Test Report for State Certification Testing
Dominion Voting Systems D-Suite 5.13-A

Version: 04

Date: 12/12/2022

U.S. Election Assistance Commission

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SIGNATURES

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REVISIONS

Revision	Description	Date
00	Initial Release	06/20/2022
01	Updated Revision	07/07/2022
02	Updated for clarification on testing per customer comments	11/02/2022
03	Updated for clarification on testing per customer comments	12/02/2022
04	Additional edits per customer request.	12/12/2022

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1.0   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) 5.13-A 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, the Colorado Requirements Gap Analysis Matrix, and the Colorado-specific requirements in the Colorado Secretary of State Election Rules [8 CCR 1505-1] Rule 21. *Note: Colorado requires testing to the 2002 Voting Systems Standard (VSS) by statute; however, testing to the VVSG requirements was deemed sufficient since the requirements in the VSS and VVSG are almost identical.*

1.1   References

- D-Suite 5.13-A Testing Campaign Scope of Testing Document

- State of Colorado Requirements Matrix

- Colorado Secretary of State Election Rules [8 CCR 1505-1] Rule 21

- Election Assistance Commission 2005 Voluntary Voting System Guidelines (VVSG) Version 1.0, Volume I, "Voting System Performance Guidelines"

- Election Assistance Commission 2005 Voluntary Voting System Guidelines (VVSG) Version 1.0, 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 150-2020, "NVLAP Procedures and General Requirements (NIST Handbook 150-2020)"

- National Voluntary Laboratory Accreditation Program NIST Handbook 150-22, 2017 Edition, "Voting System Testing (NIST Handbook 150-22-2017)"

- 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, Revision 7.0

- EAC Requests for Interpretation (RFI) (listed on www.eac.gov)

- EAC Notices of Clarification (NOC) (listed on www.eac.gov)

- D-Suite 5.13-A Technical Data Package *(A listing of the TDP documents submitted for this test campaign is listed in Section 2.5 of this Test Report)*

1.2 Terms and Abbreviations

This subsection lists terms and abbreviations relevant to the hardware, the software, or this Test Plan.

"ADA" – Americans with Disabilities Act 1990

"BMD" – Ballot Marking Device

"COTS" – Commercial Off-The-Shelf

"EAC" – United States Election Assistance Commission

"EMS" – Election Management System

"FCA" – Functional Configuration Audit

"HAVA" – Help America Vote Act

"ICC" – ImageCast Central

"ICP" – ImageCast Precinct

"ICX" – ImageCast X

"ISO" – International Organization for Standardization

"NOC" – Notice of Clarification

"PCA" – Physical Configuration Audit

"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 System (the base system of the D-Suite 5.13) was granted certification to the 2005 Voluntary Voting System Guidelines (VVSG) by the Election Assistance Commission (EAC) on February 8, 2017. The D-Suite 5.13 System (the predecessor of the D-Suite 5.13-A) is

a modification of subsequent systems tested as modifications to the original D-Suite 5.0 System. This 5.13-A test campaign expands on the previously tested D-Suite 5.13 campaign.

1.4 Description and Overview of System Being Modified

The Democracy Suite 5.13-A Voting System is a paper-based optical scan voting system consisting of the following major components: The Election Management System (EMS), the ImageCast Central (ICC), and the ImageCast X (ICX) Ballot Marking Device (BMD). The specific components are listed below:

- EMS (includes ImageCast Voter Activation)

  - Express Server

  - Standard Server

- ICC

  - Canon DR-X10C

  - Canon DR-G2140

  - Canon DR-G1130 v1

  - Canon DR-G1130 v2

  - Canon DR-M160-II

  - InoTec HiPro 821

- ICX BMD

  - Avalue Classic 21"

  - Samsung Galaxy Tab Pro

  - Samsung Galaxy Note Pro

- ICX BMD Printers

  - HP M402dne

  - HP M404dn

  - Avision AP3061

1.5 Baseline System Description

Below is the description of the previously state-certified Democracy Suite 5.13 baseline system.

Election Management System (EMS)

The Democracy Suite 5.13 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 Precinct and ImageCast Central tabulators. This client component is installed on both the server and the client machines.

- 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.

- ImageCast Voter Activation: An application, installed on a workstation or laptop at the polling place, which allows the poll workers to program smart cards for voters. The smart cards are used to activate voting sessions on ImageCast X.

- 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.

- EMS Logger: A stand-alone application that runs on client or server machines and is used to gather diagnostics for troubleshooting.

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 Election Device Manager: Application used for production and programming of election files, and other accompanying files, for ImageCast X terminals.

- 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.

- Smart Card Helper Service: A service that is installed on a workstation or laptop at the polling place, and provides required data format for programming smart cards for 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) Ballot Marking Device (BMD)

The Democracy Suite ImageCast X ballot marking platform is a solution that is used for creation of paper cast vote records. These ballots can be scanned and tabulated by the ImageCast Central optical ballot scanner. The ImageCast X also supports enhanced accessibility voting through optional accessories connected to the ImageCast X unit. The ICX is a proprietary application which runs on COTS tablets.

1.6 Description of Modification

Dominion Voting Systems has identified the following modifications from the previously certified system:

- Added support for the HP M404dn printer with ICX BMD Classic and Samsung Galaxy tablets.

- All COTS equipment listed in Table 2-0 were tested as part of the 5.13-A test campaign, if they were not part of the 5.13 test campaign.

1.7 Scope of Testing

The scope of this testing event incorporated a sufficient spectrum of physical and functional tests to verify that certain D-Suite 5.13-A features and applications, which have been modified from the previously certified 5.13 baseline, conform to the applicable EAC 2005 VVSG 1.0 requirements.

Specifically, the testing event has the following goals:

- Verify that the D-Suite 5.13-A System meets both the applicable requirements of the EAC 2005 VVSG 1.0 and any identified additional state-specific requirements

- Source Code Review, Compliance Builds, and Build Documentation Review

- Physical Configuration Audit (PCA), including System Loads and Hardening

- Technical Documentation Review

- Functional Configuration Audit (FCA)

- System Integration Testing, including Accuracy Testing and Regression Testing

1.8   Testing Overview

The evaluation of the D-Suite 5.13-A system was designed to evaluate the system to the requirements set forth for voting systems in the EAC 2005 VVSG 1.0. The goals were constructed to verify that the system conforms to the applicable EAC 2005 VVSG 1.0 requirements. The evaluation addressed each of the test goals in the following manner:

Table 1-1: Testing Overview

Test Goal	Testing Response
Verify that the D-Suite 5.13-A System meets both the applicable requirements of the EAC 2005 VVSG 1.0 and the additional Colorado-specific requirements	This was tested by evaluating the system to specific election scenarios using a combination of different ballot programming approaches, ballot designs, ballot sizes, languages, and tabulators.
Technical Documentation Review	A cursory review of the modified TDP documents was performed to ensure that adequate system information exists
Physical Configuration Audit (PCA), including System Setup, Loads, and Hardening	A PCA and Receipt Inspection were performed to compare the voting system components and materials submitted for testing against the manufacturer's technical documentation. The system setup, loads, and hardening was tested by comparing the voting system submitted for certification testing to the manufacturer's technical documentation.
Perform Source Code Review, Compliance/Trusted 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.

2.0   TEST CANDIDATE

The Democracy Suite 5.13-A Voting System is a paper-based optical scan voting system consisting of the following major components: The Election Management System (EMS), the ImageCast Central (ICC), and the ImageCast X (ICX) Ballot Marking Device (BMD). The following paragraphs provide information for the D-Suite 5.13-A evaluated during this test campaign.

Democracy Suite Election Management System (EMS)

❖ Dominion Voting Systems Democracy Suite EMS 5.13.14.1, containing:

- Election Event Designer

- Results Tally and Reporting

- Audio Studio

- Application Server

- Election Data Translator

- Database Server

- NAS Server

- EMS Logger

- EMS Server Applications & Services

  o Data Center Manager

  o File System Service

  o Adjudication Service

  o Smart Card Helper Service

❖ MCF version (ICX) 5.13.6.3_20201229

❖ DCF version (ICC) 5.13.2.7_20210121

❖ Optional Adjudication 5.13.14.2

COTS Hardware and Software

- EMS Standard Server Configuration

  o Microsoft Windows Server 2016 (v1607)

  o Microsoft SQL Server 2016 Standard with SP2

- o Microsoft SQL Server 2016 Management Studio

- o Server computer system per *2.02 Democracy Suite System Configuration Overview*

  - Dell PowerEdge R640

  - Dell PowerEdge R630

  - Dell PowerEdge R710

  - Dell PowerEdge T630

- EMS Express Server Configuration

  - o Microsoft Windows 10 Professional (v1909)

  - o Microsoft SQL Server 2016 SP2 Express with Advanced Services

  - o Desktop computer system per *2.02 Democracy Suite System Configuration Overview*

    - Dell Precision 3450 XE

    - Dell Precision 3440 XE

    - Dell Precision T3420

    - Dell Precision T1700

- Client Workstation Configuration

  - o Microsoft Windows 10 Professional (v1909)

  - o Desktop computer system per *2.02 Democracy Suite System Configuration Overview*

    - Dell Precision 3450 XE

    - Dell Precision 3440 XE

    - Dell Precision T3420

    - Dell Precision T1700

- EMS COTS Software common to Standard and Express configurations

  - o Microsoft.Net Framework 4.8

  - o Microsoft.Net Framework 3.5

  - o Microsoft IIS (part of the Windows installation, not a separate item)

  - o Microsoft Visual J# 2.0

- o Microsoft Visual C++ 2013 Redistributable

- o Microsoft Visual C++ 2015 Redistributable

- o Java SE Runtime Environment 6.0 Update 20 or later

- o Dallas 1-Wire Device Driver version 4.1.0 or newer

- o RAID utility

- o Adobe Reader DC or later

- Optional COTS Software for Standard and Express configurations

  - o Microsoft Windows Defender (Standard & Express Server)

  - o Cepstral Voices (English, Spanish, etc.) 6.2.3

  - o Microsoft Excel 2010 or later

  - o Additional Fonts (Arial narrow fonts, 2.37a)

- Auxiliary Equipment

  - o iButton to 1-Wire USB Adapter: Dallas Maxim DS1402-RP8+

  - o iButton Reader/Writer: Dallas Maxim DS9490R#

  - o Smart Card Reader: Advanced Card Systems ACR38U

  - o Smart Card Reader: Advanced Card Systems ACR39U

  - o Smart Card Reader: HID Global Omnikey 3121

  - o LCD Monitor: Dell P2419H

  - o LCD Monitor: Dell P2417H

  - o Ethernet Switch: Dell x1026

  - o Ethernet Switch: Dell x1018

  - o Ethernet Switch: Dell x1008

  - o Ethernet Switch: Dell N1524

  - o Ethernet Switch: Cisco 8-port Switch (CBS350-8T-E-2G)

  - o Ethernet Switch: Cisco 24-port Switch (CBS350-24T-4G)

  - o Mini-Server Rack: StarTech RK1236BKF

- o Rack Power Distribution Unit: APC AP9562

- o UPS: Tripp Lite SMART1500RMXL2U

- o UPS: APC SMT1500 Smart-UPS

- o UPS: APC SMT1500C Smart-UPS

- o UPS: CyberPower PR1500LCD

- o UPS: CyberPower PR1500LCD-VTVM

- o UPS: APC BR1000G

- o Keyboard, Mouse, Headset with microphone, Audio Adapter – COTS computing accessories

- EMS Report Printer:

  - o Canon LBP6230DW laser or equivalent

  - o HP LaserJet M404dn or equivalent

- Election media

  - o iButton (Pollworker): Dallas Maxim DS1963S-F5+ (w/Black Key Ring Mount DS9093A+)

  - o Compact Flash Memory (16GB): Centon C4-CM-CF-16.4

  - o USB Memory Device (16GB): Centon S4-CM-U3P2-16.1

  - o USB Memory Device (8GB): Centon S4-CM-U3P2-8.1

  - o USB Memory Device (16GB): Apacer EH353-M APHA016GAG0CG-3TM

  - o USB Memory Device (8GB): Apacer EH353-M APHA008GAG0CG-3TM

  - o Smart Cards: ACOS-6-64

  - o USB Memory Device (128GB): Apricorn Aegis ASK3-NX-128GB

  - o USB Memory Device (32GB): Apricorn Aegis ASK3-NX-32GB

  - o USB Memory Device (120GB): Apricorn Aegis ASK3-120GB

  - o USB Memory Device (30GB): Apricorn Aegis ASK3-30GB

ImageCast Voter Activation (ICVA)

❖ Software version: 5.13.14.1

COTS Hardware and Software

- Client Workstation Configuration

  - Microsoft Windows 10 Professional (v1909)

  - Desktop computer system per *2.02 Democracy Suite System Configuration Overview*

    - Dell Latitude 3420

    - Dell Latitude 3410

    - Dell Latitude 3400

    - Dell Latitude 3490

    - Dell Latitude e3480

    - Dell Latitude e3470

    - Dell Latitude e7450

    - Dell Latitude e7470

- Auxiliary Equipment

  - Smart Card Reader: Advanced Card Systems ACR38U

  - Smart Card Reader: Advanced Card Systems ACR39U

  - Smart Card Reader: HID Global Omnikey 3121

- Election Media

  - USB Memory Device (16GB): Centon S4-CM-U3P2-16.1

  - USB Memory Device (8GB): Centon S4-CM-U3P2-8.1

  - USB Memory Device (16GB): Apacer EH353-M APHA016GAG0CG-3TM

  - USB Memory Device (8GB): Apacer EH353-M APHA008GAG0CG-3TM

  - Smart Cards: ACOS-6-64

Central Count

ImageCast Central Count (ICC)

❖ ICC software application: version 5.13.2.7

COTS Software

- ICC COTS computer operating system: Windows 10 Professional (v1909)

- Microsoft .NET Framework 3.5

- Microsoft .NET Framework 4.8

- Microsoft Windows Defender

- Microsoft Visual C++ 2015 Redistributable

- Dallas Maxim: 1-wire driver - version 4.1.0 or newer, 64-bit (32-bit as needed)

- Canon: DR-X10C driver - version 1.15 SP3

- Canon: DR-G2140 driver - version 1.1 SP2

- Canon: DR-G1130 v1 driver - version 1.2 SP6

- Canon: DR-G1130 v2 driver - version 1.2 SP6

- Canon: DR-M160-II driver - version 1.2 SP6

- HiPro 821dd driver 1.3.0.4

COTS Hardware

- ICC Scanner: Canon DR-X10C FW: version 2.8

- ICC Scanner: Canon DR-G2140 with optional post-imprinter FW: version 1.23

- ICC Scanner: Canon DR-G1130 v1 with optional post-imprinter FW: version 1.33

- ICC Scanner: Canon DR-G1130 v2 with optional post-imprinter FW: version 2.02

- ICC Scanner: Canon DR-M160-II FW: version 2.02

- ICC Scanner: InterScan HiPro 821dd with integrated imprinter FW: version 2.3.44

- Canon Scanner Client Workstation Configuration:

  - Desktop or All-in-One computer system per *2.02 Democracy Suite System Configuration Overview*

    - Dell Precision 3450 XE

    - Dell Precision 3440 XE

    - Monitor: Planar PCT2235

    - Dell OptiPlex 3050 AIO

- Dell OptiPlex 7440 AIO

- Dell OptiPlex 9030 AIO

- HiPro Scanner Client Workstation Configuration:

  - Dell Optiplex XE3

  - Dell Optiplex 7050

  - Dell Optiplex 7060

  - Monitor: Lenovo 10QXPAR1US

  - Monitor: Lenovo 11GCPAR1US

  - Monitor: Dell P2418HT

- Auxiliary Equipment

  o iButton to 1-Wire USB Adapter: Dallas Maxim DS1402-RP8+

  o iButton Reader/Writer: Dallas Maxim DS9490R#

- Election Media

  o iButton: Dallas Maxim DS1963S-F5+ (with Key Ring Mount DS9093A+)

  o USB Memory Device (16GB): Centon S4-CM-U3P2-16.1

  o USB Memory Device (8GB): Centon S4-CM-U3P2-8.1

  o USB Memory Device (16GB): Apacer EH353-M APHA016GAG0CG-3TM

  o USB Memory Device (8GB): Apacer EH353-M APHA008GAG0CG-3TM

Precinct BMD

ImageCast X with BMD (ICX BMD)

❖ Firmware version: 5.13.12.2

❖ Hardware version:

- Avalue SID-21V-Z37 (ICX Classic)

- Samsung Galaxy NotePro (12.2 in. screen) in Armodilo enclosure

- Samsung Galaxy TabPro (12.2 in. screen) in Armodilo enclosure

Optional Hardware

- Accessible-Tactile Interface (ATI-USB) box

- ICX Classic BMD Transport Bag

- ICX Voting Booth

- ICX Privacy Screen

COTS Hardware

- UPS

  - APC SMT-1500 (for HP M402dne and M404dn printers only)

  - APC SMT-1500C (for HP M402dne and M404dn printers only)

  - CyberPower PR1500LCD

  - CyberPower PR1500LCD-VTVM

- Printer:

  - HP M402dne Laser

  - HP M404dn Laser

  - Avision AP3061

- Hub:

  - Lavalink STS-2UE (for Samsung Galaxy tablets only)

- Election Media

  - USB Memory Device (16GB): Centon S4-CM-U3P2-16.1

  - USB Memory Device (8GB): Centon S4-CM-U3P2-8.1

  - USB Memory Device (16GB): Apacer EH353-M APHA016GAG0CG-3TM

  - USB Memory Device (8GB): Apacer EH353-M APHA008GAG0CG-3TM

  - USB Memory Device (128GB): Apricorn Aegis ASK3-NX-128GB

  - USB Memory Device (32GB): Apricorn Aegis ASK3-NX-32GB

  - USB Memory Device (120GB): Apricorn Aegis ASK3-120GB

  - USB Memory Device (30GB): Apricorn Aegis ASK3-30GB

  - Smart Cards: ACOS-6-64

COTS Software

- Android 8.1.0-1.1.11 (ICX Classic)

- Android 5.0.2 (ICX Samsung Galaxy Note Pro)

- Android 4.4.2 (ICX Samsung Galaxy Tab Pro)

Optional COTS Software

- None

Optional COTS products

- Headphone: Cyber Acoustics ACM-70, ACM-70B or equivalent

- Sip & puff: Enabling Device #972

- Sip & puff straws: #970K (Pkg of 10)

- Paddle switches: Enabling Device #971

- Paddle switches: AbleNet 10033400 (2x)

- Paddle Switch Cable: Hosa Technology YMM-261 (for use with AbleNet switches)

For COTS equipment, every effort was made to verify that the COTS equipment had not been modified for use. This was accomplished by performing research using the COTS equipment manufacturer's websites based on the serial numbers and service tag numbers for each piece of equipment. Assigned test personnel evaluated COTS hardware, system software and communications components for proven performance in commercial applications other than voting. For PCs, laptops, and servers, the service tag information was compared to the system information found on each machine.

Physical external and internal examinations were also performed when the equipment was easily accessible without the possibility of damage. Hard drives, RAM memory, and other components were examined to verify that the components matched the information found on the COTS equipment manufacturer's websites.

A comprehensive list of all the major COTS components in the D-Suite 5.13-A system are included in the table below along with supporting information designating which test campaign the components were tested in (the previous test campaign on the 5.13 system or the current test campaign on the 5.13-A system).

Table 2-0. D-Suite 5.13-A COTS Components

Description	Manufacturer	Model / MPN	Test Campaign
PowerEdge Server - Rackmount	Dell	R640	5.13-A
PowerEdge Server - Rackmount	Dell	R630	5.13
PowerEdge Server - Tower	Dell	R710	5.13
PowerEdge Server - Tower	Dell	T630	5.13
Workstation	Dell	Precision 3450 XE	5.13-A
Workstation	Dell	Precision 3440 XE	5.13
Workstation	Dell	Precision T3420	5.13
Workstation	Dell	Precision T1700	5.13
Laptop	Dell	Latitude 3420	5.13
Laptop	Dell	Latitude 3410	5.13
Laptop	Dell	Latitude 3400	5.13
Laptop	Dell	Latitude 3490	5.13
Laptop	Dell	Latitude e3480	5.13
Laptop	Dell	Latitude e3470	5.13
Laptop	Dell	Latitude e7450	5.13
Laptop	Dell	Latitude e7470	5.13
Workstation - All in One	Dell	Optiplex 3050	5.13-A
Workstation - All in One	Dell	Optiplex 9030	5.13
Workstation - All in One	Dell	Optiplex 7440	5.13
Workstation	Dell	Optiplex XE3	5.13
Workstation	Dell	Optiplex 7060	5.13
Workstation	Dell	Optiplex 7050	5.13
Central Scanner	Canon	DR-X10C	5.13
Central Scanner	Canon	DR-G2140	5.13
Central Scanner	Canon	DR-G1130 v1	5.13
Central Scanner	Canon	DR-G1130 v2	5.13
Central Scanner	Canon	DR-M160-II	5.13
Central Scanner	Inotec	HiPro 821	5.13
ImageCAST X Voting Terminal	Avalue	Classic 21"	5.13
ImageCAST X Voting Terminal	Samsung	Galaxy Tab Pro	5.13
ImageCAST X Voting Terminal	Samsung	Galaxy Note Pro	5.13
BMD Printers	Hewlett Packard	M404dn	5.13-A
BMD Printers	Hewlett Packard	M402dne	5.13

Table 2-0. D-Suite 5.13-A COTS Components *(continued)*

Description	Manufacturer	Model / MPN	Test Campaign
BMD Printers	Avision	AP3061	5.13
Server Operating System	Microsoft	Windows Server 2016	5.13
Database Software	Microsoft	SQL Server 2016 Standard w SP2	5.13
iButton USB Adapter	Dallas Maxim	DS1402-RP8+	5.13
iButton Reader/Writer	Dallas Maxim	DS9490R#	5.13
Smart Card Reader/Writer	Advanced Card Systems	ACR39U	5.13
Smart Card Reader/Writer	Advanced Card Systems	ACR38U	5.13
Smart Card Reader/Writer	HID Global	Omnikey 3121	5.13-A
LCD Monitor	Dell	P2419H	5.13
LCD Monitor	Dell	P2417H	5.13
Touchscreen Monitor - Canon ICC	Planar	PCT2235	5.13
Touchscreen Monitor - HiPro ICC	Lenovo	10QXPAR1US	5.13
Touchscreen Monitor - HiPro ICC	Lenovo	11GCPAR1US	5.13-A
Touchscreen Monitor - HiPro ICC	Dell	P2418HT	5.13
Ethernet Switch - 24 port	Dell	x1026	5.13
Ethernet Switch - 16 port	Dell	x1018	5.13
Ethernet Switch - 8 port	Dell	x1008	5.13
Ethernet Switch - 24 port	Dell	N1524	5.13
Ethernet Switch - 8 port	Cisco	CBS350-8T-E-2G	5.13
Ethernet Switch - 24 port	Cisco	CBS350-24T-4G	5.13
Rack Server	Star Tech	RK1236BKF	5.13
Rack Power Distribution Unit	APC	AP9562	5.13
UPS -1.5kVA Rackmount	Tripp Lite	SMART1500RMXL2U	5.13
UPS -1.5kVA Desktop	APC	SMT1500	5.13
UPS -1.5kVA Desktop	APC	SMT1500C	5.13
UPS -1.5kVA Desktop	CyberPower	PR1500LCD	5.13
UPS -1.5kVA Desktop w/ Inverter	CyberPower	R1500LCD-VTVM	5.13
UPS - 1kVA Desktop	APC	BR1000G	5.13
EMS Report Printer	Hewlett Packard	M404dn	5.13
EMS Report Printer	Canon	LBP6230dw	5.13
iButton	Dallas Maxim	DS1963S-F5+	5.13
Compact Flash - 16GB	Centon	C4-CM-CF-16.4	5.13
USB Flash Drive - 16GB	Centon	S4-CM-U3P2-16.1	5.13

Table 2-0. D-Suite 5.13-A COTS Components *(continued)*

Description	Manufacturer	Model / MPN	Test Campaign
USB Flash Drive - 8GB	Centon	S4-CM-U3P2-8.1	5.13
USB Flash Drive - 16GB	Apacer	EH353-M APHA016GAG0CG-3TM	5.13
USB Flash Drive - 8GB	Apacer	EH353-M APHA008GAG0CG-3TM	5.13
USB Flash Drive - 128GB	Apricorn Aegis	ASK3-NX-128GB	5.13
USB Flash Drive - 32GB	Apricorn Aegis	ASK3-NX-32GB	5.13
USB Flash Drive - 120GB	Apricorn Aegis	ASK3-120GB	5.13
USB Flash Drive - 30GB	Apricorn Aegis	ASK3-30GB	5.13
Smartcards	Advanced Card Systems	ACOS-6-64	5.13
Hub	Lavalink	STS-2UE	5.13
Accessible Tactile Interface - USB	e2ip Technologies	181-000036 Rev. A	5.13
ICX Classic BMD Transport Bag	Dominion Voting	125-000069	5.13
ICX Voting Booth	Dominion Voting	123-000448	5.13
ICX Privacy Screen	Dominion Voting	125-000072	5.13
Headphones	Cyber Acoustics	ACM-70B	5.13
Sip and Puff	Enabling Devices	#972	5.13
Sip and Puff Straw Packs	Enabling Devices	#970K	5.13
Paddle switches	Enabling Devices	#971	5.13
Paddle switches	AbleNet	10033400	5.13
Paddle Switch Y Cable (for AbleNet switches	Hosa Technology	YMM-261	5.13

2.1 System Limits

Table 2-1. D-Suite 5.13-A System Limits

Limit (Maximum Number)	Value (by configuration)		Limiting Component
	Express	Standard	
Landscape Ballot Orientation			
Ballot Positions	292	292	22 inch Landscape Ballot (240 candidates + 24 write-ins + 28 Yes/No choices)
Precincts in Election	250	1000	Memory
Contests in Election	250	1000	Memory
Candidates/Counters in Election	2500	10000	Memory
Candidates/Counters in Precinct	240	240	22 inch Landscape Ballot

Table 2-1. D-Suite 5.13-A System Limits *(continued)*

Limit (Maximum Number)	Value (by configuration)		Limiting Component
	Express	Standard	
Candidates/Counters in Tabulator	2500	10000	Memory
Ballot Styles in Election	750	3000	Memory
Contests in a Ballot Style	38	38	22 inch Landscape Ballot (24 candidacy contests + 14 propositions)
Candidates in a Contests	240	240	22 inch Landscape Ballot
Ballot Styles in a Precinct	5	5	Memory
Number of Parties	30	30	Memory
Vote For in Contest	24	24	22 inch Landscape Ballot
Supported Languages per Election	5	5	Memory
Number of Write-ins	24	24	22 inch Landscape Ballot
Portrait Orientation			
Ballot Positions	462	462	22 inch Portrait Ballot
Precincts in Election	250	1000	Memory
Contests in Election	250	1000	Memory
Candidates/Counters in Election	2500	10000	Memory
Candidates/Counters in Precinct	462	462	22 inch Portrait Ballot
Candidates/Counters in Tabulator	2500	10000	Memory
Ballot Styles in Election	750	3000	Memory
Contests in a Ballot Style	156	156	22 inch Portrait Ballot
Candidates in a Contests	231	231	22 inch Portrait Ballot (Column Span 3)
Ballot Styles in a Precinct	5	5	Memory
Number of Parties	30	30	No Limitation
Vote For in Contest	30	30	No Limitation
Supported Languages per Election	5	5	Memory
Number of Write-ins	462	462	22 inch Portrait Ballot

2.2 Supported Languages

The following languages have been stated to be supported by the D-Suite 5.13-A System:

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

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

2.3 Supported Functionality

The Democracy Suite 5.13-A is designed to support the following voting variations:

- General Election
- Closed Primary
- Open Primary
- Early Voting
- Partisan/Non-Partisan Offices
- Write-In Voting

- Primary Presidential Delegation Nominations

- Split Precincts

- Vote for N of M

- Ranked order voting

- Ballot Rotation

- Provisional or Challenged Ballots

2.4 System Overview

The testing event utilized one setup of the D-Suite 5.13-A System and its components as configured for normal use by the State of Colorado. A diagram depicting the D-Suite 5.13-A is provided in Figure 2-1.
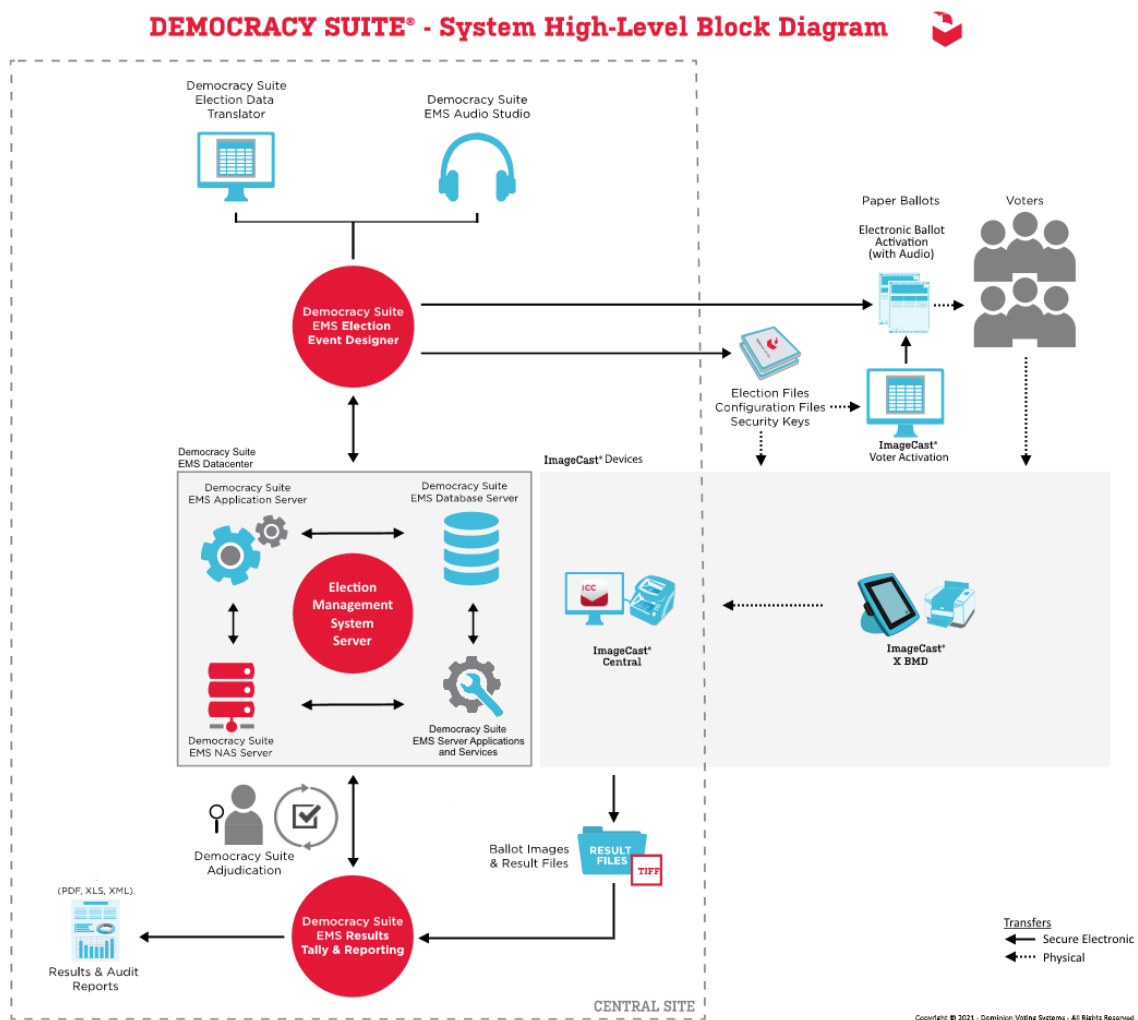

Figure 2-1 System Diagram

2.5   System Technical Data Package

Table 2-2: D-Suite 5.13-A TDP Documents

Document Number	Document Description	Document Version
2.02	Democracy Suite System Overview	5.13-A.CO::1
2.03	Democracy Suite EMS Functionality Description	5.13-A::1
2.03	Democracy Suite ImageCast Central Functionality Description	5.13-A::1
2.03	Democracy Suite ImageCast X System Functionality Description	5.13-A::1
2.05	Democracy Suite Adjudication Software Design and Specification	5.13-A::1
2.05	Democracy Suite EMS Software Design and Specification	5.13-A::1
2.05	Democracy Suite ImageCast Central Software Design and Specifications	5.13-A::1
2.05	Democracy Suite ImageCast X Software Design and Specification	5.13-A::1
2.06	Democracy Suite System Security Specifications	5.13-A::1
2.07	Democracy Suite System Test and Verification Specification	5.13-A::1
2.08	Democracy Suite Adjudication System Operation Procedures	5.13-A::1
2.08	Democracy Suite EMS System Operations Procedures	5.13-A::1
2.08	Democracy Suite ImageCast Central System Operation Procedures	5.13-A::1
2.08	Democracy Suite ImageCast X System Operations Procedures	5.13-A::1
2.09	Democracy Suite Adjudication System Maintenance Manual	5.13-A::1
2.09	Democracy Suite EMS System Maintenance Manual	5.13-A::1
2.09	Democracy Suite® ImageCast X System Maintenance Manual	5.13-A::1
2.10	Democracy Suite Personnel Deployment and Training Requirements	5.13-A::1
2.11	Democracy Suite Configuration Management Plan	5.13-A.CO::1
2.12	Democracy Suite Quality Assurance Program	5.13-A::1
2.13	Democracy Suite System Change Notes	5.13-A.CO::1
Build Documents		
---	Democracy Suite ImageCast X Build	5.13-A::1
---	Democracy Suite Windows Build Document	5.13-A::1

Table 2-2: D-Suite 5.13-A TDP Documents (*continued*)

Document Number	Document Description	Document Version
DVS Supplemental Documents		
---	Democracy Suite C# Automated Code Review Process	5.13-A::1
---	Democracy Suite ImageCast Tabulator Surface Cleaning Guide	5.13-A::1
---	Democracy Suite ImageCast C++ Coding Standard	5.13-A::1
---	Notice of Protected Information	5.13-A::1
---	Java Coding Standards	5.13-A::1
---	JavaScript Coding Standards	5.13-A::1
---	Democracy Suite ImageCast Configuration File Settings	5.13-A::1
---	Democracy Suite ImageCast Device Configuration Files	5.13-A::1
---	Democracy Suite ImageCast Election Definition Files	5.13-A::1
---	Democracy Suite ImageCast Printing and Finishing Specifications	5.13-A::1
---	Democracy Suite ImageCast Total Results File Format	5.13-A::1
---	Democracy Suite ImageCast X Machine Configuration File (MCF) Parameters Settings	5.13-A::1
---	Usability Test Report Of ImageCast X 5.0 with 36 Participants for VVSG 1.0	5.13-A::1
---	Democracy Suite System Identification Guide	5.13-A.CO::1
---	SD_Google Java Style Dominion	1.0
Installation and Configuration		
---	Democracy Suite EMS Client Workstation Installation and Configuration Procedure	5.13-A::1
---	Democracy Suite EMS Express Installation and Configuration Procedure	5.13-A::1
---	Democracy Suite ImageCast Voter Activation Installation and Configuration Procedure	5.13-A::1
---	Democracy Suite EMS Standard System Installation and Configuration Procedure	5.13-A::1
---	Democracy Suite ImageCast Central Installation and Configuration Procedures	5.13-A::1
---	Democracy Suite ImageCast X System Installation and Configuration	5.13-A::2
User Guides		
---	Democracy Suite ImageCast Adjudication User Guide	5.13-A::1
---	Democracy Suite EMS Audio Studio User Guide	5.13-A::1
---	Democracy Suite EMS Automated Test Deck User Guide	5.13-A::1

Table 2-2: D-Suite 5.13-A TDP Documents *(continued)*

Document Number	Document Description	Document Version
---	Democracy Suite EMS Election Data Translator User Guide	5.13-A::1
---	Democracy Suite EMS Election Event Designer User Guide	5.13-A::1
---	Democracy Suite ImageCast Central User Guide	5.13-A::1
---	Democracy Suite EMS ImageCast Voter Activation User Guide	5.13-A::1
---	Democracy Suite ImageCast X User Guide	5.13-A::1
---	Democracy Suite EMS Mobile Ballot Production User Guide	5.13-A::1
---	Democracy Suite EMS Results Tally & Reporting User Guide	5.13-A::1
COTS Manuals		
---	AbleNet_single_switch_manual.pdf Quickstart Guide: Single Switches	B
---	acs ACOS6 Multi-Application and Purse Card Functional Specifications V1.04	1.04
---	acs ACR38x CCID Smart Card Reader Reference Manual V6.05	6.05
---	acs ACR39 Series PC-linked Smart Card Readers Reference Manual V1.04	1.04
---	APC_BR1000G_User_Guide.pdf	EN 990-3804B
---	APC_SMT1500_OpsManual	EN 990-3534F
---	APC_SMT1500C_UserGuide	EN 990-5442B
---	Apricorn Aegis 3NX Compliance	rev 11-03-20
---	Apricorn_Aegis_USB_manual.pdf	---
---	Armodilo-Original-Sphere-Setup-Guide.pdf	---
---	Armodilo-Sphere-Mounting-Instructions.pdf	---
---	Armodilo-Sphere-Specification-Sheet.pdf	---
---	Avalue_SID_21V_FactSheet	---
---	Avalue_SID_21V_Z37_UserManual	1.0
---	Avalue_SID-21V_QuickRef	1st Ed
---	Canon_DR-G1130_User_Guide	PUB. CE-IM-910-E1.00
---	Canon_DR-G2140_2110_2090_User_Manual	PUB. 6T3-0034-E1.10
---	Canon_DR-M160II_User_Guide	PUB. CE-IM-0953-E1.00

Table 2-2: D-Suite 5.13-A TDP Documents *(continued)*

Document Number	Document Description	Document Version
---	Canon_DRX10C_User_Manual	PUB. CE-IE-608
---	Canon_LBP6230dw_Startup	FT6-0797(000)
---	Cisco 350 Series Network Switch Administration Guide	2022-04-14
---	CyberPower_PR1500LCD_User_Manual	---
---	Dell Latitude 3410 Product Compliance Datasheet	A18
---	Dell Power Switch N1524 Compliance	A11
---	Dell Precision 3440 Compliance	A17
---	Dell_Latitude_3470_laptop_Owners_Manual	Rev. A00
---	Dell_Latitude_3480-laptop_owners manual_en-us	Rev. A00
---	Dell_Latitude_E7450-Ultrabook_owners-manual	Rev. A02
---	Dell_Latitude_E7470_Ultrabook_Owners_Manual	Rev. A02
---	Dell_Latitude_3420_Setup_and_Specification-en-us	Rev. A03
---	Dell_Latitude_3420-laptop_owners-manual2_en-us	Rev. A00
---	Dell_Networking_N-series_User's Guide10_en-us	Rev. A04
---	Dell_Networking_X-Series_Datasheet	1.9
---	Dell_Networking_X-Series-UG_en-us	Rev. A06
---	Dell_OptiPlex_3050 AIO Owner's Manual	Rev. A00
---	Dell_OptiPlex_7050-desktop_owners-manual.pdf	---
---	Dell_OptiPlex_7060-desktop_setup.pdf	---
---	Dell_OptiPlex_xe3_specifications_en-us.pdf	---
---	Dell_P2418HT-monitor_user's-guide.pdf	---
---	Dell_Optiplex_7440-aio_Owners_Manual	Rev. A01
---	Dell_P2417H_Monitor_Users_Guide	Rev. A01
---	Dell_P2419h-monitor_user's-guide_en-us	Rev. A00
---	Dell_Poweredge_R630_Owner_Manual	Rev. A03
---	Dell_Poweredge_R640_Owner_Manual	Rev. A01
---	Dell_Poweredge_R640_Tech_Guide	Rev. A00
---	Dell_Poweredge_R710_owner's-manual_en-us.pdf	Rev. A03
---	Dell_Poweredge_T630_owners-manual_en-us	Rev. A06
---	Dell_Precision_3440_specifications_en-us	Rev. A00
---	Dell_Precision_T1700-workstation_owners-manual_en-us	Rev. A00
---	Dell_Precision-3450-workstation_setup_and_specifications	Rev. A02
---	Dell_Precision-3450_Service_Manual	Rev. A02
---	Dell_Precision_T3420_Workstation_Owner_Manual	Rev. A00
---	HID OMNIKEY Smart Reader User Guide	Rev. A.3
---	HP LaserJet Pro M404dn Spec w Compliance	---
---	HP_LaserJet_Pro_M402x_M403x_User_Guide	2
---	HP_LaserJet_Pro_M404_UserGuide	2
---	Interscan_HiPro_821.pdf	---
---	IOGear Quick Start Guide 2/4-Port USB Cable KVM Switch	---

Table 2-2: D-Suite 5.13-A TDP Documents *(continued)*

Document Number	Document Description	Document Version
---	Kingston_FCR-HS4_data_sheet	MKD-314.3 EN
---	Lava_Hub_Manual.pdf	---
---	Lenovo_ThinkCentreTIO24Gen3Touch.pdf	---
---	tio24gentouch_ug_en_202006.pdf	---
---	Lexar_Pro USB 3 Dual Slot Reader	---
---	OKI_C332dn_user_guide	Rev 4
---	OKI_C612_C712_UG	Rev 3
---	OKI_C931_UserManual	Rev 7
---	Planar-PTC2235_user-guide	---
---	RoHS Declaration (PR1500LCD-VTVM)	---
---	Tripp-Lite-SMART1500_Owners-Manual	---
---	ACOS6_Reference_Manual_v2.81.pdf	2.81
	Dell OptiPlex 7060 Small Form Factor Service Manual	Rev. A00
	Dell_Latitude-3490-laptop_owners-manual4_en-us.pdf	Rev. A01
	DEll_PowerEdge_R630_Data_Sheet.pdf	A10
---	Dell Latitude 3400 Setup and specifications guide	Rev. A00
---	Dell Precision 3430 Small Form Factor Setup and specifications guide	Rev. A00
---	Galaxy_Tab_Pro_SM-P900_Health_and_Safety.pdf	---
---	HP_LaserJer_Pro_404dn_Data_Sheet.pdf	R1
---	HP_LaserJet_Pro_M402dne_Datasheet.pdf	4AA6-5210EEP
---	OKI_C331_C531_users_guide	Rev1
---	OKI_C721_manual.pdf	Rev4
---	Tripp_Smart_Pro_SM1500RMXL2UTAA_Datasheet.pdf	---
---	OptiPlex 7060 Small Form Factor Setup and specifications guide	Rev. A01
---	Dell_Precision-3430-workstation_owners-manual2_en-us.pdf	---
---	Cisco 350 Series Datasheet	---
---	Cisco 350 Series Quickstart	---
---	Dell P2418HT Compliance	---
---	Dell OptiPlex XE3 Compliance	---
---	Dell Latitude 3410 Owner's Manual	---
---	Dell OptiPlex 7060 Service Manual	---
---	HID Omnikey 3121 Assembly	---
---	HID Omnikey 3121 Datasheet	---
---	Samsung Note Pro User Manual	---
---	Samsung Tab Pro User Manual	---
---	SCAMAX 8x1 Scanner Brochure	---
---	SCAMAX Scanner User Manual	---

3.0 TEST PROCESS AND RESULTS

To evaluate the Democracy Suite 5.13-A test requirements, each section of the EAC 2005 VVSG was analyzed to determine the applicable tests. The EAC 2005 VVSG Volume I Sections, along with the strategy of evaluation, are described in the following paragraphs.

Section 2: Functional Requirements

The requirements in this section were tested during the FCA and System Integration Test. This evaluation utilized baseline test cases as needed.

The test cases specifically designed to evaluate the modifications are listed below:

— M404dn Printer Support

Section 3: Usability and Accessibility Requirements

The requirements in this section were not tested during this state certification effort as results from the previous D-Suite 5.13 state test campaign, containing the HP M402dn (a predecessor to the HP M404dn), were evaluated. No changes were submitted for the ICX that warranted usability and accessibility testing to be performed.

Section 4: Hardware Requirements

The 5.13-A system introduces support for the HP M404dn printer for use with the ICX Classic BMD and Samsung Galaxy tablets. Testing from the federal certification test campaign on D-Suite 5.0, containing the HP M402dn (a predecessor to the HP M404dn) was evaluated. During this test campaign, the HP M402dn printer was configured for use with the ICX Classic BMD and Samsung Galaxy tablets.

Section 5: Software Requirements

The requirements in this section were tested utilizing a combination of review and functional testing during the Source Code Review, Build Documentation Review, and FCA.

Section 6: Telecommunications Requirements

The requirements in this section were not tested due to Colorado Rule 20.6.1(f) prohibiting the use of modems.

Section 7: Security Requirements

The requirements in this section were not tested during this state certification effort as results were re-used from the previous D-Suite 5.13 state test campaigns. The submitted modifications did not require additional testing to be performed.

Section 8: Quality Assurance Requirements

The requirements in this section were not tested during this state certification effort as results were re-used from the previous D-Suite 5.5 federal test campaign. There were no changes submitted that warranted a Quality Assurance review to be performed.

Section 9: Configuration Management Requirements

The requirements in this section were not tested during this state certification effort as results were re-used from the previous D-Suite 5.5 federal test campaign. There were no changes submitted that warranted a Configuration Management review to be performed.

Throughout the test campaign, Pro V&V personnel maintained a test log identifying the system and equipment under test and any records of deviations to the test plan along with the rationale for performing the deviations. Pro V&V shall also utilize an internal bug tracking system to record and track all issues and/or discrepancies noted during the test campaign.

The following sections outline the test process that was followed to evaluate D-Suite 5.13-A against the test goals defined in Section 2.0.

3.1 Test Configuration

The testing event utilized one setup of the D-Suite 5.13-A System and its components.

3.2 Summary Findings and Recommendation

Summary findings for the System Level Testing (System Integration Testing, Accuracy, and FCA), PCA, and Source Code Review are detailed in the relevant sections of this report.

3.2.1 Source Code Review

Pro V&V reviewed the submitted source code to the EAC VVSG 1.0 and the manufacturer-submitted coding standards. Prior to initiating the software review, Pro V&V verified that the submitted documentation is sufficient to enable: (1) a review of the source code and (2) Pro V&V to design and conduct tests at every level of the software structure to verify that design specifications and performance guidelines are met. The source code review was based on the source code changes made since the previous system was certified.

A combination of Automated Source Code Review and Manual Source Code Review methods were used to review the changes in the source code from the previously certified system. The automated source code review tools utilized were CheckStyle and StyleCop. ExamDiff Pro was the tool utilized to perform a manual comparison of the previously certified code against the modified code submitted for this test campaign.

- Automated Source Code Review: The Automated Source Code Review was performed during the D-Suite 5.13-A Compliance and Trusted Builds. No source code issues were found during the Automated Source Code review.

- Manual Source Code Review: The Manual Source Code review was performed along with a Manual Review on 10% of the comments for compliance to VVSG Volume Section 5.2.7. No source code issues were found during the Manual Source Code review.

- Compliance Build: The compliance build was performed following the compliance review. Once the compliance review was performed and the source was deemed stable enough to proceed with testing, the source code and all additional packages were compiled into a Compliance Build.

- Trusted Build: The trusted build consisted of inspecting customer submitted source code, COTS, and third party software products and combining them to create the executable code. This inspection followed the documented process from the "United States Election Assistance Commission Voting System Test Laboratory Program Manual" Section 5.5 – 5.7. Performance of the trusted build includes the build documentation review. The Trusted Build was performed following the completion of the Functional Configuration Audit.

3.2.2 Physical Configuration Audit (PCA)

The Physical Configuration Audit (PCA) compares the voting system components submitted for certification testing to the manufacturer's technical documentation. The purpose of the PCA was to verify that the submitted hardware is unmodified from the previously certified voting system.

The PCA included the following activities:

- Establish a configuration baseline of software and hardware to be tested; confirm whether manufacturer's documentation is sufficient for the user to install, validate, operate, and maintain the voting system

- Verify software conforms to the manufacturer's specifications; inspect all records of manufacturer's release control system; if changes have been made to the baseline version, verify manufacturer's engineering and test data are for the software version submitted for certification

- Review manufacturer's documents of user acceptance test procedures and data against system's functional specifications; resolve any discrepancy or inadequacy in manufacturer's plan or data prior to beginning system integration functional and performance tests

- Subsequent changes to baseline software configuration made during testing, as well as system hardware changes that may produce a change in software operation are subject to re-examination

During execution of the test procedure, the components of the D-Suite 5.13-A 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.

3.2.3 System Level Testing

System Level Testing included the Functional Configuration Audit (FCA), the Accuracy Test, and the System Integration Tests. The Accuracy Test and the System Integration tests were performed as part of the regression test requirements for this campaign. System Level testing was implemented to evaluate the complete system. This testing included all proprietary components and COTS components (software, hardware, and peripherals). For software system tests, the tests were designed according to the stated design objective without consideration of its functional specification. The system level hardware and software test cases were prepared independently to assess the response of the hardware and software to a range of conditions.

The FCA for this test campaign included an assessment of the submitted modification and included inputs of both normal and abnormal data during test performance. This evaluation utilized baseline test cases as well as specifically designed test cases and included predefined election definitions for the input data. As part of the FCA, three primary and three general elections were executed to verify that each of the submitted modifications had been successfully implemented. The System Integration Tests were performed to verify the D-Suite 5.13-A functioned as a complete system.

During System Level Testing, the system was configured exactly as it would for normal field use per the procedures detailed in the D-Suite 5.13-A technical documentation. This included connecting all supporting equipment and peripherals as well as any physical security equipment such as locks and ties.

3.2.3.1 Functional Configuration Audit (FCA)

The Functional Configuration Audit (FCA) encompasses an examination of manufacturer's tests, and the conduct of additional tests, if needed, to verify that the system hardware and software perform all the functions described in the manufacturer's documentation submitted in the TDP.

In addition to functioning according to the manufacturer's documentation, tests were conducted to ensure all applicable EAC VVSG 1.0 requirements were met.

Summary Findings

All functional tests for the HP M404dn printer were successfully executed. No issues were noted. No manufacturer's test or additional tests were utilized.

3.2.3.2 Accuracy

The Accuracy Test ensured that each component of the voting system could process at least 1,549,703 consecutive ballot positions correctly within the allowable target error rate. The Accuracy Test is designed to test the ability of the system to "capture, record, store, consolidate and report" specific selections and absences of a selection. The required accuracy is defined as an error rate. This rate is the maximum number of errors allowed while processing a specified volume of data. For this test, the correct number of ballot positions to be processed is derived using a desired error rate of 1 in 10,000,000 and a maximum acceptable error rate of 1 in 500,000.

For paper-based voting systems, the ballot positions on a paper ballot must be scanned to detect selections for individual candidates and contests and the conversion of those selections detected on the paper ballot converted into digital data. All ballot sizes specified as supported in the 5.13-A system were used in this testing

Summary Findings

The D-Suite 5.13-A system software successfully passed the Accuracy Test without issue. A total of 3,800 ballots were printed on the HP M404dn printer from an ICX BMD and scanned on an ICC component resulting in 1,560,000 voting positions being voted. All actual results obtained during test execution matched the expected results, resulting in an achieved tabulation error rate of 0% and an accuracy of 100%. The total number of voting positions voted exceeded the minimum required for test performance.

3.2.3.3 System Integration

System Integration is a system level test that evaluates the integrated operation of both hardware and software. System Integration tests the compatibility of the voting system software components, or subsystems, with one another and with other components of the voting system environment. This functional test evaluates the integration of the voting system software with the remainder of the system.

Summary Findings

During test performance, the system was configured as it would be for normal field use. Pro V&V personnel properly configured and tested the system by following the procedures detailed in the D-Suite 5.13-A technical documentation. Two General Elections and one Primary Election were successfully exercised on the voting system, as described below:

General elections with the following breakdown:

— General Election GEN-01: General Election GEN-01: A General Election with Straight Party held in four precincts, one of which is a split precinct. This election contains nineteen contests compiled into four ballot styles. Five of the contests are in all four ballot styles. The other fourteen contests are split between at least two of the precincts with a maximum of four different contest spread across the four precincts.

— General Election GEN-02: A basic election held in three precincts. This election contains fifteen contests compiled into three ballot styles with ten of the contests in all three ballot styles. The other five contests are split between the three ballot styles. This election supported voting variations that included Recall issues, with options and ranked order voting.

Primary elections with the following breakdown:

— Primary Election PRIM-03: A Closed Primary Election held in two precincts. This election contains ten contests and is compiled into two ballot styles. Two of the contests are in both ballot styles. The other eight contests are split between the two parties' ballots. This election is designed to functionally test the handling of multiple ballot styles, support for at least three languages including a character-based language, support for common voting variations, and audio support for at least three languages and an ADA binary input device.

The D-Suite 5.13-A successfully passed the System Integration Test. During execution of the test procedure, it was verified that the D-Suite 5.13-A successfully completed the system level integration tests with all actual results obtained during test execution matching the expected results.

3.2.3.4 Regression Testing

Regression testing was conducted on the D-Suite 5.13-A to establish assurance that the modifications had no adverse impact on the compliance, integrity, or performance of the system. No new faults or issues were found during regression testing.

4.0   CONCLUSION

Based on the results obtained during the test campaign, Pro V&V determines the D-Suite 5.13-A, 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, the Colorado Requirements Gap Analysis Matrix, which incorporates the 2002 VSS requirements, and the Colorado-specific requirements in the Colorado Secretary of State Election Rules [8 CCR 1505-1] Rule 21. 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.

APPENDIX A

Test Case Descriptions

Table A-1. Test Case Descriptions

Test Case	Description	Result (Pass/Fail)	Test Campaign
Functional Requirements			
EED - Added ability to store tabulator resources in the NAS project folder	Specifically designed test case created to evaluate the modification.	PASS	5.13
RTR - Removed the Byte Order Marker (BOM) from the beginning of the export file	Specifically designed test case created to evaluate the modification.	PASS	5.13
ADJ - Added option to only allow adjudication of contests that meet the out-stack criteria as defined in the Adjudication project	Specifically designed test case created to evaluate the modification.	PASS	5.13
Modified ICC log entry text to be more descriptive for double feed errors	Specifically designed test case created to evaluate the modification.	PASS	5.13
Corrected functionality to allow discarding of batches after 999	Specifically designed test case created to evaluate the modification.	PASS	5.13
Modified ICC to not accept a batch without a Poll ID	Specifically designed test case created to evaluate the modification.	PASS	5.13
Added ability to print Batch Header Cards from ICC	Specifically designed test case created to evaluate the modification.	PASS	5.13
Added support for HiPro firmware 1.0.1074	Specifically designed test case created to evaluate the modification.	PASS	5.13
Changed maximum Poll ID length from 6 characters to 32	Specifically designed test case created to evaluate the modification.	PASS	5.13
Added support for ICX BMD to produce a ballot without a barcode	Specifically designed test case created to evaluate the modification.	PASS	5.13
Added support for Avision AP3061 printer	Specifically designed test case created to evaluate the modification.	PASS	5.13
Added support for HP M404dn printer	Specifically designed test case created to evaluate the modification.	PASS	5.13-A
Added option to display only a 10-key keyboard when only numeric values are required for entry	Specifically designed test case created to evaluate the modification.	PASS	5.13
Added option to print a Daily Print Report that provides statistics for auditing but no results	Specifically designed test case created to evaluate the modification.	PASS	5.13
Added support for new Aegis USB memory devices	Specifically designed test case created to evaluate the modification.	PASS	5.13
Corrected scroll bar display on Samsung device when first voting session after power up is an accessible voting session	Specifically designed test case created to evaluate the modification.	PASS	5.13

Table A-1. Test Case Descriptions *(continued)*

Test Case	Description	Result (Pass/Fail)	Test Campaign
Usability and Accessibility			
Add Alternative Language Support to Election	Testing EMS support for alternative languages during election definition creation.	PASS	5.13
Create Ballot Layout	Testing EMS support for creating a ballot layout.	PASS	5.13
Audio Ballot Activation by Voter Card Insertion	Testing the capability of a voting machine to activate an audio ballot by means of inserting a voter card.	PASS	5.13
Make Vote Selection	Testing the ability to select a candidate on a ballot.	PASS	5.13
Cast Ballot	Testing the ability to cast a ballot that has been voted.	PASS	5.13
Cast Overvoted Ballot	Testing the ability to cast a ballot which has more than the allowable number of selections made.	PASS	5.13
Cast Undervoted Ballot	Testing the ability to cast a ballot which has less than the allowable number of selections made for a contest	PASS	5.13
Cancel Ballot Casting	Testing the ability to cancel the casting of a ballot.	PASS	5.13
Make Vote Selection (Audio)	Testing the ability to select a candidate on an audio ballot.	PASS	5.13
Return to Previous Contest (Audio)	Testing the ability to return to a previous contest in the current election on an audio ballot.	PASS	5.13
Proceed to Next Contest (Audio)	Testing the ability to move to the next contest in the current election on an audio ballot.	PASS	5.13
Cancel Vote Selection (Audio)	Testing the ability to cancel vote selection on an audio ballot.	PASS	5.13
Review Selections (Audio)	Testing the ability to review selections made prior to casting an audio ballot	PASS	5.13
Cast Ballot (Audio)	Testing the ability to cast an audio ballot that has been voted.	PASS	5.13
Cast Overvoted Ballot (Audio)	Testing the ability to cast an audio ballot which has more than the allowable number of selections made.	PASS	5.13
Cast Undervoted Ballot (Audio)	Testing the ability to cast an audio ballot which has less than the allowable number of selections made.	PASS	5.13
Cancel Ballot Casting (Audio)	Testing the ability to cancel the casting of an audio ballot.	PASS	5.13
Text Size and Magnifying Tool	Testing the ability to use a magnifying tool to view a ballot and verifying the font size used on ballots	PASS	5.13

Table A-1. Test Case Descriptions *(continued)*

Test Case	Description	Result (Pass/Fail)	Test Campaign
Fleeing Voter	Testing support for fleeing voters.	PASS	5.13
Cast Blank Ballot	Testing the ability to cast an un-voted ballot.	PASS	5.13
Cast Blank Ballot Audio	Testing the ability to cast an un-voted audio ballot.	PASS	5.13
Overvoted Vote Selection	Testing the ability to select more than the allowable number of choices in a contest.	PASS	5.13
Overvoted Vote Selection (Audio)	Testing the ability to select more than the allowable number of choices in a contest (audio).	PASS	5.13
Manually Reset to Defaults	Testing the ability to manually reset a voting machine to its default settings.	PASS	5.13
Dexterity Required for Activation of Controls	Testing the required dexterity and force required to operate the controls on an accessible voting station.	PASS	5.13
Voter Response	Testing the ability of voting system that requires a response from the voter within a specific time frame, to alert the voter twenty seconds in advance of the time expiring.	PASS	5.13
Accidental Activation	Testing the voting machine's controls to ensure that accidental activation does not occur.	PASS	5.13
Skip Referendum Text (Audio)	Testing the ability to skip the over the reading of the text in a referendum on an audio ballot to facilitate the voter being able to vote immediately.	PASS	5.13
Repeat Information (Audio)	Testing the ability to repeat information provided to the voter when voting an audio ballot.	PASS	5.13
Pause Audio Playback	Testing the ability to pause audio playback when voting an audio ballot.	PASS	5.13
Resume Audio Playback	Testing the ability to resume audio playback after it has been paused, when voting an audio ballot.	PASS	5.13
Adjust Color Settings for Color Screens	Testing the ability to adjust the color settings for voting machines with color displays.	PASS	5.13
Ambient Contrast Ratio Settings for Color Screens	Testing the ability to adjust the figure-to-ground ambient contrast ratio on voting machines with color displays.	PASS	5.13
Inspect Touch Sensitive Areas of Touchscreens	Measuring the touch sensitive areas of a touch screen to ensure that steps have been taken to minimize accidental activation of vote response fields.	PASS	5.13

Table A-1. Test Case Descriptions *(continued)*

Test Case	Description	Result (Pass/Fail)	Test Campaign
ATI Handset Audio Support Inspection	Inspection of Audio Tactile Interface (ATI) to verify that it supports voters personal assisted listening devices.	PASS	5.13
Mobility	Inspecting the voting machine to verify that it is accessible to voters who use mobility aids, including wheelchairs.	PASS	5.13
Auto Reset to Defaults	Testing the ability of a voting machine to reset adjustable settings to their default values after a voter's session is completed.	PASS	5.13
Audio Visual Sync	Testing the ability of a voting machine to present a ballot in audio/visual mode with correct synchronization.	PASS	5.13
Page Scrolling	Verifying that page scrolling is not required for voting a ballot on an accessible voting station which uses an electronic display	PASS	5.13
Audio Acoustic Levels	Measuring the acoustic output of a voting machine's audio output, and verifying that the audio is audible only by the voter.	PASS	5.13
Button, Control, and Key Inspection	Inspecting buttons, controls, and other user actuated aspects of an accessible voting station to ensure ease of use by individuals with vision or hearing impairment.	PASS	5.13
Display Refresh Rate (Flicker) Test	Verifying that a voting system's display screen does not flicker with a frequency between 2 Hz and 55 Hz.	PASS	5.13
Color Blindness	Inspecting the voting system interface to verify that steps have been taken to accommodate voters with color blindness via color usage and design decisions.	PASS	5.13
Ambient Contrast Ratio	Verifying that a voting system's display utilizes an ambient contrast ratio sufficient to accommodate voter's with perception issues, and is accessible to voters with partial vision.	PASS	5.13
Privacy Inspection	Testing the voting machine's ability to protect the privacy of a voter.	PASS	5.13
Alternative Language	Testing the accessibility features provided by a voting machine to assist voters who lack English proficiency or have an unwritten language, in the voting process.	PASS	5.13

Table A-1. Test Case Descriptions *(continued)*

Test Case	Description	Result (Pass/Fail)	Test Campaign
Accessibility Inspection	Inspecting an accessible voting station to verify that support provided for voters with disabilities is intrinsic to the voting station and that means for voter identification or authentication do not render the accessible voting station inaccessible to voters with certain disabilities.	PASS	5.13
Audio Comprehension	Inspect audio to verify that verbal information is easily comprehensible to accommodate voters with partial vision.	PASS	5.13
Adjust Audio Speed	Testing the ability to change the rate of speech output by the voting machine, which shall support a range of speeds between 75% and 200% of the nominal rate of speech.	PASS	5.13
Adjust Audio Volume	Testing the ability to adjust volume settings while voting and audio ballot.	PASS	5.13
Security Requirements			
Security Access Controls	Testing the ability to verify that the Voting System implements security access controls.	PASS	5.13
Safeguards	Testing the ability to verify that the Voting System provides safeguards against tampering.	PASS	5.13
Security Provisions	Testing the ability of the system to provide security provisions compatible with procedures and administrative tasks involved in operation of the voting system	PASS	5.13
ICX Access Privileges	Testing the ability of the ICX to ensure that the user can only perform the permissions that were granted to the voter activation card (Tech Advisor, Poll worker, Voter	PASS	5.13
Polling Place Security	Verifying that the manufacturer has included measures pertaining to effective Polling Place Security, in their documentation	PASS	5.13
Protection Against Malicious Software	Verifying that the manufacturer's documentation has provided procedures for ensuring that protection against malicious software is maintained in a current status	PASS	5.13