



Test Plan

**Dominion Voting
Systems
D-Suite 5.2-CO
Certification Testing**

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1 Introduction

The purpose of this Test Plan is to document the procedures that Pro V&V, Inc. will follow to evaluate the Dominion Democracy Suite (D-Suite) 5.2-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. This modification is to the previously tested D-Suite 5.0 System.

At test conclusion, the results of all testing performed as part of this test campaign will be presented in a final report.

1.1 Scope

The scope of this testing event will incorporate a sufficient spectrum of physical and functional tests to verify that certain D-Suite 5.2-CO features and applications, which have been modified from the EAC certified 5.0 baseline, conform to the applicable EAC 2005 VVSG 1.0 requirements.

Specifically, the testing event has the following goals:

- Verify that the D-Suite 5.2-CO System meets both the applicable requirements of the EAC 2005 VVSG 1.0 and the additional Colorado-specific requirements
- Ensure that the D-Suite 5.2-CO provides support for all Colorado election management requirements (i.e. ballot design, results reporting, recounts, etc.)
- Source Code Review, Compliance Builds, and Build Documentation Review
- Physical Configuration Audit (PCA), including System Loads and Hardening
- Functional Configuration Audit (FCA)
- Security Testing
- System Integration Testing, including Accuracy Testing

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

Election Management System

1. Changed EMS components to utilize Windows Authentication instead of SQL Server Authentication.
2. Added ability for system to utilize self-encrypting drives as an additional security feature.
3. All components now running on combination of Windows 10, Windows Server 2012R2, with SQL Server 2016. Also included are scripts for security hardening procedures.
4. Added ability to configure how common cards are consolidated and to track precinct information for consolidated cards.
5. Added ability to create a convention for the ballot ID, artwork file name and description.
6. Added ability to generate one or more ballots without generating all ballots in the election project.
7. Added the ability to produce election definition in final form for the ImageCast X voting application.
8. Added ability to produce and modify a configuration file for ImageCast X.
9. Allowed the application to program the USB Flash Device with necessary resources used for setting up an ImageCast X voting device.
10. Extended the styling capabilities for Ballot Type, Translations, Contest and Contest Heading sections and dialogs to allow the EED User to style content for voting screens and printed artifacts. This also includes a new set of template keywords.
11. Added a new section for listing and modifying settings for Screen Ballots for display on the ImageCast X voting application.
12. Renamed existing "Ballots" Section to "Ballot Cards", serving to separate settings from "Screen Ballots".
13. Added ability to preview a screen ballot when an ICX device is connected via USB.
14. Modified the specification of available area for Write-in detection, which is passed through the election files to the optical scan tabulators.
15. Improved reporting ability to break-down results per precinct for consolidated ballots.

16. Added new report export providing information on cast vote records.
17. Added new report export providing information on what precincts each batch of results contains.
18. Added ability to select multiple precincts for the Summary Report.
19. Added ability to indicate in a project whether disabled contests and candidates should appear in the Election Summary and Statement of Votes Cast reports.
20. Added ability to bypass adjudication for early voting results.
21. Added ability to import subsets of data using the application: New languages and translations, template assignment, and tabulators.
22. Modified Contest and Contest Heading tables to allow enhance styling capabilities for ImageCast X.
23. Improved Adjudication Stop/Resume function to be more robust.

ImageCast Central

1. Replaced the Kofax module with a TWAIN interface.
2. Added an option to force ICC to overrun a preset number of ballots every time scanning stops mid-batch.
3. Simplified the switching between election projects in ICC.
4. Application now runs on Windows 10 operating system.

ImageCast X

1. Added a vote simulator for use during Logic & Accuracy Testing.
2. Added ability to display more than one contest on a screen.
3. Added ability to display a heading for a single or a group of contests on the screen.
4. Added ability to align the contest cell left, right or center, along with support for font size, bold, italic and underline text.
5. Added ability to playback audio for screen contents for languages that do not have Text-to-Speech support.

6. Modified the printing of the QR Ballot so it now has the human readable part printed in an OCR-friendly font.
7. Improved ability to print voter's selection on the BMD printer in non-Latin languages (e.g., Chinese).
8. Added support for using Legal-sized paper size on the BMD printer

ImageCast Voter Activation

1. Streamlined workflow – less clicks to activate voter card

1.2 References

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

- D-Suite 5.2-CO (Colorado State Level) Testing Campaign Scope of Testing Document dated 2017-03-06
- State of Colorado Requirements Matrix
- Colorado Secretary of State Election Rules [8 CCR 1505-1] Rule 21
- Election Assistance Commission (EAC) 2005 Voluntary Voting System Guidelines (VVSG) Version 1.0, Volume I, “Voting System Performance Guidelines”, and Volume II, “National Certification Testing Guidelines”
- Election Assistance Commission Testing and Certification Program Manual, Version 2.0
- Election Assistance Commission Voting System Test Laboratory Program Manual, Version 2.0
- National Voluntary Laboratory Accreditation Program NIST Handbook 150, 2006 Edition, “NVLAP Procedures and General Requirements (NIST Handbook 150)”, dated February 2006
- National Voluntary Laboratory Accreditation Program NIST Handbook 150-22, 2008 Edition, “Voting System Testing (NIST Handbook 150-22)”, dated May 2008
- United States 107th Congress Help America Vote Act (HAVA) of 2002 (Public Law 107-252), dated October 2002
- Pro V&V, Inc. Quality Assurance Manual, Version 7.0
- EAC Requests for Interpretation (RFI) (listed on www.eac.gov)
- EAC Notices of Clarification (NOC) (listed on www.eac.gov)
- Dominion Voting Systems Democracy Suite 5.2-CO Technical Data Package (*A listing of the D-Suite 5.2-CO documents submitted for this test campaign is listed in Section 4.6 of this Test Plan*)

1.3 Terms and Abbreviations

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

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

“TDP” – Technical Data Package

“UPS” – Uninterruptible Power Supply

“VSTL” – Voting System Test Laboratory

“VVSG” – Voluntary Voting System Guidelines

1.4 Testing Responsibilities

All testing will be conducted under the guidance of Pro V&V by personnel verified by Pro V&V to be qualified to perform the testing. Pro V&V will be utilizing third party testing during the performance of hardware testing. All testing will be witnessed by Pro V&V personnel at the third party test site.

1.4.1 Project Schedule

The schedule for this project is contained in a Pro V&V-generated spreadsheet. This schedule is presented in Attachment A. The dates on the schedule are not firm dates but are estimates to completion based on multiple variables.

1.4.2 Test Case Development

To verify that the system meets the applicable requirements, Pro V&V will utilize baseline test cases augmented with supplemental test cases designed specifically for the system being evaluated in this test campaign. Pro V&V will develop specific test cases to include a review of the ICX ballot QR Code to ensure it does not include any voter identity data as well as a test case to ensure that there is no voting/personal information contained on the voter card and the ICX after a voter session has concluded.

2 Test Candidate

The system that is the baseline for the submitted modification is described in the following subsections. All information presented was derived from the previous Certification Test Report and/or the System Overview.

The Democracy Suite 5.2-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). Below is the description of the previously EAC certified Democracy Suite 5.0 baseline system (*Note: this description contains the ImageCast Precinct (ICP) which is not part of the current system under test*):

Election Management System (EMS)

The Democracy Suite 5.0 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.

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 Precinct (ICP)

The ICP device is a hybrid precinct optical scan paper/DRE ballot counter designed to provide six major functionalities: ballot scanning, second chance voting, accessible voting, ballot review, tabulation, and poll worker functions. For both ballot scanning and tabulation functionalities the ICP scans marked paper ballots, interprets voter marks on the paper ballot and stores and tabulates each vote from each paper ballot. Second Chance voting refers to scenarios in which an error has been detected on the voter's paper ballot (e.g., blank ballot, undervoted ballot, overvoted ballot, misread ballot, cross-over voted ballot), and the ICP notifies the voter by displaying a message or providing an audio visual cue, that one of these situations has been detected, and offers the voter an opportunity to reject and fix their ballot, or to cast the ballot as-is. Accessible voting allows voters with disabilities to listen to an audio representation of a ballot and use a hand held controller called an Audio Tactile Interface (ATI) to make vote selections, which are then saved directly to the ICP when the voter casts their Accessible Voting ballot. The Ballot Review feature allows a voter to review their vote selections using an audio or visual representation, which displays or presents the voter with a complete listing of all contests contained on the ballot and an indication of the results which will be recorded for each contest once the voter's ballot is cast. For poll worker functions the ICP contains a small touch-screen LCD to allow the poll worker to initiate polling place activities, diagnostics and reports.

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, 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.

2.1 Test Candidate System Overview

A diagram depicting the D-Suite 5.2-CO is provided in Figure 2-1, below.

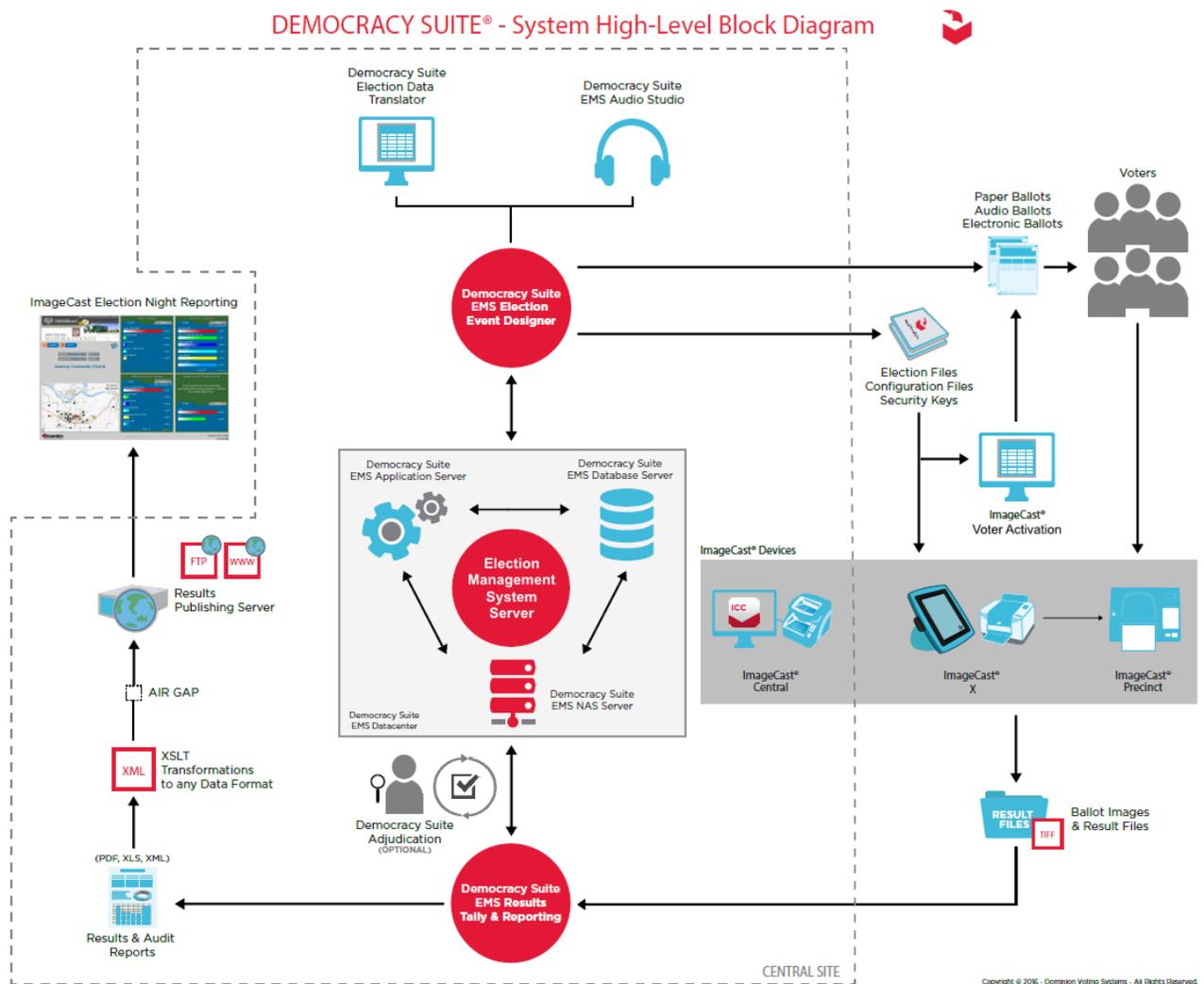


Figure 2.1 D-Suite 5.2-CO System Overview

2.2 Testing Configuration

The testing event will utilize one setup of the D-Suite 5.2-CO System and its components as configured for normal use by the State of Colorado.

2.3 System Limits

The EMS platform will be tested in both deployable physical hardware configurations:

- EMS Express hardware configuration - all EMS software components are installed on a single physical PC or laptop. This is a standalone configuration.
- EMS Standard hardware configuration - the EMS server components are installed on a single physical server, in addition to the Universal Power Supply (UPS) and Local Area Network (LAN) switch devices, while the EMS client components are installed on one or more physical PCs or laptops. All system components are interconnected in a client-server local LAN environment.

The system limits that Dominion Voting Systems has stated to be supported by the Democracy Suite 5.0ds are provided in the table below.

Table 2-1. Democracy Suite 5.0ds System Limits by Configuration

Characteristic	Configuration Values		Limiting Component
	Standard	Express	
Ballot positions	462	462	Ballot
Precincts in an election	1000	250	EMS
Contests in an election	4000	250	EMS
Candidates/Counters in an election	40000	2500	EMS
Candidates/Counters in a precinct	462	462	Tabulator
Candidates/Counters in a tabulator	10000	2500	Tabulator
Ballot Styles in an election	4000	750	Tabulator
Contests in a ballot style	125	125	ICX
Candidates in a contest	462	231	EMS
Ballot styles in a precinct	5	5	Tabulator
Number of political parties	30	30	Tabulator

“vote for” in a contest	30	30	Tabulator
Supported languages in an election	5	5	Tabulator
Number of write-ins	462	462	Ballot

2.4 Supported Languages

The following languages have been stated by D-Suite 5.2-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 will be cast during functional testing. The accuracy of the translations between languages will not be verified.

2.5 Supported Functionality

The Democracy Suite 5.2-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 Precincts
- Vote for N of M
- Ballot Rotation
- Provisional or Challenged Ballots

2.6 Technical Data Package

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

Table 2-2. TDP Documents

Document Number	Description	Version
<i>Adjudication Documents</i>		
2.05	Democracy Suite Adjudication Software Design and Specification	5.2-CO::76
2.08	Democracy Suite Adjudication System Operation Procedures	5.2-CO::119
2.09	Democracy Suite Adjudication System Maintenance Manual	5.2-CO::59
<i>Democracy Suite Documents</i>		
2.02	Democracy Suite System Overview	5.2-CO::70
2.06	Democracy Suite System Security Specification	5.2-CO::483
2.07	Democracy Suite System Test and Verification	5.2-CO::144
2.10	Democracy Suite Personnel Deployment and Training Requirements	5.2-CO::86
2.11	Democracy Suite Configuration Management Process	5.2-CO::292
2.12	Democracy Suite Quality Assurance Program	5.2-CO::113
2.13	Democracy Suite System Change Notes	5.2-CO::46

<i>EMS Documents</i>		
2.03	Democracy Suite EMS Functional Description	5.2-CO::319
2.05	Democracy Suite EMS Software Design and Specification	5.2-CO::268
2.08	Democracy Suite EMS System Operations Procedures	5.2-CO::674
2.09	Democracy Suite EMS System Maintenance Manual	5.2-CO::100
---	Democracy Suite EMS System Installation and Configuration Procedure	5.2-CO::126
<i>ImageCast Central Documents</i>		
2.03	Democracy Suite ImageCast Central Functionality Description	5.2-CO::133
2.05	Democracy Suite ImageCast Central Software Design and Specification	5.2-CO::77
2.08	Democracy Suite ImageCast Central System Operation Procedures	5.2-CO::166
---	Democracy Suite ImageCast Central Installation and Configuration Procedure	5.2-CO::84
<i>ImageCast X Documents</i>		
2.03	Democracy Suite ImageCast X Functionality Description	5.2CO.5
2.05	Democracy Suite ImageCast X Software Design and Specification	5.2CO.4
2.08	Democracy Suite ImageCast X System Operation Procedures	5.2CO.6
2.09	Democracy Suite ImageCast X System Maintenance Manual	5.2CO.5
---	Democracy Suite ImageCast X Installation and Configuration Procedure	5.2CO.6
<i>User Guides</i>		
---	Democracy Suite ImageCast Adjudication User Guide	5.2-CO::108
---	Democracy Suite EMS Audio Studio User Guide	5.2-CO::24
---	Democracy Suite EMS Election Data Translator User Guide	5.2-CO::66
---	Democracy Suite EMS Election Event Designer User Guide	5.2-CO::155
---	Democracy Suite EMS Mobile Ballot Production User Guide	5.2-CO::34
---	Democracy Suite EMS Results Tally and Reporting User Guide	5.2-CO::84
---	Democracy Suite ImageCast Central User Guide	5.2-CO::94
---	Democracy Suite ImageCast Voter Activation User Guide	5.2-CO::34
---	ImageCast X Ballot Marking Device User Guide	5.2CO.5
<i>Supplementary Documents</i>		
---	AT4 Wireless Test Report No. (NIE) 39698RSE.001 (Tecla Shield)	---
---	Cyber Acoustics ACM-70B Stereo Headphones Product Sheet	---
---	Democracy Suite ImageCast C++ Coding Standard	5.2-CO::22

---	Democracy Suite C# Automated Code Review Process	5.2-CO::17
---	Dell Latitude E7470 Owner's Manual	Rev. A02
---	Dell P2417H Monitor User's Guide	Rev. A01
---	Dell OptiPlex 7440 AIO Owner's Manual	Rev. A01
---	Dell Networking X-Series Specification Sheet	Ver. 1.9
---	Canon DR-G1130 User Manual	---
---	Canon DR-M160II User Manual	---
---	Canon DR-X10C User Manual	---
---	Dominion Voting Systems Java Coding Standards	1.0
---	Dominion Voting Systems JavaScript Coding Standards	1.0
---	Democracy Suite ImageCast Device Configuration Files	5.2-CO::64
---	Democracy Suite ImageCast Printing and Finishing Specification	5.2-CO::55
---	Democracy Suite ImageCast Total Results File Format	5.2-CO::25
---	Democracy Suite ImageCast Election Definition Files	5.2-CO::35
---	HP LaserJet Pro M203 User Guide	---
---	HP LaserJet Pro M402dn Datasheet	Rev. 2
---	HP LaserJet Pro M402dne Datasheet	---
---	Dell Precision Tower 3420 Owner's Manual	Rev. A00
---	Google Java Style Dominion XML	---
---	Dell PowerEdge R620 Owners's Manual	Rev. A05
---	Dell PowerEdge R630 Regulatory Compliance Sheet	Rev. A10
---	Dell PowerEdge R630 Owners's Manual	Rev. A03
---	APC Back-UPS BE600M1 User Manual	---
---	APC Back-UPS Pro BR1000G User Manual	---
---	APC Back-UPS SMT1500 User Manual	---
---	Samsung Galaxy Note Pro SM-P900 User Manual	---
---	Tripp Lite SmartPro SM1500RMXL2UTAA Datasheet	---
---	Tripp Lite SmartPro SM3000RMXL2UTAA Datasheet	---
---	LAVA STS Product Family User Manual	Rev. A01
---	AOC USB Monitor E1659Fwu User Manual	---
<i>Build Documents</i>		
---	Democracy Suite EMS Software Build Document	5.2::2

---	ImageCast X Build	XXX
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2.7 Third Party Test Reports

This subsection lists the reports by third party entities that are relevant to the system being evaluated and the test engagement.

Table 2-3. Third Party Test Reports

Report Title	Revision	Issue Date
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3 Test Process

The following procedure outlines the steps that the test team will execute to evaluate the D-Suite 5.2-CO System under the scope defined in Section 1.1.

3.1 General Information

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

3.2 Hardware and Software Required for Testing

Dominion Voting Systems will provide all required software and hardware to perform testing.

Election Administration

Democracy Suite Election Management System (EMS)

- Dominion Voting Systems Democracy Suite EMS 5.2.x, containing:
 - Election Event Designer
 - Results Tally and Reporting
 - Audio Studio

- Application Server
- Election Device Management Server
- Data Center Manager
- File System Service
- Adjudication Service
- Election Data Translator
- Election Data Manager (for ICX electronic file generation)
- Adjudication

COTS Hardware and Software

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

- Microsoft Visual J# 2.0
- Microsoft Visual C++ 2015 Redistributable
- Java SE Runtime Environment 6.0 Update 20 or later
- Dallas 1-Wire Device Driver version 4.03 or newer
- RAID utility
- Adobe Reader DC or later
- Optional COTS Software for Standard and Express configurations
 - Microsoft Windows Defender (Express Server)
 - Avast! anti-virus software (Standard Server)
 - Cepstral Voices (English, Spanish, etc.) 6.2.3
 - Microsoft Excel 2010 or later
 - Additional Fonts (Arial narrow fonts, 2.37a)
 - UPS drivers
 - Printer drivers
- Auxiliary Equipment
 - iButton (SHA-1) with USB Reader/Writer: Maxim DS9490R#
 - Compact Flash Reader: Lexar Professional USB 3.0 Dual-Slot Card Reader or equivalent
 - LCD monitor, keyboard, mouse, headset with microphone, audio adapter, networking switch – COTS computing accessories
- Election media
 - iButton: Maxim DS1963S-F5+
 - DVS Compact Flash Memory Cards: 4GB, 8GB, 16GB, or 32GB

- USB Memory Device: 4GB, 8GB, or 16GB
- Smart Cards: ACOS-6-64

Central Count

- ICC software application: version 5.2.x

COTS Software:

- ICC COTS computer operating system: Windows 10 (64-bit) Professional edition
- Microsoft Windows Defender
- Microsoft Visual C++ 2015 Redistributable
- Dallas Maxim: 1-wire driver - version 4.03 or newer, 64 bit (32 bit as needed)
- Canon: DR-X10C driver - version 1.15 w/ SP1
- Canon: DR-G1130 driver - version 1.0.0.1
- Canon: DR-M160-II driver - version 1.2.5582

COTS Hardware:

- ICC Scanner: Canon DR-X10C
- ICC Scanner: Canon DR-G1130
- ICC Scanner: Canon DR-M160-II
- Desktop or All-in-One computer system per 2.02 *Democracy Suite System Configuration Overview*

Precinct Vote Capture

ImageCast X with BMD (ICX BMD)

- Firmware version: 5.2.x
- Hardware version:

- Samsung Galaxy Note Pro (12.2 in. screen)

Optional Hardware

- Accessible-Tactile Interface (ATI-USB) box

COTS Hardware

- UPS: APC SMT-1500
- Printer: HP M402dne Laser
- Smart Cards: ACOS-6-64

COTS Software

- Android 5.0 (Samsung)
- Android 4.4.2 (Samsung)

Optional COTS Software

- None

Optional COTS products

- Headphone: Cyber Acoustics ACM-70 or equivalent
- Accessible Interface Box: Tecla Accessible Interface box
- Joystick: Komodo OpenLab 4-way Joystick
- Sip & puff: Enabling Device #972
- Sip & puff straws: #970K (Pkg of 10)
- Paddle switches: Enabling Device #971
- Paddle switches: AbleNet 10033400 (2x)

ImageCast X Voter Activation (ICVA)

- Software version: 5.2.x

COTS Hardware and Software

- Client Laptop Configuration
 - Microsoft Windows 10 Professional
 - Desktop computer system per *2.02 Democracy Suite System Configuration Overview*
- Smart Cards: ACOS-6-64

3.2.1 Test Support Equipment/Materials

Dominion Voting Systems will provide all supporting materials necessary to facilitate testing.

3.3 Strategy of Evaluations

To evaluate the Democracy Suite 5.2-CO test requirements, each section of the EAC 2005 VVSG will be analyzed to determine the applicable tests. The EAC 2005 VVSG Volume I Sections, along with the strategy of evaluation, are described below:

Section 2: Functional Requirements

The requirements in this section will be tested during the FCA and System Integration Test. This evaluation will utilize baseline test cases as well as specifically designed test cases and included predefined election definitions for the input data.

Section 3: Usability and Accessibility Requirements

The requirements in this section will not be tested during this state certification effort as results shall be re-used from the previously EAC certified Democracy Suite 5.0 system.

Section 4: Hardware Requirements

The requirements in this section will not be tested during this state certification effort as results shall be re-used from the previously EAC certified Democracy Suite 5.0 system.

Section 5: Software Requirements

The requirements in this section will be 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 will not be tested during this test campaign.

Section 7: Security Requirements

The requirements in this section will be tested during the Source Code Review, Security Tests, and FCA.

Section 8: Quality Assurance Requirements

The requirements in this section will not be tested during this state certification effort as results shall be re-used from the previously EAC certified Democracy Suite 5.0 system.

Section 9: Configuration Management Requirements

The requirements in this section will not be tested during this state certification effort as results shall be re-used from the previously EAC certified Democracy Suite 5.0 system.

Throughout the test campaign, Pro V&V personnel shall maintain 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

3.4 Test Procedures

Pro V&V will develop test procedures designed to evaluate the system being tested against the stated requirements. The test procedures can be executed independently. The procedures that will be utilized for this test engagement are summarized below:

- Source Code Review – Pro V&V will review the submitted source code to the EAC 2005 VVSG and the manufacturer-submitted coding standards. Prior to initiating the software review, Pro V&V shall verify 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 includes a Compliance Build and a Trusted Build of the submitted source code.
- Functional Configuration Audit (FCA) – This area of testing targets the specific functionality claimed by the manufacturer to ensure the product functions as documented. This testing uses both positive and negative test data to test the robustness of the system. The FCA encompasses an examination of manufacturer tests, and the conduct of additional tests, to verify that the system hardware and software perform all the functions described in the manufacturer’s documentation submitted in the TDP (such as system operations, voter manual, maintenance, and diagnostic testing manuals). It includes a test of system operations in the sequence in which they would normally be performed. These

system operations and functional capabilities are categorized as follows by the phase of election activity in which they are required:

- Overall System Capabilities: These functional capabilities apply throughout the election process. They include security, accuracy, integrity, system audit ability, election management system, vote tabulation, ballot counters, telecommunications, and data retention.
- Pre-voting Capabilities: These functional capabilities are used to prepare the voting system for voting. They include ballot preparation, the preparation of election-specific software (including firmware), the production of ballots, the installation of ballots and ballot counting software (including firmware), and system and equipment tests.
- Voting System Capabilities: These functional capabilities include all operations conducted at the polling place by voters and officials including the generation of status messages.
- Post-voting Capabilities: These functional capabilities apply after all votes have been cast. They include closing the polling place; obtaining reports by voting machine, polling place, and precinct; obtaining consolidated reports; and obtaining reports of audit trails.
- Maintenance, Transportation and Storage Capabilities: These capabilities are necessary to maintain, transport, and store voting system equipment.
- Accuracy – The accuracy test ensures that the voting system components can process ballot positions within the allowable target error rate. This test is designed to test the ability of the system to “capture, record, store, consolidate, and report” specific voter selections and absences of a selection.
- System Integration – The system level certification tests address the integration of the hardware and software. This testing focuses on the compatibility of the voting system software components and subsystems with one another and with other components of the voting system. During test performance, the system is configured as would be for normal field use.
- Regression Testing – Regression testing will be performed on all system components to verify that and all functional and/or firmware modifications made during the test campaign did not adversely affect the system and its operation.
- Physical Configuration Audit (PCA) – The PCA compares the voting system components submitted for testing to the manufacturer’s technical documentation. The PCA includes 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 drawings, specifications, technical data, and test data associated with system hardware (if non-COTS) to establish system hardware baseline associated with software baseline.
- Review manufacturer 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.
- Security – During the execution of this test case, the system shall be inspected for various controls and measure that are in place to meet the objectives of the security standards which include: protection of the critical elements of the voting system; establishing and maintaining controls to minimize errors; protection from intentional manipulation, fraud and malicious mischief; identifying fraudulent or erroneous changes to the voting system; and protecting the secrecy in the voting process.

4 Test Data

The output test data will be collected and stored in an appropriate manner as to allow for data analysis. Actual results from executed tests will be recorded in real-time in Test Execution Logs.

5 Conditions of Satisfaction

The voting system will be evaluated against the Colorado Requirements Gap Analysis Matrix, which incorporates the VVSG requirements, and the Colorado-specific requirements in the Colorado Secretary of State Election Rules [8 CCR 1505-1] Rule 21. Throughout this test campaign, Pro V&V will execute tests, inspect resultant data and perform technical documentation reviews to ensure that each applicable requirement is met.

6 Test Report

At test conclusion, a Test Report will be generated documenting all findings. Pro V&V will follow standard requirements for the format of the Test Report. The Recommendation section of the Test Report will follow the requirements of the NIST 150 Handbook for opinions and interpretations.

Attachment A

Task Name	Start Date	End Date	% Complete	Duration	Predecessors
Test Plan	03/15/17	03/24/17	0%	8d	
Test Plan Creation	03/15/17	03/21/17	0%	5d	
Vendor Review & Comments	03/22/17	03/22/17	0%	1d	3
Comment Review & Update	03/23/17	03/23/17	0%	1d	4
Approved Test Plan	03/24/17	03/24/17	0%	1d	5
Source Code	03/15/17	03/23/17	0%	7d	
Manual Review	03/15/17	03/15/17	0%	1d	
Source Code Review	03/15/17	03/17/17	0%	3d	
Source Code Re-Review	03/20/17	03/20/17	0%	1d	9
Document Review	03/21/17	03/21/17	0%	1d	10
Compliance Build	03/22/17	03/23/17	0%	2d	11
Automated Review	03/15/17	03/15/17	0%	1d	
Source Code Review	03/15/17	03/15/17	0%	1d	
Source Code Re-Review	03/16/17	03/16/17	0%	1d	14
Document Review	03/17/17	03/17/17	0%	1d	15
Compliance Build	03/20/17	03/21/17	0%	2d	16
System Delivery & Setup	03/15/17	03/27/17	0%	9d	
PCA	03/15/17	03/15/17	0%	1d	
System Setup	03/16/17	03/17/17	0%	2d	19
System Loads & Hardening	03/24/17	03/27/17	0%	2d	12
System Level Testing	03/28/17	04/14/17	0%	14d	
FCA	03/28/17	04/10/17	0%	10d	21
Security	03/28/17	04/10/17	0%	10d	21
Accuracy	04/06/17	04/10/17	0%	3d	
System Integration	04/11/17	04/12/17	0%	2d	25
Colorado Matrix	04/13/17	04/14/17	0%	2d	26
Test Report	04/11/17	05/03/17	0%	17d	
Test Report Creation	04/11/17	04/17/17	0%	5d	
Vendor Review & Comments	04/18/17	04/18/17	0%	1d	29
Submission & Review	04/19/17	04/25/17	0%	5d	30
Comment Review & Update	04/26/17	04/28/17	0%	3d	31
Submission & Review of Revision	05/01/17	05/02/17	0%	2d	32
Approved Test Report	05/03/17	05/03/17	0%	1d	33