



Test Report

**Dominion Voting Systems
Democracy Suite (D-Suite) System
Version 5.17-CO
State Certification Testing**

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Disclaimer: This campaign was tested by an EAC accredited VSTL to applicable standards of the VVSG. All testing and references were performed outside of the EAC Test and Certification Program

v. TR-01-02-DVS-2023-02.02

REVISIONS

Revision	Description	Date
00	Initial Release	05/12/2023
01	Updated TDP Document Versions, Reformatted Report	05/12/2023
02	Added Test Case Table for IRV Testing	5/22/2023

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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) 5.17-CO 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 and the voting systems requirements set forth by the State of Colorado. *Note: Colorado requires testing to the 2002 Voting Systems Standard (VSS) by statute; however, testing to the VVSG requirements is deemed sufficient since the requirements in the VSS and VVSG are almost identical.*

The system configuration is a modification baselined from the previously state certified D-Suite 5.13-A system, the modifications of which were evaluated during certification testing of the D-Suite 5.17 system configuration. The D-Suite 5.17 system was granted certification to the 2005 Voluntary Voting System Guidelines (VVSG) by the Election Assistance Commission (EAC) on March 16, 2023. Detailed descriptions of the D-Suite 5.17 test campaign are contained in Pro V&V Report No.TR-01-01-DVS-50-01.01, Rev. 03, which is available for viewing on the EAC's website at www.eac.gov.

1.1 References

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

- D-Suite 5.17-CO (State Level) Testing Campaign Scope of Testing Document
- State of Colorado Requirements Matrix
- 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 3.0
- Election Assistance Commission Voting System Test Laboratory Program Manual, Version 3.0
- 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
- EAC Requests for Interpretation (RFI) and Notices of Clarification (NOC) (listed on www.eac.gov)

- Dominion Voting Systems Technical Data Package (*A listing of the D-Suite 5.17-CO documents submitted for this test campaign is listed in Section 3.3 of this Test Report*)
- Pro V&V Report No.TR-01-01-DVS-50-01.01, Rev. 03

1.2 Terms and Abbreviations

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

“BMD” – Ballot Marking Device

“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

“ICP” – ImageCast Precinct

“ICX” – ImageCast X

“IRV” – Instant Runoff Voting

“PCOS” – Precinct Count Optical Scan

“ISO” – International Organization for Standardization

“NOC” – Notice of Clarification

“QA” – Quality Assurance

“RCV” – Rank Choice Voting

“RFI” – Request for Interpretation

“RTR” – Results Tally & Reporting

“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 5.17) was granted certification to the 2005 Voluntary Voting System Guidelines (VVSG) by the Election Assistance Commission (EAC) on February 8, 2017. The D-Suite 5.17 System (the predecessor of the D-Suite 5.17-CO) is a modification of subsequent systems tested as modifications to the original D-Suite 5.0 System. This 5.17-CO test campaign expands on the D-Suite 5.17 system that was granted certification to the 2005 Voluntary Voting System Guidelines (VVSG) by the Election Assistance Commission (EAC) on March 16, 2023. Detailed descriptions of the D-Suite 5.17 test campaign are contained in Pro V&V Report No. TR-01-01-DVS-50-01.01, Rev. 03, which is available for viewing on the EAC's website at www.eac.gov.

1.4 Scope

The scope of this testing event incorporated a sufficient spectrum of physical and functional tests to verify that certain D-Suite 5.17-CO features and applications, which have been modified from the D-Suite 5.17 baseline, conform to the applicable EAC 2005 VVSG 1.0 requirements. D-Suite 5.17-CO includes modifications to the D-Suite 5.13-A system currently certified for use in the State of Colorado. These modifications were evaluated during the D-Suite 5.17 EAC test campaign.

Specifically, the testing event has the following goals:

- Verify that the D-Suite 5.17-CO System meets both the applicable requirements of the EAC 2005 VVSG 1.0 and the additional Colorado-specific requirements
- Perform Trusted Builds and Generate Hash Values
- Physical Configuration Audit (PCA), including System Loads and Hardening
- Technical Documentation Review
- Functional Configuration Audit (FCA), including functional testing of all submitted modifications and testing of Instant Runoff Voting
- System Integration Testing, including Accuracy Testing and Regression Testing

Dominion Voting Systems has identified the following modifications from the previously certified system 5.13-A system configuration:

General System Changes

- System and security updates to Democracy Suite
 - Upgrade to Windows Server 2019 and SQL Server 2019
 - New tool for performing automated hardening procedure of all Windows-based components

- Additional encryption of election databases on ICX
- ICX Smart Card Mutual Authentication and Secure Messaging
- Added additional election-specific information to the barcode on paper ballots
- Improved pseudo random number algorithm

Election Management System

- System and security upgrades to the EMS system:
 - Expanding use of Trusted Certificates
 - Additional Software Encryption of the SQL database
 - Blocked auto-play for all external media
- Election Event Designer: Added information about status of election files in the Tabulator list to indicate whether election media has been programmed or needs to be re-programmed
- Results Tally & Reporting: Added option to redact low turnout by precinct and/or counting group from CVR export for Primary Elections

Adjudication

- New Adjudication Activity Log and Export
- Added ability to perform Database Back-ups and Maintenance Procedure

ImageCast X

- Additional USB models added to list of accepted devices

2.0 TESTING OVERVIEW

The evaluation of the D-Suite 5.17-CO 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 5.17-CO features and applications, which have been modified from the previously tested 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, Systems Loads and Hardening & Receipt Inspection	A PCA and Receipt Inspection were 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. The system setup, loads, and hardening was tested by comparing the voting system submitted for certification testing to the manufacturer’s technical documentation.
Verified that the D-Suite 5.17-CO meets the applicable requirements of the EAC 2005 VVSG 1.0.	Testing evaluated the D-Suite 5.17-CO system to election scenarios using a combination of different ballot programming approaches, ballot designs, ballot sizes, languages, and tabulators.
Functional Configuration Audit (FCA), including Regression Testing	The D-Suite 5.17-CO system was tested in pre-election, Election Day, post-election and evaluated against documented behavior and expected results for all scenarios.
System Integration Testing	The D-Suite 5.17-CO was tested 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 voting system components.

2.1 Test Candidate

The Democracy Suite 5.17-CO 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) BMD. Below is the description of the Democracy Suite 5.17 baseline system, which contains the same components descriptions for the Democracy Suite 5.17-CO system.

Election Management System (EMS)

The Democracy Suite 5.17 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.

Image Cast 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, reviewed, cast and tabulated at the polling location on an ImageCast Precinct device or later 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.

Democracy Suite 5.17-CO System Configuration Components

Democracy Suite Election Management System (EMS)

- Dominion Voting Systems Democracy Suite EMS 5.17.17.1, containing:
 - Election Event Designer
 - Results Tally and Reporting
 - Audio Studio
 - Election Data Translator
 - Application Server Database Server
 - EMS Logger
 - NAS Server

- EMS Server Applications & Services
 - Data Center Manager
 - File System Service
 - Adjudication Services 5.17.14.1
 - Smart Card Helper Service
- ❖ DCF version (ICP/ICC) DCF_5.17.9.1_20220916
- ❖ MCF version (ICX) MCF_5.17.15.1_20220920
- Optional Adjudication 5.17.14.1

COTS Hardware and Software

- EMS Standard Server Configuration
 - Microsoft Windows Server 2019
 - Microsoft SQL Server 2019 Standard
 - Server computer system per *2.02 Democracy Suite System Configuration Overview*
 - Dell PowerEdge R640
 - Dell PowerEdge R630
 - Dell PowerEdge T630
 - Dell PowerEdge R710
- EMS Express Server Configuration
 - Microsoft Windows 10 Professional
 - Microsoft SQL Server 2019 Express with Advanced Services
 - Desktop computer system per *2.02 Democracy Suite System Configuration Overview*
 - Dell Precision 3460 XE
 - Dell Precision 3450 XE
 - Dell Precision 3440 XE
 - Dell Precision T3420
 - Dell Precision T1700
- Client Workstation Configuration
 - Microsoft Windows 10 Professional
 - Desktop computer system per *2.02 Democracy Suite System Configuration Overview*
 - Dell Precision 3460 XE
 - Dell Precision 3450 XE

- Dell Precision 3440 XE
 - Dell Precision T3420
 - Dell Precision T1700
- EMS COTS Software common to Standard and Express configurations
 - Microsoft.Net Framework 4.8
 - Microsoft.Net Framework 3.5
 - Microsoft Visual C++ 2015 Redistributable
 - Java SE Runtime Environment 6.0 Update 20 or later
 - Dallas 1-Wire Device Driver version 4.1.0 or newer
 - Adobe Reader DC or later
- Optional COTS Software for Standard and Express configurations
 - Microsoft Windows Defender (Servers and Client Workstations)
 - 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 to 1-Wire USB Adapter: Dallas Maxim DS1402-RP8+
 - iButton Reader/Writer: Dallas Maxim DS9490R#
 - Smart Card Reader: Advanced Card Systems ACR38U
 - Smart Card Reader: Advanced Card Systems ACR39U
 - Smart Card Reader: HID Omnikey 3121 FIPS-201
 - LCD Monitor:
 - Dell P2422H
 - Dell P2419H
 - Dell P2417H
 - Ethernet Switch: Dell x1026
 - Ethernet Switch: Dell x1008
 - Ethernet Switch: Dell X1018
 - Ethernet Switch: Dell N1524

- Ethernet Switch: Cisco 8-port Switch (CBS350-8T-E-2G)
- Ethernet Switch: Cisco 24-port Switch (CBS350-24T-4G)
- Mini-Server Rack: StarTech RK1236BKF
- Rack Power Distribution Unit: APC AP9562
- UPS:
 - Tripp Lite SMART1500RMXL2U
 - APC SMT1500 Smart-UPS
 - APC SMT1500C Smart-UPS
 - APC BR1000G
 - CyberPower PR1500LCD
 - CyberPower PR1500LCD-VTVM
- Keyboard, Mouse, Headset with microphone, Audio Adapter networking switch – COTS computing accessories
- EMS Report Printer: HP M404dn laser or equivalent
- EMS Report Printer: Canon LBP6230dw or equivalent
- Election media:
 - iButton (Pollworker): Dallas Maxim DS1963S-F5+ (w/Black Key Ring Mount DS9093A+)
 - Compact Flash Memory Cards (16GB): Centon C4-CM-CF-16.4
 - USB Memory Device (128GB): Apricorn AEGIS Secure Key 3NX PN: ASK3-NX-128GB
 - USB Memory Device (32GB): Apricorn AEGIS Secure Key 3NX PN: ASK3-NX-32GB
 - USB Memory Device (120GB): Apricorn AEGIS Secure Key PN: ASK3-120GB
 - USB Memory Device (30GB): Apricorn AEGIS Secure Key PN: ASK3-30GB
 - USB Memory Device (16GB): Centon (BiCS4) PN: C4-CT-U3P2-16.3
 - USB Memory Device (16GB): Centon S4-CM-U3P2-16.1
 - USB Memory Device (16GB): Apacer EH353-M APHA016GAG0CG-3TM
 - USB Memory Device (8GB): Centon (BiCS4) PN: C4-CT-U3P2-8.3
 - USB Memory Device (8GB): Centon S4-CM-U3P2-8.1
 - USB Memory Device (8GB): Apacer EH353-M APHA008GAG0CG-3TM
 - Smart Cards: ACOS-6-64

ImageCast Voter Activation (ICVA)

- Software version: 5.17.17.1

COTS Hardware and Software

- Client Workstation Configuration
 - Microsoft Windows 10 Professional
 - Desktop computer system per *2.02 Democracy Suite System Configuration Overview*
 - Dell Latitude 3330
 - 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 Omnikey 3121 FIPS-201
- Election Media:
 - USB Memory Device (16GB): Centon (BiCS4) PN: C4-CT-U3P2-16.3
 - USB Memory Device (16GB): Centon S4-CM-U3P2-16.1
 - USB Memory Device (16GB): Apacer EH353-M APHA016GAG0CG-3TM
 - USB Memory Device (8GB): Centon (BiCS4) PN: C4-CT-U3P2-8.3
 - USB Memory Device (8GB): Centon S4-CM-U3P2-8.1
 - USB Memory Device (8GB): Apacer EH353-M APHA008GAG0CG-3TM
 - Smart Cards: ACOS-6-64

ImageCast Central Count (ICC)

- ICC software application: version 5.17.15.1

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 4.1.0 or newer, 64 bit (32 bit as needed)
- Canon: DR-G2140 driver - version 1.1 SP2
- Canon: DR-G1130 driver - version 1.2 SP6
- Canon: DR-X10C driver - version 1.15 SP3
- Canon: DR-M160-II driver - version 1.2 SP6
- InoTec: HiPro 821 driver - version 1.3.0.4

COTS Hardware:

- ICC Scanner: Canon DR-G2140
- Imprinter (optional)
- ICC Scanner: Canon DR-G1130
- Imprinter (optional)
- ICC Scanner: Canon DR-X10C
- ICC Scanner: Canon DR-M160-II
- ICC Scanner: InoTec HiPro 821 with integrated imprinter
- Canon Scanner Client Workstation Configuration:
- Desktop or All-in-One computer system per *2.02 Democracy Suite System Configuration Overview*
 - Dell Precision 3460 XE
 - Dell Precision 3450 XE
 - Dell Precision 3440 XE
 - Touch Monitor: Planar PCT2235
 - Dell OptiPlex 3050 AIO
 - Dell OptiPlex 7440 AIO
 - Dell OptiPlex 9030 AIO
- InoTec HiPro Scanner Client Workstation Configuration:
- Desktop computer system per *2.02 Democracy Suite System Configuration Overview*
 - Dell OptiPlex XE4
 - Dell OptiPlex XE3
 - Dell OptiPlex 7060
 - Dell OptiPlex 7050
 - Lenovo 11GCPAR1US (touch monitor)
 - Lenovo 10QXPAR1US (touch monitor)

- Dell P2418HT (touch monitor)
- Auxiliary Equipment:
- iButton to 1-Wire USB Adapter: Dallas Maxim DS1402-RP8+
- iButton Reader/Writer: Dallas Maxim DS9490R#
- Election Media:
 - iButton: Dallas Maxim DS1963S-F5+ (with Key Ring Mount DS9093A+)
 - USB Memory Device (16GB): Centon (BiCS4) PN: C4-CT-U3P2-16.3
 - USB Memory Device (16GB): Centon S4-CM-U3P2-16.1
 - USB Memory Device (16GB): Apacer EH353-M APHA016GAG0CG-3TM
 - USB Memory Device (8GB): Centon (BiCS4) PN: C4-CT-U3P2-8.3
 - USB Memory Device (8GB): Centon S4-CM-U3P2-8.1
 - USB Memory Device (8GB): Apacer EH353-M APHA008GAG0CG-3TM
 - Compact Flash Memory Cards (16GB): Centon C4-CM-CF-16.4

ImageCast X with BMD (ICX BMD)

- Application version: 5.17.17.1
- Hardware version: Avalue SID-21V-Z37 (21.5 in. screen-Classic)

Optional Hardware

- Accessible-Tactile Interface (ATI-USB) box
- ICX Classic BMD Transport Bag
- ICX Privacy Screen
- ICX Voting Booth

COTS Hardware

- UPS:
 - APC SMT-1500
 - APC SMT-1500C
 - CyberPower PR1500LCD
 - CyberPower PR1500LCD-VTVM
- Printer:
 - Avision Ap3061
 - HP M402dne

- HP M404dn
- Election Media
 - USB Memory Device (128GB): Apricorn AEGIS Secure Key 3NX PN: ASK3-NX-128GB
 - USB Memory Device (32GB): Apricorn AEGIS Secure Key 3NX PN: ASK3-NX-32GB
 - USB Memory Device (120GB): Apricorn AEGIS Secure Key PN: ASK3-120GB
 - USB Memory Device (30GB): Apricorn AEGIS Secure Key PN: ASK3-30GB
 - USB Memory Device (16GB): Centon (BiCS4) PN: C4-CT-U3P2-16.3
 - USB Memory Device (16GB): Centon S4-CM-U3P2-16.1
 - USB Memory Device (16GB): Apacer EH353-M APHA016GAG0CG-3TM
 - USB Memory Device (8GB): Centon (BiCS4) PN: C4-CT-U3P2-8.3
 - USB Memory Device (8GB): Centon S4-CM-U3P2-8.1
 - USB Memory Device (8GB): Apacer EH353-M APHA008GAG0CG-3TM
 - Smart Cards: ACOS-6-64

COTS Software

- Android 8.1.0-2.2.4
- Google TTS

Optional COTS Software

- None

Optional COTS Hardware

- 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)

2.1.1 System Diagram

A diagram depicting the D-Suite 5.17-CO is provided in Figure 2-1.

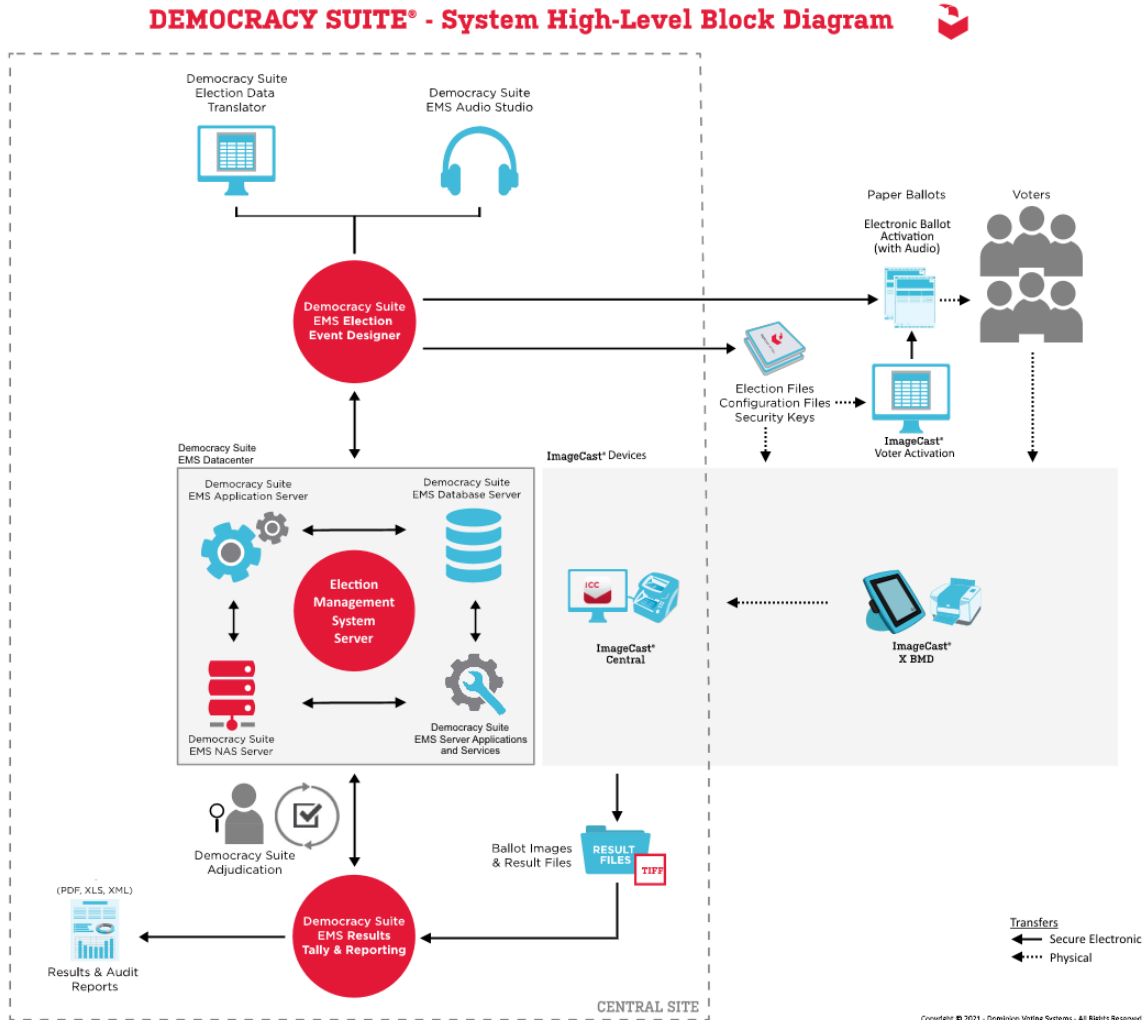


Figure 2-1 System Diagram

2.1.2 Supported Languages

The following languages have been stated to be supported by the D-Suite 5.17-CO 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 be verified.

2.1.3 Supported Functionality

The Democracy Suite 5.17-CO 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 Precints
- Vote for N of M
- Ballot Rotation
- Provisional or Challenged Ballots
- Ranked Choice Voting

2.1.4 COTS Components

Table 2-2: D-Suite 5.17-CO 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 3460 XE	5.17 EAC
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 3330	5.17 EAC
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	5.11-CO
Workstation - All in One	Dell	Optiplex 9030	5.13
Workstation - All in One	Dell	Optiplex 7440	5.13
Workstation	Dell	Optiplex XE4	5.17 EAC
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

Table 2-2: D-Suite 5.17-CO COTS Components *(continued)*

Description	Manufacturer	Model/MPN	Test Campaign
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
BMD Printers	Hewlett Packard	M404dn	5.13-A
BMD Printers	Hewlett Packard	M402dne	5.13
BMD Printers	Avision	AP3061	5.13
Server Operating System	Microsoft	Windows Server 2019	5.17 EAC
Database Software	Microsoft	SQL Server 2019	5.17 EAC
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
LCD Monitor	Dell	P2422H	5.17 EAC
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

Table 2-2: D-Suite 5.17-CO COTS Components (continued)

Description	Manufacturer	Model/MPN	Test Campaign
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	PR1500LCD-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
USB Flash Drive - 16GB (BiCS4)	Centon	C4-CT-U3P2-16.3	5.17 EAC
USB Flash Drive - 8GB	Centon	S4-CM-U3P2-8.1	5.13
USB Flash Drive - 8GB (BiCS4)	Centon	C4-CT-U3P2-8.3	5.17 EAC
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
Accessible Tactile Interface – USB	e2ip Technologies	181-000036 Rev. A	5.13
ICX Classic BMD Transport Bag	Dominion Voting	125-000069	5.13

Table 2-2: D-Suite 5.17-CO COTS Components (continued)

Description	Manufacturer	Model/MPN	Test Campaign
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

2.1.5 System Limits

Table 2-3: D-Suite 5.17-CO System Limits

Characteristic	Limit by Configuration		Limiting Component
	Express	Standard	
Ballot positions	462**/292*	462**/292*	22-inch Ballot
Precincts in an election	250	1000	Memory
Contests in an election	250	1000	Memory
Candidates/Counters in an election	2500	10000	Memory
Candidates/Counters in a precinct	462**/240*	462**/240*	22-inch Ballot
Candidates/Counters in a tabulator	2500	10000	Memory
Ballot Styles in an election	750	3000	Memory
Contests in a ballot style	156**/38*	156**/38*	22-inch Ballot
Candidates in a contest	231**/240*	231**/240*	22-inch Ballot
Ballot styles in a precinct	5	5	Memory
Number of political parties	30	30	Memory
“Vote for” in a contest	30**/24*	30**/24*	22-inch Ballot
Supported languages in an election	5	5	Memory
Number of write-ins	462**/24*	462**/24*	22-inch Ballot

* Reflects the system limit for a ballot printed in landscape

** Reflects the system limit for a ballot printed in portrait.

3.0 TEST PROCESS AND RESULTS

The following sections outline the test process that was followed to evaluate the D-Suite 5.17-CO System under the scope defined in Section 1.4.

3.1 General Information

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

3.2 Test Configuration

The testing event utilized one setup of the D-Suite 5.17-CO System.

3.3 Summary Findings

Summary findings for the PCA and System Level Testing (FCA, System Integration, Accuracy, and Regression Testing) are detailed in the relevant sections of this report. Findings for additional areas of testing and review, such as Source Code Review and Usability, can be found in the Test Report for 5.17 EAC. In addition to these areas of testing, a limited TDP Review was performed, as described below.

Technical Documentation Package (TDP) Review

In order to determine compliance of the modified TDP documents with the EAC VVSG 1.0, a limited TDP review was conducted. This review focused on TDP documents that have been modified since the certification of the baseline system. The review consisted of a compliance review to verify that each regulatory, state, or manufacturer-stated requirement had been met based on the context of each requirement. A listing of all documents contained in the D-Suite 5.17-CO TDP is provided in Table 3-1.

Table 3-1: D-Suite 5.17-CO TDP Documents

Document Number	Description	Version
<i>Build Documents</i>		
---	Democracy Suite ImageCast X Build	5.17-CO::3
---	Democracy Suite Windows Build Document	5.17-CO::3
---	Democracy Suite EMS Mobile Ballot Production Build Procedure	5.17-CO::3
<i>D-Suite Documents</i>		
2.02	Democracy Suite System Overview	5.17-CO::3
2.03	Democracy Suite EMS Functionality Description	5.17-CO::4
2.03	Democracy Suite ImageCast Central System Functionality Description	5.17-CO::3

Table 3-1: D-Suite 5.17-CO TDP Documents *(continued)*

Document Number	Description	Version
2.03	Democracy Suite ImageCast X System Functionality Description	5.17-CO::3
2.05	Democracy Suite Adjudication Software Design and Specification	5.17-CO::3
2.05	Democracy Suite EMS Software Design and Specification	5.17-CO::4
2.05	Democracy Suite ImageCast Central Software Design and Specifications	5.17-CO::3
2.05	Democracy Suite ImageCast X Software Design and Specification	5.17-CO::3
2.06	Democracy Suite System Security Specification	5.17-CO::3
2.07	Democracy Suite System Test and Verification Specification	5.17-CO::2
2.08	Democracy Suite Adjudication System Operation Procedures	5.17-CO::3
2.08	Democracy Suite EMS System Operations Procedures	5.17-CO::3
2.08	Democracy Suite ImageCast Central System Operations Procedures	5.17-CO::3
2.08	Democracy Suite ImageCast X System Operations Procedures	5.17-CO::3
2.09	Democracy Suite Adjudication System Maintenance Manual	5.17-CO::3
2.09	Democracy Suite EMS System Maintenance Manual	5.17-CO::3
2.09	Democracy Suite® ImageCast X System Maintenance Manual	5.17-CO::4
2.10	Democracy Suite Personnel Deployment and Training Requirements	5.17-CO::3
2.11	Democracy Suite Configuration Management Plan	5.17-CO::3
2.12	Democracy Suite Quality Assurance Program	5.17-CO::3
2.13	Democracy Suite System Change Notes	5.17-CO::3
<i>Installation and Configuration</i>		
---	Democracy Suite EMS Client Workstation Installation and Configuration Procedure	5.17-CO::5
---	Democracy Suite EMS Express Installation and Configuration Procedure	5.17-CO::5
---	Democracy Suite ImageCast Voter Activation Installation and Configuration Procedure	5.17-CO::4
---	Democracy Suite EMS Standard System Installation and Configuration Procedure	5.17-CO::4
---	Democracy Suite ImageCast Central Installation and Configuration Procedures	5.17-CO::4
---	Democracy Suite ImageCast X Classic System Installation and Configuration Procedure	5.17-CO::3
<i>DVS Supplemental</i>		
---	Democracy Suite ImageCast Tabulator Surface Cleaning Guide	5.17-CO::1
---	Democracy Suite ImageCast® C++ Coding Standard	5.17-CO::2
---	Notice of Protected Information	5.17-CO::2

Table 3-1: D-Suite 5.17-CO TDP Documents *(continued)*

Document Number	Description	Version
---	Java Coding Standards	5.17-CO::1
---	JavaScript Coding Standards	5.17-CO::1
---	SD_Google Java Style Dominion	N/A
---	Democracy Suite ImageCast Configuration File Settings	5.17-CO::1
---	Democracy Suite ImageCast Device Configuration Files	5.17-CO::1
---	Democracy Suite ImageCast Election Definition Files	5.17-CO::3
---	Democracy Suite ImageCast Printing and Finishing Specifications	5.17-CO::1
---	Democracy Suite ImageCast Total Results File Format	5.17-CO::1
---	Democracy Suite ImageCast X Machine Configuration File Settings	5.17-CO::1
---	Usability Test Report Of ImageCast X 5.0 with 36 Participants for VVSG 1.0	5.17-CO::1
---	Democracy Suite System Identification Guide	5.17-CO::4
<i>COTS Supplemental</i>		
---	ACM-70B Stereo Headphones Cyber Acoustics	---
---	AbleNet_single_switch_manual.pdf Quickstart Guide: Single Switches	B
---	acs ACOS6 Multi-Application and Purse Card Functional Specifications V1.04	1.04
---	ACOS6_Reference_Manual_v2.81.pdf	2.81
---	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 AP9562 Installation and Operation Rack Power Distribution Unit	990-1215D-001
---	APC_BR1000G_User_Guide.pdf	EN 990-3804B
---	APC_SMT1500_InstallGuide	EN 990-3535F-001
---	APC_SMT1500_OpsManual	EN 990-3534F
---	APC_SMT1500C_OpsManual	EN 990-5442D
---	APC_SMT1500C_UserGuide	EN 990-5442B
---	Apricorn Aegis 3NX Compliance	rev 11-03-20
---	ApriCorn_Aegis_USB_manual	---
---	Avalue_SID_21V_FactSheet	---

Table 3-1: D-Suite 5.17-CO TDP Documents (continued)

Document Number	Description	Version
---	Avalue_SID_21V_Z37_UserManual	1.0
---	Avalue_SID-21V_QuickRef	1st Ed
---	Avision AP3061 CE Report	V1.0
---	Avision AP3061 FCC Report	V3.0
---	Avision AP3061 Statement of Conformity	---
---	Avision_AP30Series_SpecSheet	---
---	Avision_AP30Series_UserGuide	---
---	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
---	Canon_DRX10C_User_Manual	PUB. CE-IE-608
---	Canon_LBP6230dw_Spec_Sheet	---
---	Canon_LBP6230dw_Startup	FT6-0797(000)
---	Cisco_350SeriesSwitches_DataSheet	C78-744156-01
---	Cisco_350SeriesSwitches_QuickStart	---
---	CyberPower_PR1500LCD_RoHSDeclaration	---
---	CyberPower_PR1500LCD_User_Manual	---
---	Dell_Latitude_3330_Compliance	---
---	Dell_Latitude_3330_owners manual	Rev. A00
---	Dell Latitude 3400 Setup and specifications guide	Rev. A00
---	Dell Latitude 3410 Product Compliance Datasheet	A18
---	Dell_Latitude_3410_Setup_and_Specification	Rev. A01
---	Dell_Latitude_3420_Compliance	---
---	Dell_Latitude_3420-laptop_owners-manual2	Rev. A00
---	Dell_Latitude_3420_Setup_and_Specification	Rev. A03
---	Dell Power Switch N1524 Compliance	A11
---	Dell Precision 3440 Compliance	A17
---	Dell_Latitude_3410-laptop_owners-manual2_en-us Setup and specifications guide	Rev. A00

Table 3-1: D-Suite 5.17-CO TDP Documents (continued)

Document Number	Description	Version
---	Dell_Latitude_3470_laptop_Owners_Manual	Rev. A00
---	Dell_Latitude_3480-laptop_owners manual_en-us	Rev. A00
---	Dell_Latitude-3490-laptop_owners-manual4_en-us.pdf	Rev. A01
---	Dell_Latitude_E7450-Ultrabook_owners-manual	Rev. A02
---	Dell_Latitude_E7470_Ultrabook_Owners_Manual	Rev. A02
---	Dell_Networking_N-series_PowerSwitch_N1524_Compliance	---
---	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	Rev. A01
---	Dell_Optiplex_7060-desktop_setup	Rev. A01
---	Dell_Optiplex_7440-aio_Owners_Manual	Rev. A01
---	Dell_Optiplex_9030-aio_owners-manual_en-us	Rev. A01
---	Dell_Optiplex_XE3_Compliance	---
---	Dell_Optiplex_XE3_Setup_and_Specifications	Rev. A01
---	Dell_Optiplex_XE3_SFF_Service_Manual-en-us	Rev. A01
---	Dell_Optiplex_XE4_SFF_Compliance	---
---	Dell_Optiplex_XE4_SFF_Service_Manual-en-us	Rev. X-Rev
---	Dell_Optiplex_XE4_SFF_Setup_and_Specifications_en-us	Rev. A01
---	Dell_P2417H_Monitor_Users_Guide	Rev. A01
---	Dell_P2418HT_Monitor_Compliance	---
---	Dell_P2418HT-monitor_user's guide	Rev. A00
---	Dell_P2419h-monitor_user's-guide_en-us	Rev. A00
---	Dell_P2422H_monitor_users-guide	Rev. A02
---	Dell_P2422H_regulatory and environmental datasheet en-us	---
---	DEll_PowerEdge_R630_Data_Sheet.pdf	A10
---	Dell_Powerededge_R630_Owner_Manual	Rev. A03
---	Dell_Powerededge_R640_Owner_Manual	Rev. A01
---	Dell_Powerededge_R640_Tech_Guide	Rev. A00

Table 3-1: D-Suite 5.17-CO TDP Documents (continued)

Document Number	Description	Version
---	Dell_Poweredge_R710_owner's manual_en-us	Rev. A03
---	Dell_Poweredge_T630_owners-manual_en-us	Rev. A06
---	Dell Precision 3430 Small Form Factor Setup and specifications guide	Rev. A00
---	Dell_Precision_3440_Compliance	---
---	Dell_Precision_3440-workstation_setup-guide_en-us	Rev. A00
---	Dell_Precision_3450-SFF_regulatory and environmental datasheet en-u	---
---	Dell_Precision_3450-SFF-Service-Manual	Rev. A02
---	Dell_Precision_3450-SFF-Setup-and-Specifications	Rev. A02
---	Dell_Precision_3460-SFF-Service-Manual	Rev. A00
---	Dell_Precision_3460-SFF-Setup-and-Specifications	Rev. A01
---	Dell_Precision_T1700-workstation_owners-manual_en-us	Rev. A00
---	Dell_Precision_T3420_regulatory and environmental datasheet	---
---	Dell_Precision_T3420_Workstation_Owner_Manual	Rev. A00
---	HID_Omnikey_3121_assembly	Rev. A.O
---	HID_Omnikey_3121_userguide_ins_en	Rev. A.3
---	HID_Omnikey_3121-Datasheet	---
---	HP_LaserJet_Pro_M402dne_Datasheet.pdf	4AA6-5210EEP
---	HP_LaserJet_Pro_M402x_M403x_User_Guide	2
---	HP_LaserJet_Pro_M404_UserGuide	2
---	HP_LaserJer_Pro_404dn_Data_Sheet.pdf	R1
---	HP_LaserJet_Pro_M404dn_SpecwCompliance	---
---	InterScan_HiPro_821.pdf	---
---	Lenovo_ThinkCentreTIO24Gen3Touch	First Edition
---	Lenovo_ThinkCentreTIO24Gen4TouchUserGuide	First Edition
---	Planar-PTC2235_user-guide	---
---	SCAMAX_8x1-Document-Scanner-Brochure	A
---	SCAMAX_DocumentScanner_UserManual	2019.12
---	Tripp-Lite-SMART1500_Owners-Manual	---
---	Tripp_Smart_Pro_SM1500RMXL2UTAA_Datasheet.pdf	---
---	Dell OptiPlex 7060 Small Form Factor Service Manual	Rev. A00

Table 3-1: D-Suite 5.17-CO TDP Documents *(continued)*

Document Number	Description	Version
---	Dell Precision 3430 Small Form Factor Setup and specifications guide	Rev. A00
<i>User Guides</i>		
---	Democracy Suite ImageCast Adjudication User Guide	5.17-CO::3
---	Democracy Suite EMS Audio Studio User Guide	5.17-CO::3
---	Democracy Suite EMS Automated Test Deck User Guide	5.17-CO::2
---	Democracy Suite EMS Election Data Translator User Guide	5.17-CO::4
---	Democracy Suite EMS Election Event Designer User Guide	5.17-CO::4
---	Democracy Suite ImageCast Central User Guide	5.17-CO::4
---	Democracy Suite EMS ImageCast Voter Activation User Guide	5.17-CO::3
---	Democracy Suite ImageCast X User Guide	5.17-CO::4
---	Democracy Suite EMS Results Tally & Reporting User Guide	5.17-CO::4

3.3.1 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
- If the hardware is non-COTS, Pro V&V reviewed drawings, specifications, technical data, and test data associated with system hardware to establish a system hardware baseline associated with the software baseline
- 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

Summary Findings

During execution of the test procedure, the components of the D-Suite 5.17-CO 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.

3.3.2 System Level Testing

System Level Testing included the Functional Configuration Audit (FCA), Accuracy, and the System Integration Tests. 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.

3.3.2.1 Functional Configuration Audit (FCA)

The Functional Configuration Audit (FCA) encompassed an examination of manufacturer's tests, and the conduct of additional tests, to verify that the system hardware and software performed 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. The FCA for this test campaign included an assessment of the submitted modifications 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.

The specifically designed test cases were utilized to evaluate the previously identified submitted modifications that include:

- Adding support for the DR X10-C
- Adding support for Instant Runoff Voting

Additionally, test cases were designed to test the following Colorado-specific requirements:

- Abstract Reporting
- Ballot-Level Cast Vote Records and Exports
- Election Night Reporting Data and Exports

The table below lists the test cases used during testing and verification of IRV functionality with the GEN02 election project:

Table 3-2: Instant Runoff Voting Test Cases

Component	Test Case Name	Result
ImageCast Central	RCV: Scan Batch of Hand Marked Ballots	Pass
	RCV: Stop On – Duplicated Candidate	Pass
	RCV: Stop On – Skipped Ranking	Pass
	RCV: Stop On – Overvoted Ranking	Pass
	RCV: Stop On – Unused Ranking	Pass
	RCV: Stop On – Inconsistent Ordering	Pass
	RCV: Stop On – Unranked Contest	Pass
ImageCast X	RCV: Manual Voting Session using Poll Worker Card	Pass
	RCV: Standard Voting Session using Voter Card	Pass
	RCV: Accessible Voting Session using Voter Card	Pass
Adjudication	Adjudicate RCV: Set-up with RCV Filter Options	Pass
	Adjudicate RCV: Duplicate Ranking Ballot	Pass
	Adjudicate RCV: Inconsistent Ranking Ballot	Pass
	Adjudicate RCV: Overvoted Ranking Ballot	Pass
	Adjudicate RCV: Skipped Ranking Ballot	Pass
	Adjudicate RCV: Unused Ranking Ballot	Pass
	Adjudicate RCV: Unvoted Contest Ballot	Pass
Results Tally & Transfer	Create Ranked Profile	Pass
	Tabulate Ranked Contest	Pass
	Verify RCV Report	Pass
	Verift Election Report	Pass

Summary Findings

The D-Suite 5.17-CO system successfully passed the FCA. During execution of the test procedure, it was verified that the D-Suite 5.17-CO system successfully completed the FCA with all actual results obtained during test execution matching the expected results.

3.3.2.2 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. As part of the System Integration Tests, one primary and one general election 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 5.17-CO 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 5.17-CO system technical documentation. This included connecting all supporting equipment and peripherals as well as any physical security equipment such as locks and ties.

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 5.17-CO technical documentation. One General Election and one Primary Election were successfully exercised on the voting system, as described below:

General election with the following breakdown:

- General Election GEN-01: A basic election held in four precincts, one of which is a split precinct. This election contains nineteen contests compiled into four ballot styles with five of the contests in all four ballot styles. The other fifteen 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 election 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 5.17-CO system successfully passed the System Integration Test. During execution of the test procedure, it was verified that the D-Suite 5.17-CO system successfully completed the system level integration tests with all actual results obtained during test execution matching the expected results.

3.3.2.3 Regression Testing

Regression testing was conducted on the D-Suite 5.17-CO to establish assurance that the modifications had no adverse impact on the compliance, integrity, or performance of the system.

Summary Findings

No new faults or issues were found during regression testing.

3.3.2.4 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. 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 5.17-CO system were used in this testing.

Summary Findings:

To perform the Accuracy Test, ballots were scanned by the ICC (Canon DR X-10C) and a results report was generated. Sufficient ballots were scanned to ensure each component accurately scanned at least a total of 1,575,000 ballot positions. During execution of the test procedure, it was verified that the D-Suite 5.17-CO System successfully completed the accuracy test with all actual results obtained during test execution matching the expected results. Results were also verified back through the EMS.

4.0 CONCLUSIONS

Based on the results obtained during the test campaign and the re-use of testing from the previous D-Suite certification test campaigns, where applicable, Pro V&V determines the D-Suite 5.17-CO System, as presented for evaluation, met 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 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
<i>General System Changes</i>			
Upgrade to Windows Server 2019 and SQL Server 2019	Specifically designed test case created to evaluate the modification.	PASS	5.17*
New tool for performing automated hardening procedure of all Windows-based components	Specifically designed test case created to evaluate the modification.	PASS	5.17*
Addition encryption of election databases on ICX	Specifically designed test case created to evaluate the modification.	PASS	5.17*
ICX Smart Card Mutual Authentication and Secure Messaging	Specifically designed test case created to evaluate the modification.	PASS	5.17*
Added additional election-specific information to the barcode on paper ballots	Specifically designed test case created to evaluate the modification.	PASS	5.17*
Improved pseudo random number algorithm	Specifically designed test case created to evaluate the modification.	PASS	5.17*
Expanding use of Trusted Certificates	Specifically designed test case created to evaluate the modification.	PASS	5.17*
Additional Software Encryption of the SQL database	Specifically designed test case created to evaluate the modification.	PASS	5.17*
Blocked auto-play for all external media	Specifically designed test case created to evaluate the modification.	PASS	5.17*
EED – Added information about status of election files in the Tabulator list to indicate whether election media has been programmed or needs to be re-programmed.	Specifically designed test case created to evaluate the modification.	PASS	5.17*
RTR – Added option to redact low turnout by precinct and/or counting group from CVR export for Primary Elections	Specifically designed test case created to evaluate the modification.	PASS	5.17*
ADJ – New Adjudication Activity Log and Export	Specifically designed test case created to evaluate the modification.	PASS	5.17*
ADJ – Added ability to perform Database Back-ups and Maintenance Procedure	Specifically designed test case created to evaluate the modification.	PASS	5.17*
ICX – Additional USB models added to list of accepted devices.	Specifically designed test case created to evaluate the modification.	PASS	5.17*
Adding Instant Runoff Voting	Specifically designed test case created to evaluate the modification.	PASS	5.17-CO
Adding support for the Canon DR X10-C Scanner	Specifically designed test case created to evaluate the modification.	PASS	5.17-CO
<i>Colorado-Specific Requirements</i>			
Colorado Requirements Matrix – Abstract Reporting	Specifically designed test case created to evaluate the modification.	PASS	5.17-CO
Colorado Requirements Matrix – Ballot-Level Cast Vote Records and Exports	Specifically designed test case created to evaluate the modification.	PASS	5.17-CO
Colorado Requirements Matrix – Election Night Reporting Data and Exports	Specifically designed test case created to evaluate the modification.	PASS	5.17-CO

**D-Suite 5.17 has been granted EAC certification. Test cases designated with an * were designed during the D-Suite 5.17 test campaign, the results of which are utilized to satisfy test requirements for this test campaign. Only the D-Suite 5.17-CO test cases listed above were designed and executed for this test campaign.*