

PRO V&V



700 Boulevard South
Suite 102
Huntsville, AL 35802
Phone (256)713-1111
Fax (256)713-1112

Test Plan for EAC 2005 VVSG Certification Testing
Dominion Voting Systems Democracy Suite (D-Suite) Version
5.5-B Voting System

EAC Project Number: DVS-DemSuite5.5-B

Version: Rev. 02

Date: 08/05/2019

U.S. Election Assistance Commission

VSTL

EAC Lab Code 1501

NVLAP[®]

NVLAP LAB CODE 200908-0

SIGNATURES

Approved by:

Michael Walker, VSTL Project Manager

Date

Approved by:

Wendy Owens, VSTL Program Manager

Date

REVISIONS

Revision	Description	Date
NR	Initial Release	03/28/2019
01	Updates per EAC Comments. Added ICP2 component and associated edits.	05/16/2019
02	As-Run Version	08/05/2019

TABLE OF CONTENTS

1.0	INTRODUCTION	1
1.1	Description and Overview of EAC System Being Modified.....	1
1.1.1	Baseline Certified System.....	4
1.1.2	Description of Modification.....	14
1.1.3	Initial Assessment.....	14
1.1.4	Regression Test.....	15
1.2	References.....	15
1.3	Terms and Abbreviations.....	15
1.4	Project Schedule.....	16
1.5	Scope of Testing.....	17
1.5.1	Block Diagram.....	18
1.5.2	System Limits.....	19
1.5.3	Supported Languages.....	20
1.5.4	Supported Functionality.....	21
1.5.5	VVSG.....	21
1.5.6	RFIs.....	21
1.5.7	NOCs.....	22
2.0	PRE-CERTIFICATION TESTING AND ISSUES	22
2.1	Evaluation of Prior VSTL Testing.....	22
2.2	Evaluation of Prior Non-VSTL Testing.....	22
2.3	Known Field Issues.....	22
3.0	MATERIALS REQUIRED FOR TESTING	22
3.1	Software.....	22
3.2	Equipment.....	23
3.3	Test Materials.....	23
3.4	Proprietary Data.....	24
4.0	TEST SPECIFICATIONS	24
4.1	Requirements (Strategy of Evaluation).....	24
4.1.1	Rational for ‘Not Applicable’ requirements.....	27
4.2	Hardware Configuration and Design.....	27
4.3	Software System Functions.....	27
4.4	Test Case Design.....	27

4.4.1	Hardware Qualitative Test Case Design	28
4.4.2	Hardware Environmental Test Case Design	29
4.4.3	Software Module Test Case Design and Data	29
4.4.4	Software Functional Test Case Design and Data.....	29
4.4.5	System-Level Test Case Design	30
4.5	Security Functions	30
4.6	TDP Evaluation.....	31
4.7	Source Code Review.....	37
4.8	QA & CM System Review	37
4.9	Physical Configuration Audit (PCA)	37
4.10	Functional Configuration Audit (FCA).....	38
4.11	Accuracy	38
4.12	Volume & Stress.....	39
4.13	System Integration	39
5.0	TEST DATA	39
5.1	Test Data Recording	39
5.2	Test Data Criteria.....	39
6.0	TEST PROCEDURES AND CONDITIONS	39
6.1	Facility Requirements	40
6.2	Test Set-Up	40
6.3	Test Sequence	40
6.4	Test Operations Procedure.....	40
	PROJECT SCHEDULE.....	A-1

1.0 INTRODUCTION

The purpose of this Test Plan is to document the procedures that Pro V&V, Inc. will follow to perform certification testing during a system modification campaign for the Dominion Voting Systems Democracy Suite (D-Suite) 5.5-B 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. Prior to submitting the voting system for testing, Dominion Voting Systems submitted an application package to the EAC for certification of the D-Suite 5.5-B Voting System. The application was accepted by the EAC and the project was assigned the unique Project Number of DVS-DemSuite5.5-B.

At test conclusion, the results of all testing performed as part of this test campaign will be submitted to the EAC in the form of a national certification test report.

1.1 Description and Overview of EAC Certified System Being Modified

The EAC Certified 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, the EAC Certificate of Conformance and/or the System Overview.

The D-Suite 5.5-B Voting System is a paper-based optical scan voting system with a hybrid paper/DRE option consisting of the following major components: The Election Management System (EMS), the ImageCast Central (ICC), the ImageCast Precinct (ICP and ICP2), the ImageCast X (ICX) DRE w/ Reports Printer, ImageCast X (ICX) DRE w/VVPAT, the ImageCast Evolution (ICE), and the ImageCast X (ICX) BMD. The D-Suite 5.5-B Voting System configuration is a modification from the EAC approved D-Suite 5.5 system configuration.

The following subsections describe the baselined D-Suite 5.5 Voting System.

Election Management System (EMS)

The D-Suite 5.5 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 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 ballot scanning functionality the ICP scans marked paper ballots, interprets voter marks on the paper ballots and stores the ballots for tabulation when the polls are closed.

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.

The Tabulation of paper ballots and Accessible Voting ballots cast by voters is performed when the polls are closed on the ICP unit and the unit tabulates the results, generates results files for aggregation into RTR, and prints a results report containing the results of the ballots 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)

The Democracy Suite ImageCast X (ICX) consists exclusively of COTS available hardware and operating system, while the applications installed on top customize its behavior to turn it into a Ballot Marking Device (BMD) or a Direct-Recording Electronic (DRE) device with or without a Voter Verifiable Paper Audit Trail (VVPAT). ICX application is the application that verifies voter's session eligibility, using the smart card and then presents the appropriate ballot to the voter. When a voter is satisfied with choices selected, ICX application verifies them and produces an Electronic Mobile Ballot or stores the votes onto a memory device. The ICX is designed to perform the following functions:

- Ballot marking and printing of electronic mobile ballots (in BMD mode)
- Ballot review and second chance voting
- Accessible voting and ballot marking
- Saving voting results (in DRE mode)
- Printing votes on a voter verifiable paper audit trail device (when VVPAT is in use)

1.1.1 Baseline Certified System

The baseline system for this modification is the D-Suite 5.5 Voting System. The tables below describe the certified equipment and firmware versions. Detailed descriptions of the D-Suite 5.5 test campaign are contained in Pro V&V Report No. TR-01-01-DVS-2017-02.01 Rev. B, which is available for viewing on the EAC’s website at www.eac.gov.

This subsection lists the proprietary and COTS software to be provided by the manufacturer as part of the test campaign.

Table 1-1. Democracy Suite 5.5 EMS Software Component Descriptions

Software	Version	Filename	Configuration	
			Standard	Express
EMS Election Event Designer (EED)	5.5.12.1	setup.exe: EED_FED_CERT_Setup_x64.msi	X	X
EMS Results Tally and Reporting (RTR)	5.5.12.1	setup.exe: RTR_FED_CERT_Setup_x64.msi	X	X
EMS Application Server	5.5.12.1	setup.exe: APPS_FED_CERT_Setup_x64.msi	X	X
EMS File System Service (FSS)	5.5.12.1	setup.exe: FSSSetup.msi	X	X
EMS Audio Studio (AS)	5.5.12.1	setup.exe: EMSAudioStudioSetup.msi	X	X
EMS Data Center Manager (DCM)	5.5.12.1	DemocracySuiteEMS_DCM.exe	X	X
EMS Election Data Translator (EDT)	5.5.12.1	setup.exe: EDTSetup_x86.msi EDTSetup_x64.msi	X	X
ImageCast Voter Activation (ICVA)	5.5.12.1	setup.exe: ICVASetup.msi	X	X
EMS Adjudication (Adj.)	5.5.8.1	DVS ImageCast Adjudication Client Setup.msi	X	X
EMS Adjudication Service	5.5.8.1	DVS Adjudication Services Setup.msi	X	X
Smart Card Helper Service	5.5.12.1	setup.exe: SmartCardServiceSetup.msi	X	X

Table 1-2. Democracy Suite 5.5 ImageCast Precinct Software Component Descriptions

Firmware/Software	Version	Filename
Election Firmware	5.5.3-0002	cf2xx.sig
Firmware Updater	5.5.3-0002	firmUp.enc
Firmware Extractor	5.5.3-0002	FirmwareExtract.enc
Kernel (uClinux)	5.5.3-0002	image.bin.gz
Boot Loader (COLILO)	20040221	colilo.bin
Asymmetric Key Generator	5.5.3-0002	Keygen.enc
Asymmetric Key Exchange Utility	5.5.3-0002	KeyExchange.enc
Firmware Extractor (Uses Technician Key)	5.5.3-0002	TechExtract.enc

Table 1-3. Democracy Suite 5.5 ImageCast Central Software Component Descriptions

Firmware/Software	Version	Filename
ImageCast Central Application	5.5.3.0002	ICCSup.exe

Table 1-4. Democracy Suite 5.5 ImageCast X Software Component Descriptions

Firmware/Software	Version	Filename
ICX Application	5.5.10.25	ICX.apk

Table 1-5. Democracy Suite 5.5 EMS Client/Server Software Component Descriptions

Firmware/Software	Version	Filename	Configuration	
			Standard	Express
Microsoft Windows Server	2012 R2 Standard	Physical Media from Microsoft	X	
Microsoft Windows	10 Professional	Physical Media from Microsoft	X	X
.NET Framework	3.5	Physical Media from Microsoft	X	X
Microsoft Visual J#	2.0	vjredist64.exe vjredist.exe	X	X
Microsoft Visual C++ 2013 Redistributable	2013	vc_redist_x64.exe vc_redist_x86.exe	X	X
Microsoft Visual C++ 2015 Redistributable	2015	vc_redist.x64.exe vc_redist.x86.exe	X	X
Java Runtime Environment	7u80	jre-7u80-windows-x64.exe jre-7u80-windows-i586.exe	X	X
Java Runtime Environment	8u144	jre-8u144-windows-x64.exe jre-8u144-windows-i586.exe	X	X
Microsoft SQL Server 2016 Standard	2016 Standard	Physical Media from Microsoft	X	

Table 1-5. Democracy Suite 5.5 EMS Client/Server Software Component Descriptions (continued)

Firmware/Software	Version	Filename	Configuration	
			Standard	Express
Microsoft SQL Server 2016 Service Pack 1	2016 SP1	SQLServer2016SP1-KB3182545-x64-ENU.exe	X	
Microsoft SQL Server 2016 SP1 Express	2016 SP1	SQLEXPADV_x64_ENU.exe		X
Cepstral Voices	6.2.3.801	Allison (English): Cepstral_Allison_windows_6.2.3.801.exe Alejandra (Spanish): Cepstral_Alejandra_windows_6.2.3.801.exe	X	X
Arial Narrow Fonts	2.37a	ARIALN.TTF ARIALNB.TTF ARIALNBI.TTF ARIALNI.TTF	X	X
Maxim iButton Driver	4.05	install_1_wire_drivers_x86_v405.msi install_1_wire_drivers_x64_v405.msi	X	X
Adobe Reader DC	AcrobatDC	AcroRdrDC1501020060_en_US.exe	X	X
Microsoft Access Database Engine	2010	AccessDatabaseEngine.exe AccessDatabaseEngine_x64.exe	X	X
Open XML SDK 2.0 for Microsoft Office	2.0	OpenXMLSDKv2.msi	X	X

Table 1-6. Democracy Suite 5.5 EMS Software Platform Unmodified COTS Component Descriptions

Firmware/Software	Version	Filename
Infragistics NetAdvantage Win Forms 2011.1	2011 Vol.1	NetAdvantage_WinForms_20111.msi
Infragistics NetAdvantage WPF 2012.1	2012 Vol.1	NetAdvantage_WPF_20121.msi
TX Text Control Library for .NET	16.0	TXText Control.NET for Windows Forms 16.0.exe
SOX	14.3.1	sox.exe , libgomp-1.dll, pthreadgc2.dll, zlib1.dll
NLog	1.0.0.505	NLog.dll
iTextSharp	5.0.5	itextsharp.dll

Table 1-6. Democracy Suite 5.5 EMS Software Platform Unmodified COTS Component Descriptions (continued)

Firmware/Software	Version	Filename
OpenSSL	1.0.2k & 2.0.14 FIPS	openssl.exe, libeay32.dll, ssleay32.dll
SQLite	1.0.103.0	System.Data.SQLite.DLL (32-bit and 64-bit)
Lame	3.99.4	lame.exe
Speex	1.0.4	speexdec.exe and speexenc.exe
Ghostscript	9.04	gsdll32.dll (32-bit and 64-bit)
One Wire API for .NET	4.0.2.0	OneWireAPI.NET.dll
Avalon-framework-cvs-20020806	20020806	avalon-framework-cvs-20020806.jar
Batik	0.20-5	batik.jar
Fop	0.20-5	fop.jar
Microsoft Visual J# 2.0 Redistributable Package-Second Edition(x64)	2.0	vjc.dll , vjsjbc.dll, vjslibcw.dll, vjsnativ.dll , vjssupuilib.dll , vjsvwaux.dll
Entity framework	6.1.3	EntityFramework.dll
Spreadsheetlight	3.4.3	SpreadsheetLight.dll, SpreadsheetLight.xml
Open XML SDK 2.0 For Microsoft Office	2.0.5022.0	DocumentFormat.OpenXml.dll, DocumentFormat.OpenXml.xml

Table 1-7. Democracy Suite 5.5 ImageCast Precinct Unmodified COTS Component Descriptions

Firmware/Software	Version	Filename
OpenSSL 1.0.2k	1.0.2k	openssl-1.0.2k.tar.gz
OpenSSL FIPS 2.0.10	2.0.10	openssl-fips-2.0.10.tar.gz
Zlib	1.2.3	Zlib-1.2.3.tar.gz

Table 1-8. Democracy Suite 5.5 ImageCast X Unmodified COTS Component Descriptions

Firmware/Software	Version	Filename
Google Text-to-Speech Engine	3.11.12	ARM: com.google.android.tts_3.11.12-210311121_minAPI19(armeabi-v7a)(nodpi).apk x86: com.google.android.tts_3.11.12-210311123_minAPI15(x86)(nodpi).apk
ICX Prime Android 5.1.1 Image	0405	0405_5.1.1-01.12_user_android_x86.iso
ICX Classic Android 4.4.4 Image	0.0.98	byt_t_crv2_64-ota-BCX18-V0.0.98.zip

Table 1-9. Democracy Suite 5.5 ImageCast Central Software Build Library Source Code (Unmodified COTS)

Firmware/Software	Version	Filename
OpenSSL 1.0.2k	1.0.2k	openssl-1.0.2k.tar.gz
OpenSSL FIPS 2.0.10	2.0.10	openssl-fips-2.0.10.tar.gz

Table 1-10. Democracy Suite 5.5 ImageCast Central Runtime Software Components (Unmodified COTS)

Firmware/Software	Version	Filename
1-Wire Driver (x86)	4.05	install_1_wire_drivers_x86_v405.msi
1-Wire Driver (x64)	4.05	install_1_wire_drivers_x64_v405.msi
Canon DR-G1130 TWAIN Driver	1.2 SP6	G1130_DRIT_V12SP6.exe
Canon DR-M160II TWAIN Driver	1.2 SP6	M160II_DRIT_V12SP6.exe
Visual C++ 2013 Redistributable (x86)	12.0.30501	vc redistrib_x86.exe

Table 1-11. Democracy Suite 5.5 ImageCast Precinct Modified COTS Software Component Descriptions

Firmware/Software	Version	Filename
uClinux	20070130	uClinux-dist-20070130.tar.gz
COLILO Bootloader	20040221	Colilo20040221.tar.gz

Table 1-12. Democracy Suite 5.5 ImageCast X Modified COTS Software Component Descriptions

Firmware/Software	Version	Filename
Zxing Barcode Scanner	4.7.5	BS-4.7.5.zip
SoundTouch	1.9.2	Soundtouch-1.9.2.tar.gz

Table 1-13. Democracy Suite 5.5 EMS Software Build Environment Component Descriptions

Firmware/Software	Version	Filename
Windows 10 Professional	10 Professional	Physical Media from Microsoft
.NET Framework 3.5	3.5	Physical Media from Microsoft
Internet Information Server (IIS)	10.0	Physical Media from Microsoft
7-Zip	9.20 (64 Bit)	7z920-x64.msi
Visual Studio 2015 Professional with Update 3	2015 Update 3	en_visual_studio_professional_2015_with_update_3_x86_x64_web_installer_8922978.exe

Table 1-13. Democracy Suite 5.5 EMS Software Build Environment Component Descriptions
(continued)

Firmware/Software	Version	Filename
.NetDiscUtils	0.10	DiscUtilsBin-0.10.zip
Infragistics NetAdvantage Win Forms 2011.1	2011.1	NetAdvantage_WinForms_20111.msi
Infragistics Net Advantage – WPF 2012.1	2012.1	NetAdvantage_WPF_20121.msi
TX Text Control 16.0.NET	16	TX Text Control.NET for Windows Forms 16.0.exe
Speex	1.0.4	speex_win32_1.0.4_setup.exe
Microsoft Visual J#	2.0	vjredist64.exe
iTextSharp	5.0.5	itextsharp-5.0.5-dll.zip
Ghostscript	9.0.4	gs904w32.exe gs904w64.exe
Nlog	1.0.0.505	NLog-1.0-Refresh-bin.zip
OneWireAPI.NET	4.0	1-wiresdkver400_beta2.zip
Lame	3.99.4	lame3.99.4-20120130.zip
Sox	14.3.1	sox-14.3.1-win32.zip
Avalon Framework	20020806	avalon-framework-cvs-20020806.jar.zip
Fop	0.20-5	fop-0.20.5.jar
Batik	0.20-5	batik-1.5-fop-0.20-5.jar
SQLite	1.0.103.0	sqlite-netFx46-setup-bundle-x64-2015-1.0.103.0.exe
OpenSSL 1.0.2k	1.0.2k	openssl-1.0.2k.tar.gz
OpenSSL FIPS 2.0.10	2.0.10	openssl-fips-2.0.10.tar.gz
Strawberry Perl	5.24.1.1	strawberry-perl-5.24.1.1-64bit.msi
Patch	2.5.9-7	patch-2.5.9-7-bin.zip
ISOnewspaper	30.4	ISOnewspaper30v4_gr.icc.zip
Ogg Vorbis Encoder	2.88	oggenc2.88-1.3.5-generic.zip
Ogg Vorbis Encoder	1.10.1	oggdecV1.10.1.zip
Prism Mvvm	1.1.1	prism.mvvm.1.1.1.nupkg
Bitmiracle.libtiff.net	2.4.560	Bitmiracle.libtiff.net.2.4.560.nupkg
Prism	4.0.0	prism.4.0.0.nupkg
Prism.UnityExtensions	4.0.0	prism.unityextensions.4.0.0.nupkg
PDF Printing	2.9.5.2	PDFPrinting.zip
Entity Framework	6.1.3.net45	entityframework.6.1.3.nupkg

Table 1-13. Democracy Suite 5.5 EMS Software Build Environment Component Descriptions
(continued)

Firmware/Software	Version	Filename
WiX	3.10	Wix310.exe
Spreadsheet Light	3.4.3	spreadsheetlight.3.4.3.nupkg
Open XML SDK 2.0 for Microsoft Office	2.0	OpenXMLSDKv2.msi
Adobe Reader DC	AcrobatDC	AcroRdrDC1501020060_en_US.exe
Arial Narrow Fonts	2.37a	ArialNarrowFonts.zip
SSH.NET	2016.1.0	SSH.NET-2016.1.0-bin.zip
SSMS	14.0.17119.0	SSMS-Setup-ENU.exe
TwainDSM	2.3.0	Twaindsm-2.3.0.win.bin

Table 1-14. Democracy Suite 5.5 ICC Software Build Environment Component Descriptions

Firmware/Software	Version	Filename
NASM Assembler	2.12.02	nasm-2.12.02-win32.zip
OpenSSL 1.0.2k	1.0.2k	openssl-1.0.2k.tar.gz
OpenSSL FIPS 2.0.10	2.0.10	openssl-fips-2.0.10.tar.gz
CSC3-2010	N/A	CSC3-2010.crl
tss-ca-g2	N/A	tss-ca-g2.crl

Table 1-15. Democracy Suite 5.5 Adjudication Software Build Environment Component Descriptions

Firmware/Software	Version	Filename
Microsoft Enterprise Library	5.0	Enterprise Library 5.0.msi
Microsoft Prism	4.0.0	Prism.4.0.0.nupkg
Microsoft Identity Foundation SDK	4.0	WindowsIdentityFoundation-SDK-4.0.msi
Toggle Switch Control Library	1.1.1	ToggleSwitch 1.1.1.zip
Infragistics NetAdvantage Ultimate 2013.1	2013.1	NetAdvantage_20131_PlatformInstaller.zip
iTextSharp	5.5.1	itextsharp-all-5.5.1.zip
CLR Security	June 2010	clrsecurity_june10.zip
OpenSSL 1.0.2k	1.0.2k	openssl-1.0.2k.tar.gz
OpenSSL FIPS 2.0.10	2.0.10	openssl-fips-2.0.10.tar.gz
Community MSI Extensions	1.4	msiext-1.4.zip
TreeViewEx	3.0.0.0	TreeViewEx.dll

Table 1-16. Democracy Suite 5.5 ImageCast Precinct Election Firmware Compiler Descriptions

Firmware/Software	Version	Filename
g++ (GNU C++ compiler)	gcc3.4.0-20040603	m68k-uclinux-tools-c++-gcc3.4.0-20040603.sh

Table 1-17. Democracy Suite 5.5 ImageCast Precinct Firmware Build Environment Component Descriptions

Firmware/Software	Version	Filename
Ubuntu 16.04.1	16.04.1	ubuntu-16.04.1-desktop-i386.iso
Toolchain Installation Script	N/A	Toolchain.sh
m68k uClinux tools base gcc	3.4.0-20040603	m68k-uclinux-tools-base-gcc3.4.0-20040603.sh
m68k uClinux tools c++ gcc	3.4.0-20040603	m68k-uclinux-tools-c++-gcc3.4.0-20040603.sh
m68k uClinux tools gdb	20040603	m68k-uclinux-tools-gdb-20040603.sh
OpenSSL 1.0.2k	1.0.2k	openssl-1.0.2k.tar.gz
OpenSSL FIPS 2.0.10	2.0.10	openssl-fips-2.0.10.tar.gz

Table 1-18. Democracy Suite 5.5 ImageCast X Firmware Build Environment Component Descriptions

Firmware/Software	Version	Filename
Ubuntu 14.04.4	14.04.4	ubuntu-14.04.4-desktop-amd64.iso

Table 1-19. D-Suite 5.5 Configuration Files

Configuration File	Version	Filename
Machine Configuration File (MCF)	5.5.10.20_20180806	MCF_5.5.10.20_20180806.mcf
Device Configuration File (DCF)	5.4.01_20170521	DCF_5.4.01_20170521.dcf

Table 1-20. D-Suite 5.5 Voting System Equipment

Component	Serial Number
<i>Proprietary Hardware</i>	
ImageCast Precinct Optical Scanner PCOS-320C	AAFAJFM0061, AAFAJFN0030, AAFAJGI6764, AAFAJEL0352
ImageCast Precinct Optical Scanner PCOS-320A	AANAGCP0347, AANAGCP0002
ICP Ballot Box BOX-330A	AAUCCFX0083, AAUCCGI0011
ICX Inline EMI Filter	[DVS-EMIFILTER-001] thru [DVS-EMIFILTER-003]
<i>COTS Hardware</i>	

Table 1-20. D-Suite 5.5 Voting System Equipment (continued)

Component	Serial Number
ICX aValue 15" Tablet (SID-15V)	0E14AF00014, B03G005400006, B033G00540008, 9E274118, 1D274118, Baytrail98D750C0, Baytrail12034DCC, Baytrail9A6550C8
ICX aValue 21" Tablet (SID-21V)	0E14AF00027, B03G005500019, 03G005500009, 0039BZ2D, 0039B209, Baytrail0039B22D, BaytrailF1B2587F, BaytrailF1B25983
A Value 21" ICX DRE (Prime)	1707101522, 1707101789, 1707101730, 1707101887, 1707101710, 1707101725, 1707101731, 1708100916, 1708100876, 1708100915, 1707101845, 1707101778, 1717101720, 1707101845, 1707101722, 1707202552, 1711300282, 1707100089, 1707101795, 1707101793, 17101793
SII Thermal Printer	1115271A, 1115273A, 115270A, 1115275A
KFI VRP3 Thermal Printer (VVPAT)	KPR000000715, KPR0000078339, KPR0000078377, KRP000000711, KPR000000712, KPR170900010119, KPR0000078337, KPR0000078364, KPR170900008115, KPR0000078339, KPR170900008116, KPR170900010347, KPR170900009733, KPR170900010120, KPR170900010119, KPR170900010337, KPR170900010338, KPR170900010348
Dell OptiPlex 7440 All In One	HVNRFB2, HVNQFB2, HVNPFB2
Dell PowerEdge R630	4Z07T52
Dell PowerEdge R640	JMP9CM2
Canon imageFormula DR-G1130 Scanner	GF301092, GF304418
Canon DR-M160II Scanner	GX333569, GX333573, GX324846, GX326272, GX319353
Dell Precision T3420 PC	HS0VFB2, HS0TFB2, HS0RFB2, HS0SFB2, 4TB3MN2, F575HH2
HP LaserJet Pro Printer M402dn	PHBQF20342, PHBQF20345, PHBQC12619, PHBQC19613, PHBQC12519, PHBQD18790, PHBQC12616, PHBQG09329
HP LaserJet Pro Printer M402dne	PHB5D00782, PHB5D04714, PHB5F04770, PHB5B18304, PHB5D04713
Dell OptiPlex 9030 All-In-One	CF73S52
Dell Ultrasharp 24" Monitor U2414H	1PVZ152, 62VZ152
Dell OptiPlex 3050 All-In-One	19YWWK2
Smart Card Reader ACR39	RR374-010362

Table 1-21. D-Suite 5.5 Voting System Support Equipment

Component	Serial Number
Dell Monitor KM632	FYNTY12, CKX6Y12, CN-0524N3-72461-59H-6U5U
Dell Monitor P2414Hb	CN-0524N3-74261-5AH-2DNU, CN-0524N3-74261-5AH-2DAU
Dell DVD Multi Recorder GP60NB60	[DVS-Dell-001]
Dell Latitude E7450 Laptop	30GFH72, 369FH72
Dell Latitude e3480 Laptop	1VD3NJ2
Maxim iButton Programmer DS9490R# with DS1402	[DVS-Maxim-001] thru [DVS-Maxim-006]
APC Smart-UPS SMT1500	3S1536X06436, 3S1536X06475, 3S1536X06461, 3S1536X06485, 3S1536X06484, 3S1536X06322, 3S1536X07467, 3S1536X06485, 3S1536X06272, 3S1536X06201, 3S1536X07305, 3S1504X00395, 3S1504X00396, 3S1716X02289, W51530180004, 3S171X06059
Dell X1008 Network Switch	4R8XX42, 26SXX42
Dell X1018 Network Switch	6TN7Y42, 63SXX42
Enabling Devices Sip and Puff	[DVS-enabling devices-001] - [DVS-enabling devices-002]
Cyber Acoustics Headphones ACM-70	[DVS-cyber acoustics-001] - [DVS-cyber acoustics-005]
4-Way Joystick Controller S26	PME QC 1550 12, [DVS-JOY-001], [DVS-JOY-002]
Enablemart # 88906 Rocker (Paddle) Switch	[DVS-paddle-001]
Dell PowerConnect 2808 Network Switch	3S2P0Z1
IOGEAR SDHC/microSDHC 0U51USC410 Card Reader	8632, 8633
Lexar USB 3.0 Dual-Slot Reader	24020845007435
Hoodman Steel USB 3.0 UDMA Reader 102015	[DVS-hoodman-001]
ATI Handset	98862010101-035, 98862010103-075, 00659010100-046, 98862010100-232, 093015-1-1, 00659010100-035
ATI-USB Handset	02440010100-011, [DVS-ATIUSB-001], [DVS-ATIUSB-002], B104326-1-4-040, B104326-1-4-035
ACS PC-Linked Smart Card Reader ACR39U	RR374-006272, RR374-010356, RR374-010365
Lexar Professional CF Card Reader Workflow CFR1	24050361400108, 24050361401994, 24050361401991, 24050361401990
CORCOM Filter P/N#: 15EMC1	[DVS-CorcomEMIFilter-001]
Delta Filter P/N#: 16PDCG5C	[DVS-DeltaEMIFILTER-001]
Kingston Card Reader FCR-HS4	08738174208132

1.1.2 Description of Modification

The Dominion Democracy Suite 5.5-B Voting System is a modified voting system configuration that includes upgrades to the components of the D-Suite 5.5 Voting System. The list below includes changes between this system and the baseline of the Democracy Suite 5.5 Voting System:

GENERAL MODIFICATIONS

- Addition of ImageCast Evolution (ICE), a precinct-level, optical scan, ballot counter (tabulator) designed to perform three major functions: ballot scanning and tabulation, ballot review and second chance voting, and accessible voting and ballot marking. *Submitted version: ICE firmware version 5.5.6.1, hardware version PCOS 410A.*
- Addition of InoTec HiPro 821 Scanner as a component for the ImageCast Central Count (ICC). *Submitted version: ICC software application version 5.5.4.1, HiPro 821 Scanner hardware version 1.1.0.8.*
- Addition of Canon imageFORMULA DR-M260 Scanner as a component for the ImageCast Central Count (ICC). *Submitted version: ICC software application version 5.5.4.1, DR-M260 Scanner hardware version 1.0 SP4.*
- Addition of ImageCast Precinct 2 (ICP2) optical ballot counter. The ICP2 is a precinct-based optical scan ballot tabulator that is used in conjunction with ImageCast compatible ballot storage boxes. *Submitted version: ICP2 firmware version 5.5.1.1, hardware version PCOS-330A.*

1.1.3 Initial Assessment

Testing from the previous test campaign was used to establish the baseline. The focus of this test campaign is the addition of the ImageCast Evolution (ICE) optical ballot hybrid precinct-based scanner and BMD, the InoTec HiPro 821 Scanner, the ImageCast Precinct 2 (ICP2) optical ballot scanner, and the Canon imageFORMULA DR-M260 Scanner. It was determined the following tasks would be required to verify compliance of the modifications:

- Source Code Review, Compliance Build, Trusted Build, and Build Document Review
- System Integration Testing
- Technical Documentation Package (TDP) Review
- Functional Configuration Audit (FCA)
- System Loads & Hardening
- Physical Configuration Audit (PCA)
- Security Testing

- Hardware Testing
- Usability & Accessibility Testing
- Volume & Stress Testing
- Accuracy Testing

1.1.4 Regression Test

Regression testing for this test campaign will consist of the execution of the System Integration Testing.

1.2 References

- Election Assistance Commission 2005 Voluntary Voting System Guidelines (VVSG) Version 1.0, Volume I, “Voting System Performance Guidelines”, and Volume II, “National Certification Testing Guidelines”
- Election Assistance Commission Testing and Certification Program Manual, Version 2.0
- Election Assistance Commission Voting System Test Laboratory Program Manual, Version 2.0
- National Voluntary Laboratory Accreditation Program NIST Handbook 150, 2016 Edition, “NVLAP Procedures and General Requirements (NIST HB 150-2016)”, dated July 2016
- National Voluntary Laboratory Accreditation Program NIST Handbook 150-22, 2008 Edition, “Voting System Testing (NIST Handbook 150-22)”, dated May 2008
- United States 107th Congress Help America Vote Act (HAVA) of 2002 (Public Law 107-252), dated October 2002
- Pro V&V, Inc. Quality Assurance Manual, Revision 1.0
- Election Assistance Commission “Approval of Voting System Testing Application Package” letter dated May 6, 2016
- EAC Requests for Interpretation (RFI) (listed on www.eac.gov)
- EAC Notices of Clarification (NOC) (listed on www.eac.gov)
- Dominion Voting Systems Technical Data Package (*A listing of the D-Suite 5.5-B documents submitted for this test campaign is listed in Section 4.6 of this Test Plan*)

1.3 Terms and Abbreviations

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

“ADA” – Americans with Disabilities Act 1990

“BMD” – Ballot Marking Device

“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

“ICE” – ImageCast Evolution

“ICP” – ImageCast Precinct

“ICX” – ImageCast X

“ISO” – International Organization for Standardization

“NOC” – Notice of Clarification

“PCA” – Physical Configuration Audit

“QA” – Quality Assurance

“RFI” – Request for Interpretation

“TDP” – Technical Data Package

“UPS” – Uninterruptible Power Supply

“VSTL” – Voting System Test Laboratory

“VVPAT” – Voter Verifiable Paper Audit Trail

“VVSG” – Voluntary Voting System Guidelines

1.4 Project Schedule

The Project Schedule for the test campaign is located in Appendix A. The dates on the schedule are not firm dates but planned estimates based on the anticipated project work flow.

1.5 Scope of Testing

The scope of testing focused on the addition of the ImageCast Evolution (ICE) optical ballot hybrid precinct-based scanner and BMD, the ICP2 optical ballot counter, the InoTec HiPro 821 Scanner, and the Canon imageFORMULA DR-M260 Scanner. To evaluate the D-Suite 5.5-B test requirements, the submitted modifications were evaluated against each section of the EAC 2005 VVSG to determine the applicable tests to be performed.

Based on this assessment, it was determined that multiple areas within the EAC 2005 VVSG would be evaluated to encompass the required tests. A breakdown of the areas and associated tests is listed below:

- EAC 2005 VVSG Volume 1, Section 2: Functional Requirements
 - System Integration Testing
 - Functional Configuration Audit (FCA)
 - Physical Configuration Audit (PCA), including System Loads & Hardening
 - Technical Documentation Package (TDP) Review
 - Volume & Stress Testing
 - Accuracy Testing
- EAC 2005 VVSG Volume 1, Section 3: Usability & Accessibility
 - Usability & Accessibility Testing
 - Technical Documentation Package (TDP) Review
- EAC 2005 VVSG Volume 1, Section 4: Hardware Requirements
 - Hardware Testing
 - Technical Documentation Package (TDP) Review
- EAC 2005 VVSG Volume 1, Section 5: Software Requirements
 - Source Code Review, Compliance Build, Trusted Build, and Build Document Review
 - Technical Documentation Package (TDP) Review
 - Functional Configuration Audit (FCA)
- EAC 2005 VVSG Volume 1, Section 7: Security Requirements
 - Security Testing

- Technical Documentation Package (TDP) Review
- Functional Configuration Audit (FCA)

1.5.1 Block Diagram

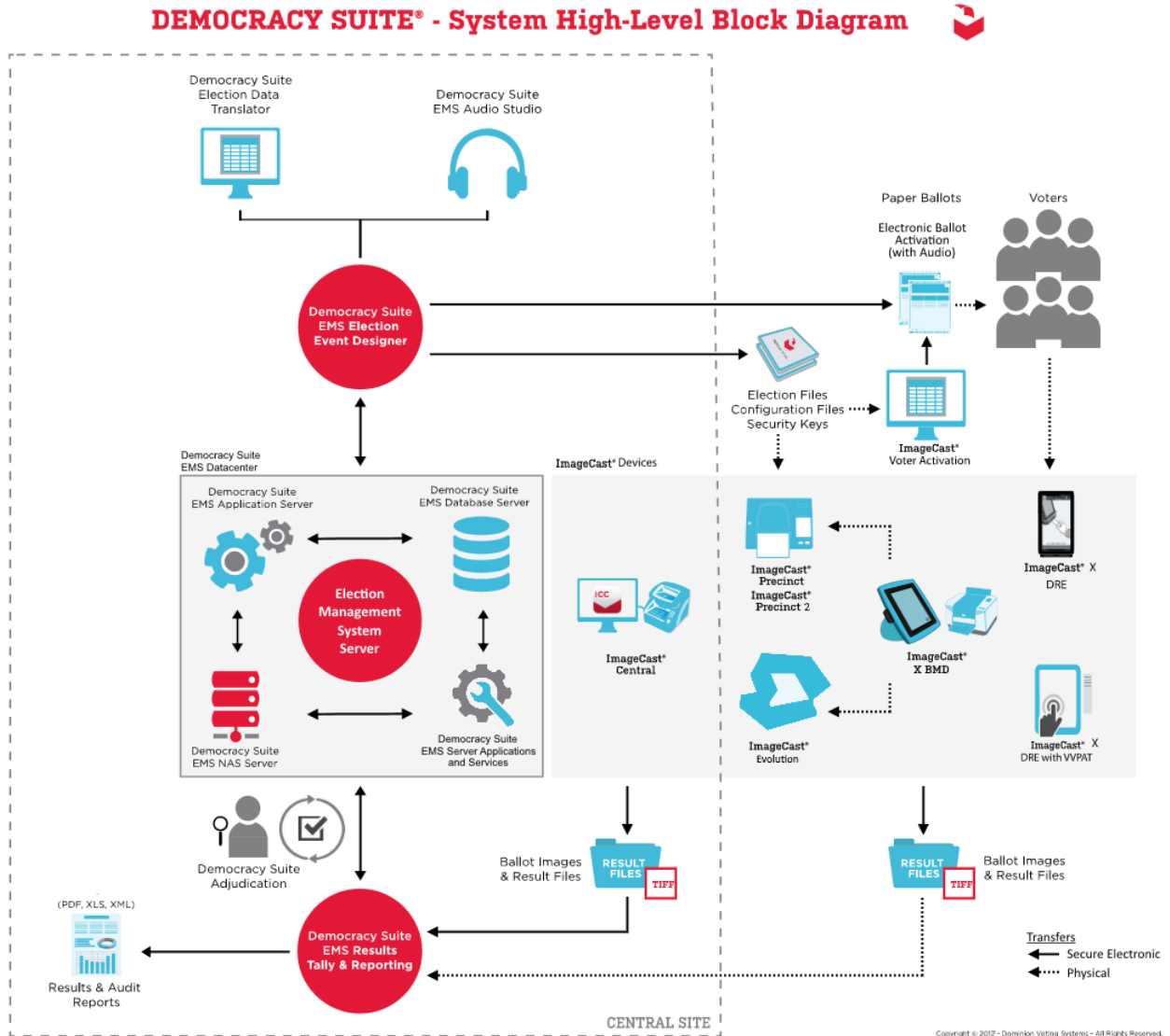


Figure 1-1. D-Suite 5.5-B System Overview

1.5.2 System Limits

The system limits that Dominion Voting Systems has stated to be supported by the D-Suite 5.5-B are provided in the table below.

Table 1-22. D-Suite 5.5-B System Limits by Configuration

Characteristic	Configuration Values		Limiting Component
	Standard	Express	
Landscape Ballot Orientation			
Ballot positions	292	292	*22-inch Landscape Ballot (240 candidates + 24 write-ins + 28 Yes/No choices)
Precincts in an election	1000	250	Memory
Contests in an election	1000	250	Memory
Candidates/Counters in an election	10000	2500	Memory
Candidates/Counters in a precinct	240	240	*22-inch Ballot
Candidates/Counters in a tabulator	10000	2500	Memory
Ballot Styles in an election	3000	750	Memory
Contests in a ballot style	38	38	*22-inch Landscape Ballot (24 candidacy contests + 14 Propositions)
Candidates in a contest	240	240	*22-inch Ballot
Ballot styles in a precinct	5	5	Memory
Number of political parties	30	30	Memory
“Vote for” in a contest	24	24	*22-inch Landscape Ballot
Supported languages in an election	5	5	Memory
Number of write-ins	24	24	*22-inch Landscape Ballot
Portrait Ballot Orientation			
Ballot positions	462	462	*22-inch Portrait Ballot
Precincts in an election	1000	250	Memory
Contests in an election	1000	250	Memory
Candidates/Counters in an election	10000	2500	Memory
Candidates/Counters in a precinct	462	462	*22-inch Portrait Ballot
Candidates/Counters in a tabulator	10000	2500	Memory
Ballot Styles in an election	3000	750	Memory
Contests in a ballot style	156	156	*22-inch Portrait Ballot

Table 1-22. D-Suite 5.5-B System Limits by Configuration *(continued)*

Characteristic	Configuration Values		Limiting Component
	Standard	Express	
Candidates in a contest	231	231	*22-inch Portrait Ballot (Column Span 3)
Ballot styles in a precinct	5	5	Memory
Number of political parties	30	30	No Limitation
“Vote for” in a contest	30	30	No Limitation
Supported languages in an election	5	5	Memory
Number of write-ins	462	462	*22-inch Portrait Ballot

***The 22-inch Ballot length applies only to hand-marked paper ballots.**

1.5.3 Supported Languages

The following languages are supported by the D-Suite 5.5-B System:

Table 1-23. D-Suite 5.5-B Supported Languages

Language	ICE	ICP	ICX
Alaska Native	Yes, if using Latin alphabet	Yes	No
Apache	Audio only	Audio only	No
Bengali	Yes	Yes	Yes
Chinese	Yes	Yes	Yes
English	Yes	Yes	Yes
Eskimo	Yes, if using Latin alphabet	Yes	No
Filipino	Yes, if using Latin alphabet	Yes	No
French	Yes	Yes	Yes
Hindi	Yes	Audio only	Yes
Japanese	Yes	Yes	Yes
Jicarilla	Audio only	Audio only	No
Keres	Audio only	Audio only	No
Khmer	Yes	Audio only	No
Korean	Yes	Yes	Yes
Navajo	Audio only	Audio only	No
Seminole	Audio only	Audio only	No
Spanish	Yes	Yes	Yes
Tagalog	No	No	Yes
Thai	Yes	Audio only	Yes
Towa	Audio only	Audio only	No
Ute	Audio only	Audio only	No
Vietnamese	Yes	Yes	Yes
Yuman	Audio only	Audio only	No

Support for all stated languages will be verified; however, only English and Spanish language ballots will be cast during the performance of functional testing. Additionally, one character based language (Chinese) will be tested during System Integration Testing.

For the character based language, the ballot will be created by Pro V&V and voted utilizing both paper ballots and ADA voting devices along with all applicable peripherals. The Chinese Language for the ballot will be created using a readily available online translation tool. The translated language text will be entered into the Election Event Designer Application. A ballot preview will be generated in the EED application. The Chinese characters displayed in the ballot preview will be compared to the characters generated by the online translation tool, to ensure that the characters match. The ballots will then be generated and printed, and the election loaded onto the tabulators and the BMD units. The Chinese characters displayed on both the printed ballots and displayed on the BMD units will be compared to the original Chinese Characters generated by the online translation tool to verify that the characters match.

1.5.4 Supported Functionality

The D-Suite 5.5-B 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

1.5.5 VVSG

The D-Suite 5.5-B Voting System shall be evaluated against the relevant requirements contained in the EAC 2005 VVSG, Version 1.0.

1.5.6 RFIs

There are no RFIs released by the EAC as of the date of this Test Plan that pertain to this test campaign that were not in effect at the time of the baseline system certification.

1.5.7 NOCs

There are no NOCs released by the EAC as of the date of this Test Plan that pertain to this test campaign that were not in effect at the time of the baseline system certification.

2.0 PRE-CERTIFICATION TESTING AND ISSUES

This section describes previous testing performed prior to submitting the voting system to the EAC.

2.1 Evaluation of Prior VSTL Testing

Pro V&V evaluated to the published Final Test Report for the D-Suite 5.5 System in order to baseline the current system under test. It was determined that Accuracy and Hardware Testing for the following components would be re-used to satisfy requirements for this test campaign: ICX BMD, ICX DRE, ICP, and ICX DRE w/VVPAT.

2.2 Evaluation of Prior Non-VSTL Testing

No prior non-VSTL testing of the D-Suite 5.5 modifications were considered for this test campaign.

2.3 Known Field Issues

D-Suite 5.5-B is a modification to a previously certified system and has not been fielded.

3.0 MATERIALS REQUIRED FOR TESTING

The following sections list all materials needed to enable the test engagement to occur.

The materials required for testing of the D-Suite 5.5-B System include all materials to enable the test campaign to occur. This includes the applicable hardware and software as well as the TDP, test support materials, and deliverable materials, as described in the following subsections.

3.1 Software

This subsection lists the proprietary and COTS software to be provided by the manufacturer as part of the test campaign.

In addition to the baseline system software identified in Section 1.1.1 of this Test Plan, the following software is required for test performance: ICC Software application version 5.5.4.1, which has been updated from the baseline version, and ICE firmware version 5.5.6.1.

Pro V&V will perform a comparison on the submitted source code against the previously certified versions. Regression testing will be performed to verify successful implementation of changes.

3.2 Equipment

This subsection lists the proprietary and COTS equipment to be provided by the manufacturer as part of the test campaign.

For COTS equipment, every effort will be made to verify that the COTS equipment has not been modified for use. This will be accomplished by performing research using the COTS equipment manufacturer’s websites based on the serial numbers and service tag numbers for each piece of equipment. Assigned test personnel will evaluate COTS hardware, system software and communications components for proven performance in commercial applications other than voting. For PCs, laptops, and servers, the service tag information will be compared to the system information found on each machine. Physical external and internal examination will also be performed when the equipment is easily accessible without the possibility of damage. Hard drives, RAM memory, and other components will be examined to verify that the components match the information found on the COTS equipment manufacturer’s websites.

All hardware required for testing is identified in Section 1.1 of this test plan.

3.3 Test Materials

This subsection lists the test materials required to execute the required tests throughout the test campaign.

Table 3-1. Required Test Materials

Material	Description(s)
Tamper Proof Security Seals	Adhesive tamper proof security seal, Novavision Part# XSG21-08RESN
Printer Cartridges	HP LaserJet CF226X
Smart Cards	Programmable Smart Cards
ImageCast Precinct Cleaning Sheets	Cleaning Sheets for ImageCast Precinct tabulator Part# CSHT-100B
Stereo Breakout Cable	3.5mm stereo male plug to dual 3.5mm mono female plugs
3.5mm Stereo Cable	3.5mm stereo male plug to 3.5mm stereo female plug
Compact Flash Cards	SanDisk Ultra 4Gb and Centon 16GB Compact Flash Cards
iButton Security Tokens	iButton Security Token with lanyards
Permanent Markers	Fine Tip Sharpie Permanent Markers
Ethernet Cables	Cat5e Ethernet Cables
ICE Paper Rolls	Replacement Thermal Paper Rolls for the ImageCast Evolution tabulator
ICP Paper Rolls	Replacement Thermal Paper Rolls for the ImageCast Precinct tabulator
Sip & Puff Disposable Straws	Disposable straws for use with the Sip & Puff input device
Ballot Stock	Ballot Paper Stock for printing ballots

Table 3-1. Required Test Materials *(continued)*

Material	Description(s)
A/C Power Cables	3-Prong A/C Power Cables
USB Thumb drives	4 GB, 8 GB, and 16 GB USB Thumb drives

3.4 Proprietary Data

All data and documentation considered by the manufacturer to be proprietary will be identified and documented in an independent submission along with a Notice of Protected Information.

4.0 TEST SPECIFICATIONS

Certification testing of the Dominion D-Suite 5.5-B Voting System submitted for evaluation will be performed to ensure the applicable requirements of the EAC 2005 VVSG and the EAC Testing and Certification Program Manual, Version 2.0 are met. Additionally, all EAC Request for Interpretations (RFI) and Notices of Clarification (NOC) relevant to the system under test will be incorporated in the test campaign. A complete listing of the EAC RFIs and NOCs is available on the EAC website.

4.1 Requirements (Strategy of Evaluation)

To evaluate the D-Suite 5.5-B test requirements, the submitted modifications were evaluated against each section of the EAC 2005 VVSG to determine the applicable tests to be performed. Based on this assessment, it was determined the following evaluations would be required to verify compliance of the modifications:

Technical Documentation Package (TDP) Review

A TDP Review will be performed to ensure that all submitted modifications are accurately documented and that the documents meet the requirements of the EAC 2005 VVSG. The preliminary TDP is performed to gather information concerning the system under test and its capabilities or design intentions. Additionally, a TDP review will be performed throughout the test campaign. The TDP Review includes the Initial Review, the Regulatory/Compliance Review, and the Final Review. This review is conducted to determine if the submitted technical documentation meets the regulatory, customer-stated, or end-user requirements and includes reviewing the documents for stated functionality review and verification.

Section 2: Functional Requirements

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

The FCA 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.

The system integration testing addresses 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.

Section 3: Usability and Accessibility Requirements

The requirements in this section shall be tested during the Usability and Accessibility Testing. This evaluation will utilize baseline test cases as well as specifically designed test cases and will include predefined election definitions for the input data.

The usability testing focuses on the usability of the system being tested. Usability is defined generally as a measure of the effectiveness, efficiency, and satisfaction achieved by a specified set of users with a given product in the performance of specified tasks. In the context of voting, the primary user is the voter, the product is the voting system, and the task is the correct recording of the voter ballot selections. Additional requirements for task performance are independence and privacy: the voter should normally be able to complete the voting task without assistance from others, and the voter selections should be private. Accessibility evaluates the requirements for accessibility. These requirements are intended to address HAVA 301 (a) (3) (B).

Section 4: Hardware Requirements

The hardware tests specified in the VVSG are divided into two categories: non-operating and operating. The non-operating tests apply to the elements of the system that are intended for use at poll site locations and are intended to simulate the storage and transport of equipment between the storage facility and the polling location. The Operating tests apply to the entire system, including hardware components that are used as part of the voting system telecommunications capability, and are intended to simulate conditions that the voting system may encounter during operation. Prior to and immediately following each required non-operating and operating test, the system shall be subjected to an operational status check.

The requirements in this section shall be tested and/or evaluated by personnel verified by Pro V&V to be qualified to perform the testing.

Section 5: Software Requirements

The requirements in this section shall be tested utilizing a combination of review and functional testing during the source code review, TDP review, and FCA. Trusted builds from previously certified versions will be used as the baseline for testing. The ICE and ICP2 components will be subjected to the full suite of testing.

To perform the 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.

Section 7: Security Requirements

The requirements in this section shall be tested during the source code review, security tests, and FCA.

To evaluate the integrity of the system, Pro V&V will develop specifically designed test cases in an attempt to defeat the access controls and security measures documented in the system TDP as well verifying compliance to EAC RFI 2012-05. A threat matrix will be created to determine the risks and vulnerabilities. An evaluation of the system will be accomplished by utilizing a combination of functional testing, source code review, and static code analyzers.

During the security testing, the system shall be inspected for various controls and measures 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.

4.1.1 Rationale for ‘Not Applicable’ Requirements

All requirements that were excluded from the previous test campaign (D-Suite 5.5) were also deemed not applicable to this test campaign due to the submitted modifications not impacting the specific requirements. These requirements are identified below:

- Volume I, Section 6.2.6 (Telecommunications Requirements: Integrity)
- Volume I, Section 7.5.2-7.5.4 (Security: Protection Against External Threats, Monitoring and Responding to External Threats, and Shared Operating Environment)
- Volume I, Section 7.6 (Use of Public Communications Networks)
- Volume I, Section 7.7 (Wireless Communications)

The rationale for not evaluating the D-Suite 5.5-B to the indicated sections is described in following table. Specific requirements that are excluded from this test campaign are identified in the EAC spreadsheet.

Table 4-1. Not Applicable Requirements

EAC 2005 VVSG Version 1 Volume I, Section	Rationale for ‘Not Applicable’
6.2.6	These requirements are written for use of public networks. The D-Suite 5.5-B does not utilize public networks.
7.5.2-7.5.4	These requirements are written for use of public networks. The D-Suite 5.5-B does not utilize public networks.
7.6	D-Suite 5.5-B does not support transmission over public networks.
7.7	No wireless technology is utilized in this system.

4.2 Hardware Configuration and Design

The hardware configuration and design for the modification has changed from the baseline system. The ImageCast Evolution (ICE) has been added to the system configuration. Also, the InoTec HiPro 821 Scanner and the Canon imageFORMULA DR-M260 Scanner are newly introduced COTS document scanners for use with the ICC. Additionally, the ICP2 has been added to this configuration.

4.3 Software System Functions

The software system functions for the previously certified voting system (D-Suite 5.5) remain unchanged for the submitted modifications. An update to the ICC was presented for evaluation, along with the ICE and ICPs firmware applications, which are new to this configuration.

4.4 Test Case Design

Test cases are designed based on the manufacturer’s design specifications and the relevant technical requirements set forth by the VVSG. Test cases shall be based on the following aspects of the voting system:

- Hardware qualitative examination design
- Hardware environmental test case design
- Software module test case design and data
- Software functional test case design
- System level test case design

Test cases shall provide information regarding the sequence of actions to be performed for the execution of a test, the requirements being met, the test objective, test configuration, equipment needed, special requirements, assumptions, and pass/fail criteria. Once the test cases are finalized, they will be validated and published for use in the test campaign. The validation of the test case will be accomplished by technical review and approval. This validation will include the following: confirmation of adequate test coverage of all requirements; confirmation that test case results are not ambiguous and gave objective pass/fail criteria; and confirmation that any automated test suites will produce valid results.

4.4.1 Hardware Qualitative Design

Previous hardware examinations were performed on the certified baseline system (D-Suite 5.5). The ICX BMD, ICX DRE, ICP, ICP2, and the ICX DRE with VVPAT hardware testing will be re-used from the previous certification test campaign (D-Suite 5.5-B). The full suite of hardware and electrical testing (as listed below) will be performed on the ICE and ICP2 components of the D-Suite 5.5-B System. The Canon M260 and InoTec HiPro Scanner components will be subjected to Temperature-Power Variation Testing only.

Electrical Tests:

- Electrical Power Disturbance
- Electromagnetic Radiation
- Electrostatic Disruption
- Electromagnetic Susceptibility
- Electrical Fast Transient
- Lightning Surge
- Conducted RF Immunity
- Magnetic Fields Immunity
- Electrical Supply

Environmental Tests:

- Bench Handling

- Vibration
- Low Temperature
- High Temperature
- Humidity
- Temperature Power Variation
- Acoustic

4.4.2 Hardware Environmental Test Case Design

The voting system hardware shall be subjected to the tests specified in Section 4.4.1. Testing will be performed by personnel verified by Pro V&V to be qualified to perform the test. Pro V&V will utilize third-party test facilities for performance of the electrical and environmental tests. Environmental and Electrical will be performed at the NTS Longmont facility located in Longmont, Colorado. All pre and post operational status checks shall be conducted by Pro V&V personnel.

4.4.3 Software Module Test Case Design and Data

Pro V&V shall review the manufacturer's program analysis, documentation, and module test case design and shall evaluate the test cases for each module with respect to flow control parameters and entry/exit data. As needed, Pro V&V shall design additional test cases to satisfy the coverage criteria specified in Volume II, Section 7.2.1.

Component Level Testing will be implemented during the FCA for each component and subcomponent. During the Source Code Review, Compliance Builds, and Security Testing, Pro V&V will utilize limited structural-based techniques (white-box testing). Additionally, specification-based techniques (black-box testing) will be utilized for the individual software components.

Pro V&V shall define the expected result for each test and the ACCEPT/REJECT criteria for certification. If the system performs as expected, the results will be accepted.

If the system does not perform as expected, an analysis will be performed to determine the cause. The test will be repeated in an attempt to reproduce the results. If the failure can be reproduced and the expected results are not met, the system will have failed the test. If the results cannot be reproduced, the test will continue. All errors encountered will be documented and tracked through resolution.

4.4.4 Software Functional Test Case Design and Data

Pro V&V shall review the manufacturer-submitted test plans and data to verify that the individual performance requirements specified in the EAC 2005 VVSG and the TDP are reflected in the software. As part of this process, Pro V&V shall review the manufacturer's test case design and prepare a detailed matrix of system functions and the test cases that exercise them. Pro V&V shall also prepare a test procedure describing all test ballots, operator procedures, and the data content

of output reports. Pro V&V shall define abnormal input data and operator actions and then design test cases to verify that the system is able to handle and recover from these abnormal conditions. During this review, emphasis shall be placed on those functions where the manufacturer data on module development, such as the system release notes and comments within the source code, reflects significant debugging problems, and on functional tests that resulted in high error rates.

Pro V&V shall define the expected result for each test and the ACCEPT/REJECT criteria for certification. If the system performs as expected, the results will be accepted.

If the system does not perform as expected, an analysis will be performed to determine the cause. The test will be repeated in an attempt to reproduce the results. If the failure can be reproduced and the expected results are not met, the system will have failed the test. If the results cannot be reproduced, the test will continue. All errors encountered will be documented and tracked through resolution.

4.4.5 System-Level Test Case Design

System Level testing will be implemented to evaluate the complete system. This testing will include all proprietary components and COTS components (software, hardware, and peripherals) in a configuration of the system's intended use. For software system tests, the tests shall be designed according to the stated design objective without consideration of its functional specification. The system level hardware and software test cases shall be prepared independently to assess the response of the hardware and software to a range of conditions.

4.5 Security Functions

The objective of the Security Testing is to evaluate the effectiveness of the voting system in detecting, preventing, recording, reporting, and recovering from security threats. To evaluate the integrity of the system, Pro V&V shall develop specifically designed test cases in an attempt to defeat the access controls and security measures documented in the system TDP. The submitted threat matrix identifying the system's risks and vulnerabilities shall be evaluated for completeness and to determine that mitigating controls are adequately implemented.

An evaluation of the system shall be accomplished by utilizing a combination of functional testing and source code review. All findings will be reported to the EAC and DVS. The test methods for performing the Security Testing are execution and review. Prior to performance of Security testing, the examiner will verify that security hardening scripts have been properly applied to system components per the system documentation. The examiner will review the submitted TDP to verify that documented access and physical controls are in place. Following the documented procedures, the examiner will configure the voting system for use and functionality to verify that the documented controls are in place and adequate and meet the stated requirements.

Physical Security will be tested by setting up the system as described in the TDP and then examining the effectiveness and comprehensiveness of physical security measures. Administrative Security will be tested by examining the system's documented security instructions and procedures for effectiveness and breadth. Logical security will be tested as part

of FCA testing by a recognized security expert who not only will review the physical and administrative testing outcomes, but will perform the following tests on system components: Vulnerability Scans, SCAP Scans, and Physical Bypass Attempts. Logical security testing will assess the effectiveness of the security hardening scripts applied during the system setup and install process.

4.6 TDP Evaluation

In order to determine compliance of the modified TDP documents with the EAC 2005 VVSG, a limited TDP review shall be conducted. This review will focus on TDP documents that have been modified since the certification of the baseline system. The review will consist of a compliance review to determine if each regulatory, state, or manufacturer-stated requirement has been met based on the context of each requirement. Results of the review of each document will be entered on the TDP Review Checklist and reported to the manufacturer for disposition of any anomalies. This process will be ongoing until all anomalies are resolved.

Any revised documents during the TDP review process will be compared with the previous document revision to determine changes made, and the document will be re-reviewed to determine whether subject requirements have been met. A listing of all documents contained in the D-Suite 5.5-B TDP is provided in Table 4-2.

Table 4-2. TDP Documents

Document Number	Description	Version
<i>Adjudication Documents</i>		
2.05	Democracy Suite Adjudication Software Design and Specification	5.5-B::122
2.08	Democracy Suite Adjudication System Operation Procedures	5.5-B::170
2.09	Democracy Suite Adjudication System Maintenance Manual	5.5-B::102
<i>D-Suite Documents</i>		
2.02	Democracy Suite System Overview	5.5-B::172
2.06	Democracy Suite System Security Specification	5.5-B::574
2.07	Democracy Suite System Test and Verification	5.5-B::196
2.10	Democracy Suite Personnel Deployment and Training Requirements	5.5-B::132
2.11	Democracy Suite Configuration Management Process	5.5-B::396
2.12	Democracy Suite Quality Assurance Program	5.5-B::160
2.13	Democracy Suite System Change Notes	5.5-B::173
<i>EMS Documents</i>		
2.03	Democracy Suite EMS Functional Description	5.5-B::383
2.05	Democracy Suite EMS Software Design and Specification	5.5-B::329
2.08	Democracy Suite EMS System Operations Procedures	5.5-B::727

Table 4-2. TDP Documents (continued)

Document Number	Description	Version
2.09	Democracy Suite EMS System Maintenance Manual	5.5-B::148
---	Democracy Suite EMS System Installation and Configuration Procedure	5.5-B::349
<i>ImageCast Central Documents</i>		
2.03	Democracy Suite ImageCast Central Functionality Description	5.5-B::191
2.05	Democracy Suite ImageCast Central Software Design and Specification	5.5-B::125
2.08	Democracy Suite ImageCast Central System Operation Procedures	5.5-B::213
---	Democracy Suite ImageCast Central Installation and Configuration Procedure	5.5-B::203
<i>ImageCast Evolution Documents</i>		
2.03	Democracy Suite ImageCast Evolution Functionality Description	5.5-B::120
2.04	Democracy Suite ImageCast Evolution System Hardware Specifications	5.5-B::332
2.05	Democracy Suite ImageCast Evolution Software Design and Specifications	5.5-B::175
2.08	Democracy Suite ImageCast Evolution System Operation Procedures	5.5-B::241
2.09	Democracy Suite ImageCast Evolution System Maintenance Manual	5.5-B::165
<i>ImageCast Precinct Documents</i>		
2.03	Democracy Suite ImageCast Precinct Functionality Description	5.5-B::182
2.04	Democracy Suite ImageCast Precinct System Hardware Specification	5.5-B::153
2.04.1	Democracy suite ImageCast Precinct System Hardware Characteristics	5.5-B::98
2.05	Democracy Suite ImageCast Precinct Software Design and Specification	5.5-B::155
2.08	Democracy Suite ImageCast Precinct System Operation Procedures	5.5-B::277
2.09	Democracy Suite ImageCast Precinct System Maintenance Manual	5.5-B::125
<i>ImageCast Precinct2 Documents</i>		
2.03	Democracy Suite ImageCast Precinct 2 Functionality Description	5.5-B::10
2.04	Democracy Suite ImageCast Precinct 2 System Hardware Specifications	5.5-B-11
2.05	Democracy Suite Imagecast Precinct 2 Software Design and Specifications	5.5-B::16
2.08	Democracy Suite Imagecast Precinct 2 System Operation Procedures	5.5-B::10
2.09	Democracy Suite Imagecast Precinct 2 System Maintenance Manual	5.5-B::9
<i>ImageCast X Documents</i>		

Table 4-2. TDP Documents *(continued)*

Document Number	Description	Version
2.03	Democracy Suite ImageCast X Functionality Description	5.5-B::97
2.05	Democracy Suite ImageCast X Software Design and Specification	5.5-B::98
2.08	Democracy Suite ImageCast X System Operation Procedures	5.5-B::85
---	Democracy Suite ImageCast X System Installation and Configuration	5.5-B::87
2.09	Democracy Suite ImageCast X System Maintenance Manual	5.5-B::76
<i>User Guides</i>		
---	Democracy Suite ImageCast Adjudication User Guide	5.5-B::141
---	Democracy Suite Election Data Translator User Guide	5.5-B::89
---	Democracy Suite EMS Audio Studio User Guide	5.5-B::38
---	Democracy Suite EMS Election Event Designer User Guide	5.5-B::339
---	Democracy Suite EMS Results Tally and Reporting User Guide	5.5-B::145
---	Democracy Suite ImageCast Central User Guide	5.5-B::137
---	Democracy Suite ImageCast Precinct User Guide	5.5-B::56
---	Democracy Suite ImageCast Voter Activation User Guide	5.5-B::53
---	Democracy Suite ImageCast X User Guide	5.5-B::252
---	Democracy Suite ImageCast Precinct 2 User Guide	5.5-B::6
---	Canon imageFORMULA DR-M160II User Manual	---
---	Canon imageFORMULA DR-M260 User Manual	---
---	Canon imageFORMULA DR-G1130 DR-G1100 User Manual	---
---	HiPro User Manual	1.2
<i>Supplementary Documents</i>		
----	Common Industry Format for Usability Test Report ImageCast X 5.2 with VVPAT	5.5::1
---	Dell Latitude E7450 Owner's Manual	Rev. A00
---	SID-15V-Z37-A1R User Manual	Rev. 1.0
---	SID-21V-Z37-A1R User Manual	Rev. 1.0
---	Cyber Acoustics ACM-70B Stereo Headphones Product Sheet	---
---	Democracy Suite ImageCast C++ Coding Standard	5.5-B::59
---	Democracy Suite C# Automated Code Review Process	5.5-B::54
---	Dell Latitude E7450/Latitude 7450 Regulatory Compliance Sheet	Rev. A09
---	Dell OptiPlex 9020 AIO Regulatory Compliance Sheet	Rev. A09

Table 4-2. TDP Documents *(continued)*

Document Number	Description	Version
---	Dell OptiPlex 9030 AIO Regulatory Compliance Sheet	Rev. A09
---	Dell Networking X-Series Specification Sheet	Ver. 1.9
---	Dell OptiPlex 9020 All-in-One Technical Specification Sheet	---
---	Dell OptiPlex 9030 All-in-One Technical Specification Sheet	---
---	Dell OptiPlex 3050 All-in-One Technical Specification Sheet	---
---	Google Java Style Dominion XML	---
---	Dominion Voting Systems Java Coding Standards	1.0
---	Dominion Voting Systems JavaScript Coding Standards	1.0
---	ICX Machine Configuration File (MCF) Parameters Settings	5.5-B::31
---	Democracy Suite ImageCast Device Configuration Files	5.5-B::105
---	Democracy Suite ImageCast Printing and Finishing Specification	5.5-B::99
---	Democracy Suite ImageCast Total Results File Format	5.5-B::62
---	Democracy Suite ImageCast Election Definition Files	5.5-B::88
---	Democracy Suite ImageCast Precinct Extracting Firmware Contents	5.5-B::41
---	Democracy Suite ImageCast Precinct Firmware Update Procedure	5.5-B::68
---	Democracy Suite ImageCast Precinct Level One (L1) Maintenance Manual	5.5-B::67
---	Democracy Suite ImageCast Precinct Technical Guide	5.5-B::57
---	Usability Test Report of ImageCast Precinct 5.0 with 36 Participants for VVSG 1.0	5.0::10
---	Usability Test Report of ImageCast X 5.0 with 36 Participants for VVSG 1.0	5.0::13
---	YEDU.E95462 Uninterruptible Power-supply Equipment Sheet	---
---	Dell Latitude E7440 Regulatory Compliance Sheet	Rev. A09
---	Dell Latitude 3480 Regulatory Compliance Sheet	Rev. A11
---	Dell PowerEdge R630 Regulatory Compliance Sheet	Rev. A10
---	Dell Precision T1700 MT Regulatory Compliance Sheet	Rev. A09
---	Dell PowerConnect 2808 Product Safety, EMC, and Environmental Datasheet	---
---	Dell PowerConnect 2816 Product Safety, EMC, and Environmental Datasheet	---
---	Smart Pro SM1500 Datasheet	---
---	APC Smart-UPS 230V Product Information Sheet	---
---	HP M402dn Datasheet	Rev. 2

Table 4-2. TDP Documents *(continued)*

Document Number	Description	Version
---	HP M402dne Datasheet	May 2017
---	Dell Latitude 3480 Owner's Manual	Rev. A00
---	Dell Latitude 3470 Owner's Manual	Rev. A00
---	Dell Precision T3420 Owner's Manual	Rev. A00
---	aValue HID-21V-BTX-A1R User Manual	Rev. 2.0
---	aValue SID-15V-Z37-A1R Data Sheet	---
---	aValue SID-21V-Z37-A1R Data Sheet	---
---	APC Installation and Operation Back-UPS Pro BR1000G	10/2014
---	APC Smart-UPS SMT1500 Operation Manual	03/2013
---	Dell OptiPlex 7440 All-In-One Owner's Manual	Rev. A01
---	Dell OptiPlex 3050 All-In-One Owner's Manual	Rev. A01
---	Dell P2417H Monitor User's Guide	Rev. A01
---	Dell PowerEdge R630 Owner Manual	Rev. A03
---	Lexar Pro USB 3 Dual Slot Reader	---
---	Usability Study of Dominion Voting Systems ImageCast Evolution Versions 4.1.1.1 and 4.6.1.1	1.0.0::37
---	Democracy Suite ImageCast Evolution Firmware Installation Procedure	5.5-B::96
---	Democracy Suite ImageCast Evolution Level One (L1) Maintenance Manual	5.5-B::134
---	Democracy Suite ImageCast Evolution Machine Behavior Settings	5.5-B::96
---	Seiko SII RP-D10 Series User's Guide	Jan. 2018
---	Dell EMC PowerEdge R640 Installation and Service Manual	Rev. A01
---	Dell OptiPlex 7060 Small Form Factor Service Manual	Rev. A00
---	Dell Latitude E7470 Owner's Manual	Rev. A02
---	APC Operation Manual Smart-UPS 750/1000/1500/2200/3000 VA	---
---	ACR38x CCID Smart Card Reader Reference Manual	V6.05
---	ACR39 Series PC-linked Smart Card Readers Reference Manual	V1.04
---	Ablenet Single Switch Quickstart Guide	---
---	The Programing Group High-Integrity C++Coding Standard Manual	Ver. 2.2
---	HIC++ Standards Model for C++	9.5.4
---	Dominion Voting Voter-verified paper audit trail (VVPAT) Model: VRP3 User Manual Safety Precautions	07 2018

Table 4-2. TDP Documents *(continued)*

Document Number	Description	Version
---	Democracy Suite ImageCast Precinct 2 Machine Behavior Settings	5.5-B::10
---	APC Smart-UPS 1500 Specification Sheet	---
---	Democracy Suite ImageCast Precinct 2 Extracting Firmware Contents and Verifying SHA256 Values	5.5-B::13
---	Democracy Suite ImageCast Precinct 2 Level One (L1) Maintenance Manual	5.5-B::9
---	APC Back-UPS BE600M1 User Manual	09/2015
---	APC Back-UPS SMT1500C Operation Manual	01/2017
---	Avalue HID-21V-BTX FactSheet (---)	---
---	Avalue SID 21V Quick Reference	Feb 2018
---	Dell Latitude 3490 Owners Manual	Rev. A01
---	Dell OptiPlex 3050 AIO EMC Emissions Compliance Sheet	Rev. A11
---	Dell Latitude 3400 Setup and Specification Guide	Rev. A00
---	Dell PowerEdge R640 Technical Guide	Rev. A00
---	Dell Networking X Series User Guide	Rev. A06
---	Dell P2419H Monitor User's Guide	Rev. A05
---	DisplayLink DL 125 Product Brief	---
---	HIC Coding Standard	2.2
---	Kingston USB 3.0 High-Speed Media Reader Datasheet	---
---	Lenovo ThinkCentre TIO24Gen3Touch Monitor User Guide	May 2017
---	Dell Optiplex 7050 Tower Owners Manual (A01)	Rev. A01
---	Dell Optiplex 7060 Small Form Factor Service Manual	Rev. A00
---	Dell Optiplex 7060 Tower Setup and Specifications Guide	Rev. A01
---	Dell Precision 3430 Small Form Factor Service Manual	Rev. A00
---	Dell Precision 3430 Small Form Factor Setup and Specifications Guide	Rev. A00
---	Scamax 8x1 Scanner Brochure	---
---	Tripp Lite SmartPro SM1500RMXL2UTAA Datasheet	---
<i>Build Documents</i>		
---	Democracy Suite ImageCast Evolution Firmware Build, Prerequisite Setup and Installation	5.5-B::95
---	Democracy Suite ImageCast Precinct Firmware Build and Install	5.5-B::90
---	Democracy Suite ImageCast X Build	5.5-B::55

Table 4-2. TDP Documents (continued)

Document Number	Description	Version
---	Democracy Suite Windows Build Document	5.5-B::40
---	Democracy Suite ImageCast Precinct 2 Build Environment and Prerequisite Setup, Firmware Build and Installation	5.5-B::24

4.7 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.

For the ICE software, a combination of Automated Source Code Review and Manual Source Code Review methods will be used to review the source code. For all other components, the submitted source code will be compared to the previously certified Democracy Suite 5.5 voting system versions to determine the changes, if any. A combination of Automated Source Code Review and Manual Source Code Review methods will then be used to review the changes in the source code. In addition, 10% of the source code comments will be manually reviewed.

4.8 QA and CM System Review

The Dominion Voting Systems Quality and Configuration Management Manuals shall be reviewed for their fulfillment of Volume I, Sections 8 and 9, and the requirements specified in Volume II, Section 2. The requirements for these sections establish the quality assurance and configuration standards for voting systems to which manufacturers must conform and require voting system manufacturers to implement a quality assurance and configuration management program that is conformant with recognized ISO standards. As part of the review process, the Dominion TDP documents will be reviewed to determine if the stated policies are being followed.

4.9 Physical Configuration Audit (PCA)

The Physical Configuration Audit (PCA) compares the voting system components submitted for qualification to the manufacturer’s technical documentation, and shall include 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 shall review drawings, specifications, technical data, and test data associated with system hardware to establish system hardware baseline associated with 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

4.10 Functional Configuration Audit (FCA)

The Functional Configuration Audit (FCA) encompasses an examination of manufacturer's 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. In addition to functioning according to the manufacturer's documentation tests will be conducted to ensure all applicable EAC 2005 VVSG requirements are met.

4.11 Accuracy

The accuracy test ensures that each component of the voting system can each process 1,549,703 consecutive ballot positions correctly within the allowable target error rate. The Accuracy test is designed to test the ability of the system to "capture, record, store, consolidate and report" specific selections and absences of a selection. The required accuracy is defined as an error rate. This rate is the maximum number of errors allowed while processing a specified volume of data.

In an effort to achieve this and to verify the proper functionality of the units under test, the following methods will be used to test components of the voting system:

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. The accuracy requirements for the ICE and the ICC units will be met by the execution of the standard accuracy test utilizing pre-marked and hand-marked ballots of each ballot length supported by the system, and ballots produced by the ICX BMD.

The ICE and ICC units will be tested by utilizing a combination of hand marked (70%) and pre-marked (30%) ballots to achieve an accuracy rate greater than 1,549,703 correct ballot positions.

The ICX BMD, ICX DRE, ICP, and the ICX DRE with VVPAT Accuracy test will be reused from the Dominion 5.5 EAC Campaign

4.12 Volume & Stress

Tests to investigate the system's response to conditions that tend to overload the system's capacity to process, store, and report data. The test parameters will focus on the system's stated limits and the ballot logic for areas such as the maximum number of active voting positions, maximum number of ballot styles, maximum candidates, maximum contests, and stated limits within the EMS. This test will be utilized to ensure the system can achieve the manufacturer's TDP claims of what the system can support. Testing will be performed by exercising an election definition and test cases developed specifically to test for volume and stress conditions of the system being tested.

4.13 System Integration

System Integration is a system level test for the integrated operation of both hardware and software. It evaluates the compatibility of the voting system software components or subsystems with one another, and with other components of the voting system environment. This is determined through functional tests integrating the voting system software with the remainder of the system. During this area of testing, the system shall be configured exactly as it would for normal field use. This includes connecting all supporting equipment and peripherals including ballot boxes, voting booths (regular and accessible), and any physical security equipment such as locks and ties.

Pro V&V personnel shall properly configure and test the system by following the procedures detailed in the D-Suite 5.5-B voting system technical documentation.

5.0 TEST DATA

The following subsections provide information concerning test data recording, criteria, and reduction.

5.1 Test Data Recording

All equipment utilized for test data recording shall be identified in the test data package. The output test data shall be recorded in an appropriate manner as to allow for data analysis. For source code and TDP reviews, results shall be compiled in reports and submitted to Dominion for resolution.

5.2 Test Data Criteria

The D-Suite 5.5-B Voting System shall be evaluated against all applicable requirements contained in the EAC 2005 VVSG. The acceptable range for system performance and the expected results for each test case shall be derived from the manufacturer-submitted technical documentation and the EAC 2005 VVSG.

6.0 TEST PROCEDURE AND CONDITIONS

The following subsections detail the facility requirements, test setup conditions, and sequence of testing.

6.1 Facility Requirements

Unless otherwise annotated, all testing shall be conducted at the Pro V&V test facility located in Huntsville, AL, by personnel verified by Pro V&V to be qualified to perform the test.

Unless otherwise specified herein, testing shall be performed at the following standard ambient conditions and tolerances:

- Temperature: 68-75° F ($\pm 3.6^\circ\text{F}$)
- Relative Humidity: Local Site Humidity
- Atmospheric Pressure: Local Site Pressure
- Time Allowable Tolerance: $\pm 5\%$

Testing performed at third-party laboratories will be subjected to the test parameters and tolerances defined by the test facility and will be reported in the final Test Report.

6.2 Test Set-up

All voting system equipment shall be received and documented using Pro V&V proper QA procedures. Upon receipt of all hardware, an inspection will be performed to verify that the equipment received is free from obvious signs of damage and/or degradation that may have occurred during transit. If present, this damage shall be recorded, photographed, and reported to the Dominion Representative. Additionally, a comparison shall be made between the recorded serial numbers/part numbers and those listed on shipper's manifest and any discrepancies shall be reported to the Dominion Representative. TDP items and all source code received shall be inventoried and maintained by Pro V&V during the test campaign.

During test performance, the system shall be configured as it would be for normal field use. This includes connecting all supporting equipment and peripherals.

6.3 Test Sequence

The D-Suite 5.5-B Voting System will be evaluated against all applicable requirements in the EAC 2005 VVSG. There is no required sequence for test performance.

6.4 Test Operations Procedure

Pro V&V will identify PASS/FAIL criteria for each executed test case. The PASS/FAIL criteria will be based on the specific expected results of the system. In the case of an unexpected result that deviates from what is considered standard, normal, or expected, a root cause analysis will be performed.

Pro V&V will evaluate every EAC 2005 VVSG requirement applicable to the Democracy Suite 5.5-B voting system. Any deficiencies noted will be reported to the EAC and the manufacturer. If it is determined that there is insufficient data to determine compliance, this test plan will be altered and additional testing will be performed.

APPENDIX A
PROJECT SCHEDULE

Task Name	Start Date	End Date	Duration
TDP	02/11/19	06/03/19	80d
Initial Review	02/11/19	03/04/19	16d
Compliance Review	03/05/19	05/28/19	60d
Final review	05/29/19	06/03/19	4d
TRR	02/12/19	02/13/19	2d
Test Plan	02/11/19	05/16/19	69d
Test Plan Creation	03/04/19	03/20/19	13d
Vendor Review & Comments	03/21/19	03/27/19	5d
EAC Submission & Review	03/28/19	04/24/19	20d
EAC Comment Review & Update	04/25/19	04/30/19	4d
EAC Submission & Review of Revision	05/01/19	05/14/19	10d
EAC Approved Test Plan	05/15/19	05/16/19	2d
Source Code Review	02/11/19	04/10/19	43d
Source Code Delivered	02/19/19	02/19/19	1d
Source Code Review Automated	02/20/19	02/20/19	1d
Source Code Review Manual	02/20/19	03/05/19	10d
Source Code Re-Review	03/06/19	03/06/19	1d
Document Review	03/07/19	03/07/19	1d
Compliance Build	03/08/19	03/11/19	2d
System Delivery & Setup	03/12/19	04/26/19	34d
Equipment Delivered	03/18/19	04/26/19	30d
PCA	03/18/19	04/26/19	30d
System Setup Loads & Hardening	03/12/19	04/26/19	34d
Hardware Testing	02/15/19	05/15/19	64d
Electrical Testing (ICE) - TUV	02/15/19	02/21/19	5d
Environmental Testing (ICE) - NTS	02/19/19	03/08/19	14d
Temp Power(ICE, M260,&HiPro)-NTS	03/11/19	03/15/19	5d
Temp Power (HiPro) - NTS	04/15/19	04/19/19	5d
Maintainability	05/14/19	05/14/19	1d
Acoustic Test	05/15/19	05/15/19	1d
System Level Testing	03/25/19	05/23/19	44d
FCA	03/25/19	04/26/19	25d
Security	04/29/19	04/30/19	2d
Usability	04/29/19	04/30/19	2d
Accessibility	05/01/19	05/01/19	1d
Volume & Stress	05/02/19	05/08/19	5d
Accuracy	05/09/19	05/13/19	3d
Regression Testing	05/14/19	05/14/19	1d
Trusted Build	05/15/19	05/16/19	2d
System Integration	05/17/19	05/23/19	5d

Test Report	05/17/19	07/24/19	46d
Test Report Creation	05/17/19	05/29/19	8d
Vendor Review & Comments	05/30/19	05/31/19	2d
EAC Submission & Review	06/03/19	06/28/19	20d
EAC Comment Review & Update	07/01/19	07/08/19	4d
EAC Submission & Review of Revision	07/09/19	07/22/19	10d
EAC Approved Test Report	07/23/19	07/24/19	2d