report are listed below:

- “ADA” – Americans with Disabilities Act 1990
- “ATI” – Audio Tactile Interface
- “BMD” – Ballot Marking Device
- “CM” – Configuration Management
- “COTS” – Commercial Off-The-Shelf
- “DRE” – Direct Record Electronic
- “EAC” – United States Election Assistance Commission
- “EMS” – Election Management System
- “FCA” – Functional Configuration Audit
- “HAVA” – Help America Vote Act
- “ICC” – ImageCast Central
- “ICX” – ImageCast X
- “ICVA” – ImageCast Voter Activation
- “ISO” – International Organization for Standardization
- “NOC” – Notice of Clarification
- “PCA” – Physical Configuration Audit
- “PCOS” – Precinct Count Optical Scan
- “QA” – Quality Assurance
- “RFI” – Request for Interpretation
- “RTR” – Results Tally & Reporting

“TDP” – Technical Data Package

“UPS” – Uninterruptible Power Supply

“VSTL” – Voting System Test Laboratory

“VVSG” – Voluntary Voting System Guidelines

1.3 Background

The D-Suite 5.0-A System (the predecessor of the D-Suite 5.4 System) was granted certification to the 2005 Voluntary Voting System Guidelines (VVSG) by the Election Assistance Commission (EAC) on August 14, 2017. The D-Suite 5.4 System is currently certified for use, the results of the certification test campaign are documented in Pro V&V Test Report 01-02-DVS-015.02. The D-Suite 5.4-E System is a modification of the D-Suite 5.4 system.

The Democracy Suite 5.4-E Voting System is a paper-based optical scan/Direct-Recording Electronic (DRE) voting system consisting of the following major components: The Election Management System (EMS), the ImageCast Central (ICC) optical ballot scanner, and the ImageCast X (ICX) DRE device with Voter Verifiable Paper Audit Trail (VVPAT).

1.4 Scope

The scope of the test campaign included tests designed to verify that certain D-Suite 5.4-E features and applications, which have been modified from the previously certified system, conform to the applicable EAC 2005 VVSG 1.0 requirements. The D-Suite 5.4-E includes functional and usability enhancements to the baselined 5.4 System, as summarized below:

Election Management System

1. Updated reporting:
 - a. Summary reports “bold” the names and count of winners in each contest
 - b. Add “Turnout by Party” to detailed results export election night
 - c. Updated “Detailed Results Report” including:
 - i. Remove candidate activity (requirement for results by candidate not being known until after close of polls on official election day)
 - ii. Include “Turnout by Party” data

- iii. Include provisional turnout data
 - d. Hide votes for precincts with low voter turnout
 - e. PDF export of Summary Report
 - f. Show results from flash drives of ICXs that were not voted on to show in Batch Loaded Report and show as processed in Tabulator Status Report after they are read in RTR
2. Screen ballot preview enhancements:
- a. Show Spanish and Tagalog languages in preview

ICX DRE w/VVPAT

- 1. Show ICX ballot page, precinct or party (needed for ballot proofing)
- 2. Contest results can be printed if number of voters is greater than 4 digits
- 3. Machine number appears on VVPAT tape for every cast ballot
- 4. ICX clock syncs with OS clock
- 5. Voter receives warning message when they pull their card before ballot is cast:
 - a. Voter can reinsert card and complete ballot or
 - b. Poll Worker can clear the session
 - c. ICX unit displays message and “locks” the machine until either the voter or poll worker completes or clears the session for a configurable amount of time
- 6. Voter card status shows time card was voted (for processing by VOTEC system)

2 Testing Overview

The evaluation of the D-Suite 5.4-E System was designed to evaluate the voting system to the requirements set forth for voting systems in the EAC 2005 VVSG. The goals were constructed to verify that certain D-Suite 5.4-E features and applications, which have been modified from the previously certified system, conform to the applicable EAC 2005 VVSG 1.0 requirements. The evaluation addressed each of the following test goals in the following manner:

Table 2-1: Testing Overview

Test Goal	Testing Response
Perform TDP Modification Review	A cursory review of the modified documents was performed to ensure that adequate system information exists.
Perform PCA & Receipt Inspection	A PCA and Receipt Inspection was performed to compare the voting system components and materials submitted for testing against the manufacturer's technical documentation to ensure everything was in agreement and correct.
Perform Source Code Review, Compliance Builds, and Documentation Review	Trusted Builds were generated during the test campaign. The source code submitted by Dominion was reviewed by PRO V&V and was successfully built using the submitted COTS and third party software products. Additionally, build documentation was reviewed.
Verified that the D-Suite 5.4-E System meets the applicable requirements of the EAC 2005 VVSG 1.0.	This was tested by evaluating the D-Suite 5.4-E System to specific election scenarios using a combination of different ballot programming approaches, ballot designs, ballot sizes, languages, and tabulators.
Perform System Setup, Loads, and Hardening	The system setup, loads, and hardening was tested by comparing the voting system submitted for certification testing to the manufacturer's technical documentation.

Table 2-1: Testing Overview *(continued)*

Simulated pre-election, Election Day, absentee, recounts, and post-election activities on the D-Suite 5.4-E System during Functional Configuration Audit (FCA).	The components of the D-Suite System were tested in pre-election, Election Day, post-election and recount situations and evaluated against documented behavior and expected results for all scenarios.
Perform FCA-Regression Testing	FCA functional regression testing was performed on all submitted modifications to the baselined system.
Abbreviated System Integration Testing	The components of the D-Suite System were tested to address the integration of hardware and software. This testing focused on the compatibility of the voting system software components and subsystems with one another and with other voting system components.

2.1 Test Candidate

The Democracy Suite 5.4-E Voting System is a paper-based optical scan/Direct-Recording Electronic (DRE) voting system consisting of the following major components: The Election Management System (EMS), the ImageCast Central (ICC) optical ballot scanner, and the ImageCast X (ICX) DRE device with Voter Verifiable Paper Audit Trail (VVPAT).

Election Management System (EMS)

The Democracy Suite 5.4-E EMS consists of various components running as either a front-end/client application or as a back-end/server application. A listing of the applications and a brief description of each is presented below.

Front-end/Client applications:

- **EMS Adjudication:** Represents the client component responsible for adjudication, including reporting and generation of adjudicated result files from ImageCast Central tabulators and adjudication of write-in selections from ImageCast X and ImageCast Central tabulators. This

client component is installed on both the server and the client machines. (*Note: The EMS Adjudication feature is optional*)

- EMS Audio Studio: A client application that represents an end-user helper application used to record audio files for a given election project. As such, it is utilized during the pre-voting phase of the election cycle.
- EMS Election Data Translator: End-user application used to export election data from election project and import election data into election project.
- EMS Election Event Designer: A client application that integrates election definition functionality together with ballot styling capabilities and represents a main pre-voting phase end-user application.
- EMS Results Tally and Reporting: A client application that integrates election results acquisition, validation, tabulation, reporting, and publishing capabilities and represents the main post-voting phase end-user application.
- ImageCast Voter Activation (ICVA): Application installed on a workstation or laptop at the polling place that allows the poll workers to program smart cards for voters.

Back-end/Server applications:

- EMS Adjudication Service: Represents a server side application which provides ballot information such as contests, candidates and their coordinates from EMS to the Adjudication application.
- EMS Application Server: Represents a server side application responsible for executing long running processes, such as rendering ballots, generating audio files and election files, etc.
- EMS Database Server: Represents a server side RDBMS repository of the election project database which holds all the election project data, including pre-voting and post-voting data.
- EMS Data Center Manager: A server application that represents a system level configuration application used in EMS back-end data center configuration.
- EMS File System Service: A back-end application that acts as a stand-alone service that runs on client machines, enabling access to low level operating system API for partitioning CF cards, reading raw partition on ICP CF card, etc.
- EMS NAS Server: Represents a server side file repository of the election project file based artifacts, such as ballots, audio files, reports, log files, election files, etc.

- SmartCard Helper Service: A service that is installed on a workstation for laptop at the polling place, and provides required data format for programming smart cards of ImageCast devices, or, for jurisdiction's voting registration system in case of integration.

ImageCast Central (ICC) Count Scanner

The ICC is a high-speed, central ballot scan tabulator based on Commercial off the Shelf (COTS) hardware, coupled with the custom-made ballot processing application software. It is used for high speed scanning and counting of paper ballots.

ImageCast X (ICX) Direct-Record Electronic (DRE)

The ICX consists exclusively of COTS available hardware and operating system, while the applications installed on top customize its behavior to turn it into a Direct-Recording Electronic (DRE) device with a Voter Verifiable Paper Audit Trail (VVPAT) (*Note: The ICX may be configured as a Ballot Marking Device (BMD); however, due to the scope of this test campaign, the ICX was configured only as a DRE w/VVPAT*). The ICX is designed to perform the following functions: ballot review and second chance voting, accessible voting, and ballot marking (if configured), saving voting results (in DRE mode), printing votes on a voter verifiable paper audit trail device (when VVPAT is in use).

2.1.1 Configuration Components

Election Administration

Democracy Suite Election Management System (EMS)

- Dominion Voting Systems Democracy Suite EMS 5.4.48.1 containing:
 - Election Event Designer
 - Results Tally and Reporting
 - Audio Studio
 - Application Server
 - Data Center Manager
 - File System Service
 - Adjudication Service

- Election Data Translator
- Smart Card Helper Service
- DCF Version 5.4.01
- Optional Adjudication 5.4.17.4

COTS Hardware and Software

- EMS Standard Configuration
 - Microsoft Windows Server 2012 R2
 - Microsoft SQL Server 2016 Standard
 - Server computer system per 2.02 *Democracy Suite System Configuration Overview*
- EMS Express Server Configuration
 - Microsoft Windows 10 Professional
 - Microsoft SQL Server 2016 Express with Advanced Services
 - Desktop computer system per 2.02 *Democracy Suite System Configuration Overview*
- Client Workstation Configuration
 - Microsoft Windows 10 Professional
 - Desktop computer system per 2.02 *Democracy Suite System Configuration Overview*
- EMS COTS Software common to Standard and Express configurations
 - Microsoft .Net Framework 4.5
 - Microsoft .Net Framework 3.5
 - Microsoft IIS (part of the Windows installation, not a separate item)
 - Microsoft Visual J# 2.0

- Microsoft Visual C++ 2015 Redistributable
 - Java SE Runtime Environment 6.0 Update 20 or later
 - Dallas 1-Wire Device Driver version 4.03 or newer
 - RAID utility
 - Adobe Reader DC
- Optional COTS Software for Standard and Express configurations
 - Microsoft Windows Defender (Express Server)
 - Avast! anti-virus software (Standard Server)
 - Cepstral Voices (English, Spanish, etc.) 6.2.3
 - Microsoft Excel 2010 or later
 - Additional Fonts (Arial narrow fonts, 2.37a)
 - UPS drivers
 - Printer drivers
- Auxiliary Equipment
 - iButton (SHA-1) with USB Reader/Writer: Maxim DS9490R#
 - Compact Flash Reader: Lexar Professional USB 3.0 Dual-Slot Card Reader or equivalent
 - LCD monitor, keyboard, mouse, headset, audio adapter, networking switch – COTS computing accessories
- Election media
 - iButton: Maxim DS1963S-F5+
 - DVS Compact Flash Memory Cards: 4GB, 8GB, 16GB, or 32GB
 - USB Memory Device: 4GB, 8GB, or 16GB

- Smart Cards: ACOS-6-64

Central Count

ImageCast Central Count (ICC)

- ICC software application: version 5.4.3.1

COTS Software:

- ICC COTS computer operating system: Windows 10 (64-bit) Professional edition
- Microsoft Windows Defender
- Microsoft Visual C++ 2015 Redistributable
- Dallas Maxim: 1-wire driver - version 4.03 or newer, 64 bit (32 bit as needed)
- Canon: DR-G1130 driver - version 1.3.6157
- Canon: DR-M160-II driver – version 1.2.6178

COTS Hardware:

- ICC Scanner: Canon DR-G1130
- ICC Scanner: Canon DR-M160-II
- Desktop or All-in-One computer
 - Microsoft Windows 10 Professional
 - Desktop computer system per *2.02 Democracy Suite System Configuration Overview*

Precinct Vote Capture

ImageCast X (ICX) DRE with VVPAT

- ICX Firmware: version 5.4.37.7
- Hardware version:
 - Avalue HID-21V-BTX (21.5 in. screen-Prime)

- KFI 702-75250014A (VVPAT Printer)
- Seiko (Report Printer)
- Optional Accessible-Tactile Interface (ATI-USB)

COTS Hardware

- Smart Cards: ACOS-6-64

COTS Software

- Android 5.1 (Avalue)
- Google Text to Speech 3.11.12

Optional COTS Software

- None

Optional COTS products

- Headphone: Cyber Acoustics ACM-70 or equivalent
- Sip & puff enabling device #972
- Sip & puff straws #970K (Pkg of 10)
- Hand paddle switches (aka tactile buttons) enabling device #971
- Paddle switches: AbleNet 10033400 (2x)

ImageCast Voter Activation (ICVA)

- Software: version 5.4.48.1

COTS Hardware and Software

- Client Workstation Configuration
 - Microsoft Windows 10 Professional
 - Desktop computer system per 2.02 Democracy Suite System Configuration Overview

- Smart Cards: ACOS-6-64

2.1.2 Supported Languages

The following languages have been stated to be supported by the by D-Suite 5.4-E System:

- Alaskan Native
- Bengali
- Chinese
- English
- Eskimo
- Filipino
- French
- Hindi
- Japanese
- Khmer
- Korean
- Spanish
- Tagalog
- Thai
- Vietnamese
- Native American
 - Apache, Jicarilla, Keres, Navajo, Seminole, Towa, Ute, Yuman

Due to the limited scope of the testing, only English, Spanish, and Tagalog ballots were cast during testing. The accuracy of the translations between languages was not verified.

2.1.3 Supported Functionality

The Democracy Suite 5.4-E is designed to support the following voting variations:

- General Election
- Closed Primary
- Partisan/Non-Partisan Offices
- Write-In Voting
- Primary Presidential Delegation Nominations
- Ballot Rotation
- Straight Party Voting
- Cross-party Endorsement
- Split Precincts
- Vote for N of M
- Recall issues, with options
- Cumulative voting
- Ranked order voting
- Provisional or Challenged Ballots

2.2 Testing Configuration

The testing event utilized one setup of the D-Suite 5.4-E System and its components as configured for normal use. The following is a breakdown of the test setup configurations:

Standard Testing Platform:

The central count location utilized both a Canon DR-G1130 and a Canon M160-II scanner connected to an ICC workstation. Additionally, the central count location housed a standard and an EMS express server containing all of the D-Suite Express Server components listed above. The polling locations utilized two ICX DRE's with VVPAT and accessibility equipment.

2.3 Test Support Equipment/Materials

All test support equipment and materials required to facilitate testing were supplied by Dominion.

2.4 Technical Data Package

This subsection lists all manufacturer provided documentation that is relevant to the system being tested.

Table 2-2. TDP Documents

Document Number	Description	Version
<i>Adjudication Documents</i>		
2.05	Democracy Suite Adjudication Software Design and Specification	5.4-E::103
2.08	Democracy Suite Adjudication System Operation Procedures	5.4-E::148
2.09	Democracy Suite Adjudication System Maintenance Manual	5.4-E::83
<i>Democracy Suite Documents</i>		
2.02	Democracy Suite System Overview	5.4-E::134
2.06	Democracy Suite System Security Specification	5.4-E::536
2.07	Democracy Suite System Test and Verification	5.4-E::173
2.10	Democracy Suite Personnel Deployment and Training Requirements	5.4-E::113
2.11	Democracy Suite Configuration Management Process	5.4-E::351
2.12	Democracy Suite Quality Assurance Program	5.4-E::142
2.13	Democracy Suite System Change Notes	5.4-E::128
<i>EMS Documents</i>		
2.03	Democracy Suite EMS Functional Description	5.4-E::355
2.05	Democracy Suite EMS Software Design and Specification	5.4-E::307
2.08	Democracy Suite EMS System Operations Procedures	5.4-E::704
2.09	Democracy Suite EMS System Maintenance Manual	5.4-E::128

Table 2-2. TDP Documents *(continued)*

Document Number	Description	Version
---	Democracy Suite EMS System Installation and Configuration Procedure	5.4-E::271
<i>ImageCast Central Documents</i>		
2.03	Democracy Suite ImageCast Central Functionality Description	5.4-E::169
2.05	Democracy Suite ImageCast Central Software Design and Specification	5.4-E::108
2.08	Democracy Suite ImageCast Central System Operation Procedures	5.4-E::198
---	Democracy Suite ImageCast Central Installation and Configuration Procedure	5.4-E::154
<i>ImageCast X</i>		
2.03	Democracy Suite ImageCast X Functionality Description	5.4-E::48
2.05	Democracy Suite ImageCast X Software Design Specification	5.4-E::72
2.08	Democracy Suite ImageCast X System Operations Procedures	5.4-E::116
2.09	Democracy Suite ImageCast X System Maintenance Manual	5.4-E::61
---	Democracy Suite ImageCast X System Installation and Configuration	5.4-E::49
<i>User Guides</i>		
---	ImageCast Adjudication User Guide	5.4-E::135
---	Automated Test Deck User guide	5.4-E::7
---	Democracy Suite EMS Audio Studio User Guide	5.4-E::35
---	Democracy Suite EMS Election Data Translator User Guide	5.4-E::92
---	Democracy Suite EMS Election Event Designer User Guide	5.4-E::248
---	Mobile Ballot Production User Guide	5.4-E::5
---	Democracy Suite EMS Results Tally and Reporting User Guide	5.4-E::118
---	ImageCast Central User Guide	5.4-E::113
---	EMS Voter Activation User Guide	5.4-E::54
---	Democracy Suite ImageCast X User Guide	5.4-E::89
<i>Supplementary Documents</i>		
---	Democracy Suite ImageCast Device Configuration Files	5.4-E::87
---	Democracy Suite ImageCast Election Definition Files	5.4-E::63
---	Democracy Suite ImageCast Printing and Finishing Specification	5.4-E::84
---	Democracy Suite ImageCast Total Results File Format	5.4-E::48

Table 2-2. TDP Documents *(continued)*

Document Number	Description	Version
---	Democracy Suite ICX Machine Configuration File (MCF) Parameters Settings	5.4-E::10
---	Common Industry Format for Usability Test Report ImageCast 5.2 with VVPAT	5.5::1
---	Democracy Suite ImageCast C++ Coding Standard	5.4-E::43
---	Democracy Suite C# Automated Code Review Process	5.4-E::38
---	Java Coding Standards	1.0
---	JavaScript Coding Standards	1.0
---	Dell Latitude E7450 Owner's Manual	Rev. A00
---	Cyber Acoustics ACM-70B Stereo Headphones Product Sheet	---
---	Dell P2417H Monitor User's Guide	Rev. A01
---	Dell Networking X-Series Specification Sheet	Ver. 1.9
---	Canon DR-G1130 User Manual	---
---	Canon DR-M160II User Manual	---
---	OKI C931e Specification Sheet	---
---	Dell Precision Tower 3420 Owner's Manual	Rev. A00
---	Dell Latitude 3470 Owners Manual	Rev. A00
---	Dell Latitude 3480 Owners Manual	---
---	Dell Latitude 3480 EMC Emissions Compliance Sheet	---
---	Dell Latitude 7450 EMC Emissions Compliance Sheet	---
---	Dell OptiPlex 3050 AIO EMC Emissions Compliance Sheet	---
---	Dell OptiPlex 9030 AIO EMC Emissions Compliance Sheet	---
---	Dell OptiPlex 9030 All-in-One Technical Specification	---
---	Dell Latitude E7440 Compliance Sheet	---
---	YEDU.E95463 Uninterruptible Power-supply Equipment UL Online Certifications Directory	---
---	Dell PowerEdge R630 Owners Manual	Rev. A03
---	APC Back-UPS BE600M1 User Manual	---
---	Avalue HID-21V-BTX-AIR User Manual	1.0
---	Dell P2217H/P2317H/P2317HWH/P2417H/P2717H Monitor User's Guide	Rev. A01
---	APC Back-UPS Pro BR1000G User Manual	---

Table 2-2. TDP Documents *(continued)*

Document Number	Description	Version
---	APC Back-UPS SMT1500 User Manual	---
---	Tripp Lite SmartPro SM1500RMXL2UTAA Datasheet	---
---	Dell Optiplex 3050 AiO Owners Manual	---
---	Dell Optiplex 7440 AiO Owner's Manual	---
---	Dell PowerEdge R630 EMC Emissions Compliance Sheet	---
---	Lexar Pro USB 3.0 Dual Slot Reader Quick Start Guide	---
---	Dell PowerConnect 2808 Product Safety Compliance Sheet	---
---	Dell PowerConnect 2816 Product Safety Compliance Sheet	---
---	APC Smart-UPS 230V Specification Sheet	---

3 Test Process and Results

The following sections outline the test process that was followed to evaluate the D-Suite 5.4-E System under the scope defined in Section 1.4.

3.1 General Information

All testing was conducted under the guidance of Pro V&V by personnel verified by Pro V&V to be qualified to perform the testing. The functional examination was performed at the Pro V&V, Inc. test facility located in Huntsville, AL.

3.2 Test Cases/Procedures

To verify that the system met the applicable requirements, Pro V&V utilized baseline test cases augmented with supplemental test cases designed specifically for the system being evaluated in this test campaign.

Prior to execution of the required test cases/procedures, the system under test was subjected to testing initialization to establish the baseline for testing and ensure that the testing candidate matched the expected testing candidate and that all equipment and supplies were present.

The following tasks were completed during the testing initialization:

- Ensured proper system of equipment. Checked power cords, keys, etc.
- Checked version numbers of (system) software and firmware on all components.

- Verified the presence of the documented EUT.
- Ensured removable media is clean.
- Ensured batteries are fully charged.
- Inspected supplies and test decks.
- Checked protective counters on all tabulators.
- Reviewed physical security measures of modifications.
- Recorded basic observations of the testing setup and review.
- Recorded serial numbers of equipment.
- Retained proof of version numbers.

3.3 Test Results

The procedures that were utilized during the test engagement and the results obtained are summarized in the following paragraphs. During the evaluation, the test team made observations of general system behavior.

Source Code Review/Trusted Build – A source code review was performed in order to review the submitted source code to the specific requirements. Both manual and automated review techniques were used per EAC approved procedures. The Source Code Review included a Compliance Build and a Trusted Build of the submitted source code. To perform the Trusted Build, Dominion-submitted source code, COTS, and Third Party software products were inspected and combined to create the executable code. Additionally, during the performance of the Trusted Build, the build documentation was reviewed.

Summary Findings:

At the conclusion of the Source Code Review, compliant source code was available for performance of the Trusted Build process. During execution of the Trusted Build, the source code submitted by Dominion and reviewed by PRO V&V was successfully built using the submitted COTS and third party software products, and the reviewed build documentation.

Functional Configuration Audit (FCA) Regression Testing – During this area of testing, the specific functionality of the modified system under evaluation that is claimed by the manufacturer in their supplied change notes and scope was targeted to ensure the product

functions as documented. This testing used both positive and negative test data to test the robustness of the system.

Regression testing was performed on all system components to verify that all functional and/or firmware modifications made during the test campaign did not adversely affect the system and its operation.

Summary Findings:

To perform the FCA, the modifications were evaluated against baseline test cases supplemented with specifically designed test cases. The FCA testing included verification of the submitted modifications detailed in the change notes. The FCA was completed successfully with no anomalies or deficiencies noted.

During execution of the test procedure, it was verified that the D-Suite 5.4-E System successfully completed the functional tests with all actual results obtained during test execution matching the expected results.

System Integration – System level certification tests were performed to address the integration of the hardware and software. This testing focused on the compatibility of the voting system software components and subsystems with one another and with other components of the voting system. During test performance, the system was configured as would be for normal field use.

Summary Findings:

An abbreviated System Integration was performed on the Democracy Suite 5.4-E system. To perform the System Integration test, one General Election and one Primary Election was designed in the EED application. The elections were then loaded onto the ICX DRE w/ VVPAT. Electronic ballots were voted on the ICX DRE w/VVPAT. Paper ballots were read by the ICC. The results were sent to RTR for results reporting. The System Integration included the elections described below, which were run from end-to-end:

Due to the limited scope of testing, two elections with the following breakdowns were executed:

- General Election held in three precincts (one of which was a split precinct resulting in four jurisdictional divides) with nineteen contests compiled into 4 ballot styles.
- Closed Primary Election in two precincts. This election contained thirty contests compiled into five ballot styles.

Note: As part of the previous test campaign (Democracy Suite (D-Suite) System Version 5.2 VVSG 1.0 Gap Analysis Test Report), Ranked Choice Voting was successfully tested.

During execution of the test procedure, it was verified that the D-Suite 5.4-E System successfully completed the system level integration tests with all actual results obtained during test execution matching the expected results.

Physical Configuration Audit (PCA) – A PCA was performed to compare the voting system components submitted for testing to the manufacturer’s technical documentation. The PCA was conducted in two phases: Initial and Final. The Initial PCA was conducted in order to baseline the system prior to test campaign commencement. The Final PCA was conducted in order to verify the final software and hardware configurations.

Summary Findings:

During execution of the test procedure, the components of the D-Suite 5.4-E System were documented by component name, model, serial number, major component, and any other relevant information needed to identify the component. For COTS equipment, every effort was made to verify that the COTS equipment had not been modified for use. Additionally, each technical document submitted in the TDP was recorded by document name, description, document number, revision number, and date of release.

At the conclusion of the test campaign, test personnel verified that any changes made to the software, hardware, or documentation during the test process were fully and properly documented.

4 Conclusions

Based on the results obtained during the test campaign and the re-use of testing from the previous D-Suite 5.0-A EAC certification test campaign and the 5.4 state test campaign, where applicable, Pro V&V determines the D-Suite 5.4-E System, as presented for evaluation, meets the requirements set forth for voting systems in the U.S. Election Assistance Commission (EAC) 2005 Voluntary Voting System Guidelines (VVSG), Version 1.0. Throughout the test campaign, as tests were executed, resultant data was inspected and technical documentation reviews were performed to ensure that each applicable requirement was met; therefore, fulfilling the test goals.