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

EAC Project Number: DVS1702

Version: Revision A

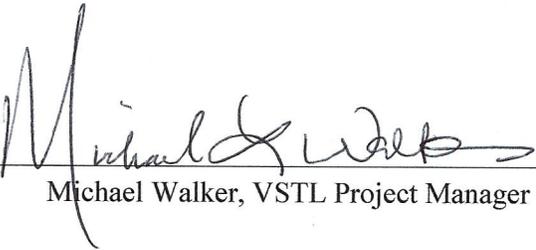Date: 12/6/17

U.S. Election Assistance Commission

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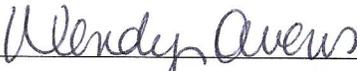
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SIGNATURES

Approved by: _Michael J Walker_ (signature)   _12/6/17_

Michael Walker, VSTL Project Manager   Date

Approved by: _Wendy Owens_ (signature)   _12/6/17_

Wendy Owens, VSTL Program Manager   Date

REVISIONS

Revision	Description	Date
NR	Initial Release	10/18/17
A	Updates per EAC comments and revised System Change Notes	12/6/17

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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 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 Voting System. The application was accepted by the EAC and the project was assigned the unique Project Number of DVS1702.

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 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), the ImageCast X (ICX) DRE w/ Reports Printer, ImageCast X (ICX) DRE w/VVPAT, and the ImageCast X (ICX) BMD. The D-Suite 5.5 Voting System configuration is a modification from the EAC approved D-Suite 5.0 system configuration.

The following subsections describe the baselined D-Suite 5.0 Voting System.

Election Management System (EMS)

The D-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.

- <u>EMS Election Data Translator:</u> End-user application used to export election data from election project and import election data into election project.

- <u>EMS Election Event Designer:</u> A client application that integrates election definition functionality together with ballot styling capabilities and represents a main pre-voting phase end-user application

- <u>ImageCast Voter Activation:</u> 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.

- <u>EMS Results Tally and Reporting:</u> 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:

- <u>EMS Adjudication Service:</u> Represents a server side application which provides ballot information such as contests, candidates and their coordinates from EMS to the Adjudication application.

- <u>EMS Application Server:</u> Represents a server side application responsible for executing long running processes, such as rendering ballots, generating audio files and election files, etc.

- <u>EMS Database Server:</u> 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.

- <u>EMS Data Center Manager:</u> A server application that represents a system level configuration application used in EMS back-end data center configuration.

- <u>EMS Election Device Manager:</u> Application used for production and programming of election files, and other accompanying files, for ImageCast X terminals.

- <u>EMS File System Service:</u> 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.

- <u>EMS NAS Server:</u> Represents a server side file repository of the election project file based artifacts, such as ballots, audio files, reports, log files, election files, etc.

- <u>Smart Card Helper Service:</u> 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) 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 any of the tablets listed in Table 1-21.

1.1.1 Baseline Certified System

The baseline system for this modification is the D-Suite 5.0 Voting System. The tables below describe the certified equipment and firmware versions. Detailed descriptions of the D-Suite 5.0 test campaign are contained in Pro V&V Report No.TR-01-01-DVS-2016-01.01 Rev. D, 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 5.0 EMS Software Component Descriptions

Software	Version	Filename	Configuration	
			Standard	Express
EMS Election Event Designer (EED)	5.0.15.1	setup.exe: EED_FED_CERT_Setup_x64.msi	X	X
EMS Results Tally and Reporting (RTR)	5.0.15.1	setup.exe: RTR_FED_CERT_Setup_x64.msi	X	X
EMS Application Server	5.0.15.1	setup.exe: APPS_FED_CERT_Setup_x64.msi	X	X
EMS File System Service (FSS)	5.0.15.1	setup.exe: FSSSetup.msi	X	X
EMS Audio Studio (AS)	5.0.15.1	setup.exe: EMSAudioStudioSetup.msi	X	X
EMS Data Center Manager (DCM)	5.0.15.1	DemocracySuiteEMS_DCM.exe	X	X
EMS Election Data Translator (EDT)	5.0.15.1	setup.exe: EDTSetup_x86.msi EDTSetup_x64.msi	X	X
ImageCast Voter Activation (ICVA)	5.0.15.1	setup.exe: ICVASetup.msi	X	X
EMS Adjudication (Adj.)	5.0.0.17002	DVS ImageCast Adjudication Client Setup.msi	X	X
EMS Adjudication Service	5.0.0.17002	DVS Adjudication Services Setup.msi	X	X
EMS Election Data Manager (EDM)	5.0.6165.23355	setup.exe: EdmInstaller.msi	X	X
Smart Card Helper Service	5.0.6165.23379	setup.exe: SmartCardServiceSetup.msi	X	X

Table 1-2. Democracy Suite 5.0 ImageCast Precinct Software Component Descriptions

Firmware/Software	Version	Filename
Election Firmware	5.0.1-US	cf2xx.sig
Firmware Updater	5.0.1-US	firmUp.enc

Table 1-2. Democracy Suite 5.0 ImageCast Precinct Software Component Descriptions *(continued)*

Firmware/Software	Version	Filename
Firmware Extractor	5.0.1-US	FirmwareExtract.enc
Kernel (uClinux)	5.0.1-US	image.bin.gz
Boot Loader (COLILO)	20040221	colilo.bin
Asymmetric Key Generator	5.0.1-US	Keygen.enc
Asymmetric Key Exchange Utility	5.0.1-US	KeyExchange.enc
Firmware Extractor (Uses Technician Key)	5.0.1-US	TechExtract.enc

Table 1-3. Democracy Suite 5.0 ImageCast Central Software Component Descriptions

Firmware/Software	Version	Filename
ImageCast Central Application	5.0.1-0001	ICCSetup_v5.0.0.15.exe

Table 1-4. Democracy Suite 5.0 ImageCast X Software Component Descriptions

Firmware/Software	Version	Filename
ICX Application	5.0.6149.28963	ICX.apk
ICX Security Certificate	N/A	icx_pkcs12.pfx
ICX Security Certificate Password	N/A	icx_pfx.pwd

Table 1-5. Democracy Suite 5.0 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	8.1 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	vcredist_x64.exe vcredist_x86.exe	X	X
Java Runtime Environment	7u76	jre-7u76-windows-x64.exe jre-7u76-windows-i586.exe	X	X
Java Runtime Environment	8u77	jre-8u77-windows-x64.exe jre-8u77-windows-i586.exe	X	X
Microsoft SQL Server 2012 Standard	2012 Standard	Physical Media from Microsoft	X	
Microsoft SQL Server 2012 Service Pack 2	2012 SP2	SQLServer2012SP2-KB2958429-x64-ENU.exe	X	

Table 1-5. Democracy Suite 5.0 EMS Client/Server Software Component Descriptions *(continued)*

Firmware/Software	Version	Filename	Configuration	
			Standard	Express
Microsoft SQL Server 2012 SP2 Express with Advanced Services	2012 SP2	SQLEXPRADV_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	N/A	ARIALN.TTF ARIALNB.TTF ARIALNBI.TTF ARIALNI.TTF	X	X
Maxim iButton Driver	4.04	install_1_wire_drivers_x86_v404.msi install_1_wire_drivers_x64_v404.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 5.0 EMS Software Platform Unmodified COTS Component Descriptions

Firmware/Software	Version	Filename
Infragistics NetAdvanatage Win Forms 2011.1	2011 Vol.1	NetAdvantage_WinForms_20111.msi
Infragistics NetAdvanatage 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
Log4net	1.2.10	log4net.dll, log4net.xml
NLog	1.0.0.505	NLog.dll
iTextSharp	5.0.5.0	itextsharp.dll
OpenSSL	1.2	openssl.exe, lebeay32.dll, ssleay32.dll

Table 1-6. Democracy Suite 5.0 EMS Software Platform Unmodified COTS Component Descriptions *(continued)*

Firmware/Software	Version	Filename
SQLite	1.0.65.0	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)
PdfToImage.dll	1.2	PdfToImage.dll
SharpSSh package	1.1.1.13	Tamir.SharpSSH.dll, Diffie.Hellman.dll, Org.Mentalis.Security.dll
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	4.3.1	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 5.0 ImageCast Precinct Unmodified COTS Component Descriptions

Firmware/Software	Version	Filename
OpenSSL	1.1.2	Openssl-1.1.2.tar.gz
PNG Reference Library	1.2.24	libpng-1.2.24.tar.gz
Zlib	1.2.3	Zlib-1.2.3.tar.gz

Table 1-8. Democracy Suite 5.0 ImageCast X (Includes EDM) Unmodified COTS Component Descriptions

Firmware/Software	Version	Filename
ASP.NET AJAX Control Toolkit	15.1.4.0	AjaxControlToolkit.Installer.15.1.4.0.exe
Entity Framework	6.1.3.net45	entityframework.6.1.3.nupkg
Ionics Zip Library	1.9.1.8	DotNetZipLib-DevKit-v1.9.zip
NLog Library	1.0.0.505	NLog-1.0-Refresh-bin.zip

Table 1-8. Democracy Suite 5.0 ImageCast X (Includes EDM) Unmodified COTS Component Descriptions *(continued)*

Firmware/Software	Version	Filename
SQLite	1.0.98.0	sqlite-netFx451-binary-bundle-x64-2013-1.0.98.0.zip
Google Text-to-Speech Engine	3.8.16	ARM: com.google.android.tts_3.8.16-210308160_minAPI15(armeabi-v7a)(nodpi).apk x86: com.google.android.ttscom.google.android.tts_3.8.16-210308163_minAPI15(x86)(nodpi).apk

Table 1-9. Democracy Suite 5.0 ImageCast Central Software Build Library Source Code (Unmodified COTS)

Firmware/Software	Version	Filename
OpenSSL	1.2.3	openssl-1.2.3.tar.gz

Table 1-10. Democracy Suite 5.0 ImageCast Central Runtime Software Components (Unmodified COTS)

Firmware/Software	Version	Filename
1-Wire Driver (x86)	4.04	install_1_wire_drivers_x86_v404.msi
1-Wire Driver (x64)	4.04	install_1_wire_drivers_x64_v404.msi
Kofax VRS	4.5 Build 269	Kofax_VRS4_50_269_DR-G1130.iso
Kofax VRS Service Pack 1	4.5.1	vrs45sp1setup.exe
Canon DR-G1130 Driver	1.2 SP4	Physical Media from Canon
Canon DR-G1130 Component Installer	4.50	CI-DR-G1130.exe
Visual C++ 2013 Redistributable (x86)	12.0.30501	vcredist_x86.exe

Table 1-11. Democracy Suite 5.0 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 5.0 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 5.0 EMS Software Build Environment Component Descriptions

Firmware/Software	Version	Filename
Windows 8.1 Professional	8.1	Physical Media from Microsoft
.NET Framework 3.5	3.5	Physical Media from Microsoft
Internet Information Server (IIS)	6	Physical Media from Microsoft
7-Zip	9.20 (64 Bit)	7z920-x64.msi
Visual Studio 2013 Premium	2013.5	vs2013.5_prem_enu.iso
ImgBurn	2.5.7.0	SetupImgBurn_2.5.7.0.exe
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
SharpSSH	1.1.1.13	SharpSSH.zip
SQLite	1.0.65.0	SQLite-1.0.65.0-binaries.zip
OpenSSL	1.2	openssl-1.2.tar.gz
ActivePerl	5.20.2	ActivePerl-5.20.2.2002-MSWin32-x86-64int-299195.msi

Table 1-13. Democracy Suite 5.0 EMS Software Build Environment Component Descriptions
(continued)

Firmware/Software	Version	Filename
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
PDF Printing	2.9.5.2	PDFPrinting.zip
Entity Framework	6.1.3	entityframework.6.1.3.nupkg
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
Acrobat Reader	Acrobat DC	AcroRdrDC1501020060_en_US.exe
Arial Narrow Fonts	N/A	ArialNarrowFonts.zip
PdfToImage	1.2	ConvertPDF_source_1.2.zip

Table 1-14. Democracy Suite 5.0 ICC Software Build Environment Component Descriptions

Firmware/Software	Version	Filename
NASM Assembler	2.09.07	nasm-2.09.07-win32.zip
OpenSSL	1.2.3	openssl-1.2.3.tar.gz

Table 1-15. Democracy Suite 5.0 EDM Software Build Environment Component Descriptions

Firmware/Software	Version	Filename
Ajax Control Toolkit	15.1.4	AjaxControlToolkit.Installer.15.1.4.0.exe
SQLite	1.0.98.0	sqlite-netFx451-binary-bundle-x64-2013-1.0.98.0.zip
Ionic	1.9.1.8	DotNetZipLib-DevKit-v1.9.zip
Google Text-to-speech Engine – Architecture arm	3.8.16	com.google.android.tts_3.8.16-210308160_minAPI15(armeabi-v7a)(nodpi).apk
Google Text-to-speech Engine – Architecture x86	3.8.16	com.google.android.ttscom.google.android.tts_3.8.16-210308163_minAPI15(x86)(nodpi).apk

Table 1-16. Democracy Suite 5.0 Adjudication Software Build Environment Component Descriptions

Firmware/Software	Version	Filename
Microsoft Enterprise Library	5.0	Enterprise Library 5.0.msi
Microsoft Prism	4.0-November 2010	Prismv4.exe
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_dotNet_20131_With SamplesAndHelp.zip
iTextSharp	5.5.1	itextsharp-all-5.5.1.zip
CLR Security	June 2010	clrsecurity_june10.zip
OpenSSL	1.0.2e	openssl-1.0.2e. i386-win32.zip
Community MSI Extensions	1.4	msiext-1.4.zip
TreeViewEx	3.0.0.0	TreeViewEx.dll

Table 1-17. Democracy Suite 5.0 ICL Software Build Environment Component Descriptions

Firmware/Software	Version	Filename
SharpZibLib	0.86.0	SharpZipLib_0860_Bin.zip
Microsoft Visual Studio 2013 Installer Projects Extension	2013	VSI_bundle.exe
Visual Basic Power Packs	12.0	vb_vbpowerpacks.exe

Table 1-18. Democracy Suite 5.0 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 1-19. Democracy Suite 5.0 ImageCast Precinct Firmware Build Environment Component Descriptions

Firmware/Software	Version	Filename
Ubuntu 10.04 LTS – Long-term support	10.04	ubuntu-10.04.2-desktop-amd64.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	1.1.2	Openssl-1.1.2.tar.gz

Table 1-20. Democracy Suite 5.0 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 1-21. Voting System Equipment

Component	Serial Number
Proprietary Hardware	
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 Samsung Tablet	[DVS-Samsung ICX-001], RF2GB01W0GD, RF2GB01V4HF, RF2GB01V5RL
ICX Inline EMI Filter	[DVS-EMIFILTER-001] thru [DVS-EMIFILTER-003]
COTS Hardware	
ICX aValue 15" Tablet (SID-15V)	0E14AF00014, B03G005400006, B033G00540008, 9E274118, 1D274118
ICX aValue 21" Tablet (SID-21V)	0E14AF00027, B03G005500019, 03G005500009, 0039BZ2D, 0039B209
Dell OptiPlex 7440 All In One	HVNRFB2, HVNQFB2, HVNPFB2
Dell PowerEdge R630	4Z07T52
Canon imageFormula DR-G1130 Scanner	GF301092, GF304418
Dell Precision T3420 PC	HS0VFB2, HS0TFB2, HS0RFB2, HS0SFB2
HP LaserJet Pro Printer M402dn	PHBQF20342, PHBQF20345, PHBQC12619, PHBQC19613, PHBQC12519, PHBQD18790, PHBQC12616
Dell OptiPlex 9030 All-In-One	CF73S52
Dell Ultrasharp 24" Monitor U2414H	1PVZ152, 62VZ152

Table 1-22. 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
ABLENET Jelly Bean Twist 10033400	[DVS-ablenet-001] thru [DVS-ablenet-014]
Tecla ShieldDos KDL-02001	[DVS-Tecla-001] thru [DVS-Tecla-006]
Brother Laser Printer HL-L2300D	U63878K5N281729
Dell DVD Multi Recorder GP60NB60	[DVS-Dell-001]

Table 1-22. Voting System Support Equipment *(continued)*

Component	Serial Number
Dell Latitude E7450 Laptop	30GFH72, 369FH72
Maxim iButton Programmer DS9490R# with DS1402	[DVS-Maxim-001] thru [DVS-Maxim-005]
APC Smart-UPS SMT1500	3S1536X06436, 3S1536X06475, 3S1536X06461, 3S1536X06485, 3S1536X06484, 3S1536X06322, 3S1536X07467, 3S1536X06484, 3S1536X06272, 3S1536X06201, 3S1536X07305, 3S1504X00395, 3S1504X00396
Dell X1008 Network Switch	4R8XX42, 26SXX42, 63SXX42
Dell X1018 Network Switch	6TN7Y42
Dell X1026 Network Switch	83D9Y42
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
ATI-USB Handset	02440010100-011, [DVS-ATIUSB-001], [DVS-ATIUSB-002]
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]

1.1.2   Description of Modification

The Dominion Democracy Suite 5.5 Voting System is a modified voting system configuration that includes upgrades to the components of the D-Suite 5.0 Voting System. The list below includes changes between this system and the baseline of the Democracy Suite 5.0 Voting System:

GENERAL MODIFICATIONS

- EMS components to utilize Windows Authentication instead of SQL Server Authentication

- Ability for system to utilize self-encrypting drives as an additional security feature

- All components now running on combination of Windows 10, Windows Server 2012R2, with SQL Server 2016 (also included are scripts for security hardening procedures)

- Ability to automatically install and configure Windows-based components of D-Suite, depending on the configuration

- Ability to gather all required logs from system and applications and store them in one zip file.

- Updated hardening scripts for windows 10 to remove preinstalled applications that exist on the system

- Add UnifiedInstaller to code build.

- Updated OpenSSL FIPS 140-2 validated modules to each of the Democracy Suite products that use these cryptographic modules

EMS

• Upgraded EMS Election Event Designer as follows:

— Ability to configure how common cards are consolidated

— Ability to create a naming convention for the ballot ID, artwork filename and description

— Ability to generate one or more ballots without generating all ballots in the election project

— Application produces election definition in final form for the ImageCast X voting application (DRE VVPAT/DRE Reports Printer/BMD)

— Ability to produce and modify a configuration file for ImageCast X (DRE VVPAT/DRE Reports Printer/BMD)

— Ability for the application to program the USB Flash Device with necessary resources used for setting up an ImageCast X voting device. (DRE VVPAT/DRE Reports Printer/BMD)

— Extended styling capabilities for ICX (DRE VVPAT/DRE Reports Printer/BMD)

— Extended support for Legal paper size for ICX BMD ballot.

— Modified the specification of available area for Write-in detection, which is passed through the election files to the optical scan tabulators

— Ability to generate distinct ballot ID's for Precinct Portions with Identical Ballot Content

— Extending Paragraph Alignment Attributes to allow for more flexibility

— Contest Headings now have a Global Order Field

— Ability to indicate which District Types can appear on Print Tape

— Support for ICX VVPAT Printer (DRE VVPAT)

— EMS outputs election files that contains styled text originating from the screen language translation outputs

— Ability to add "strike through" text on ballots

— Ability to specify how many columns the candidates within a contest should occupy when shown on screen

— Report which displays how contests appear on the ICX platform (DRE VVPAT/DRE Reports Printer/BMD)

— Ability to configure that candidates can have multiple party affiliations, and that this will result in a single voting option (ballot and tabulator) that can be selected.

— Ability to print samples of all touchscreen ballots to the voters at each polling place.

— Ability to set watermark picture for: ballot header, ballot footer and ballot stubs

— Ability to pass configuration settings during ICX preview mode (DRE VVPAT/DRE Reports Printer/BMD)

— Straight party tickets now include only the parties that are actually used in affiliations on the ballot.

— Ability for ICP/ICC tabulator platform to implement the straight party logic which takes into account multi-party affiliated voting box

— Ability for ICX tabulator platform to implement the straight party logic which takes into account multi-party affiliated voting box (DRE VVPAT/DRE Reports Printer/BMD)

— Ability for a column on the Ballot Cards screen in EED to show the paper size for each ballot is added in order to determine which ballots are larger or smaller than the allowed size for the election (letter/legal)

— Control over full face ballots implemented: search filtering by contest and languages, possible determination of only paper or only full face ballots, ballot editor supported

- Upgraded EMS Results Tally & Reporting as follows:

— Ability to break-down results per precinct for consolidated ballots, when reviewing the contents of Results Files

— New report export, Batches Containing Precincts, provides information on what precincts each batch of results contains

— Ability to select multiple precincts for the Summary Report

— Ability to indicate in a project whether disabled contests and candidates should appear in the Election Summary and Statement of Votes Cast reports

— Ability to track precinct information for consolidated cards, and view the information when reviewing the contents of Results Files

— Ability to bypass adjudication for early voting results

— Refactoring of CVR Service to allow for improved performance and reliability during loading, adjudicating and publishing of results

— Extended Service to allow Adjudication to retrieve list of Qualified Write-ins, and add new Qualified Write-ins to the master list

— Refactoring of SQL Server Reporting Service based reports to allow for improved performance and more flexibility in extending reporting capabilities.

— Ability to generate Statement of Votes Cast report by Ballot Type

— The existing CVR export can now be generated in Excel format

— The Batches Loaded Report export indicates the date and time when each results batch was loaded into the EMS database.

— Ability to remove provisional votes into a separate results batch in order to allow for adjudication of standard results in a batch

— Ability to export audit images sorted by Candidate

— User is informed if there are pending provisional ballots before pushing results to Adjudication

— Ability to choose whether the system automatically deletes any exported files

— Ability to load results which come from the same ICX tabulator definition (two physically separate ICX machines, that were assigned with the same tabulator number), and to be sure that single results are not loaded more than once. (DRE VVPAT/DRE Reports Printer)

— In advance, recognize that a report will be too big and return an appropriate message to the user that filters need to be applied.

— Evaluation of RTR "Cards cast report" when ballots were cast on ICX. (DRE VVPAT/DRE Reports Printer)

— Ability to indicate what set of results are suppressed from the final reports, by setting a threshold below which results are suppressed due to low turnout, in favor of voter privacy. This applies to the Statement of Votes Cast report.

— Straight party voting rules now take into account multi-party affiliated voting boxes

— Two new fields added to CVR session object: Ballot Type name and Precinct Portion name, in order to support ADJ Hovering on the ballot header black colored

— Ability for CvrService method to be called with unspecified contest id so that it would return all qualified write-ins in the project, (for projects with a large amount of contests it was inefficient to retrieve qualified write-ins per contest)

• Upgraded EMS Election Data Translator as follows:

— Ability to import subsets of data using the application: New languages and translations, template assignment, and tabulators

— Modifications to Contest and Contest Heading tables to allow enhance styling capabilities for ICX (DRE VVPAT/DRE Reports Printer/BMD)

— For Audio language there are up to four textual units and GEMS data mapper create Screen and Print language

— Ability to export/import data related to composite parties.

— Ability to choose, If the party image file name does not have a path, then import file from current location if it exists; if it does have a path, then import file from path location if it exists

— On import, the EDT updates the Election Event info using the data in the Election worksheet of the EDT spreadsheet.

• Upgraded EMS Audio Studio as follows:

— Modifications to application to handle the newly required audio resources for the ICX (DRE VVPAT/DRE Reports Printer/BMD)

• Upgraded EMS Adjudication as follows:

— The resume function has been made more robust

— Adjudication Administrator can now perform tasks on a remote client machine, rather than the server

— Master list of qualified write-ins is now managed by EED

— Admin can add a new write-in "on the fly" after the project has been created. Write-ins will be added to master list and will be synchronized for all adjudicators

— Ability to prevent a ballot from being completed until all write-ins are resolved

— The Adjudicator can now see the AuditMark alongside the image of the ballot being adjudicated

— Adjudicator can now skip a ballot and continue adjudicating remainder of batch

— When **Continue** is selected in the ballot load error dialog, new ballots with load errors are given a Quarantined status, with the note "Automatically Quarantined due to Load Error"

— Ability to hover over a ballot where the header is not visible and display ballot type and precinct portion

• Upgraded EMS ICVA as follows:

— Improved workflow for programming voter cards to allow for faster processing at polling location
— Added ability to indicate if a card was voted or not
— Valid time zone was set.

ICC

• Added support for a TWAIN interface
• Added option to force to ICC to overrun a preset number of ballots every time scanning stops mid-batch

• Switching election projects in ICC has been simplified

• Improvements to Write-in Area detection

• Application now runs on Windows 10

• Cross-endorsed candidates rule implemented

ICX (General)

• Ability to conduct a vote simulation for use during Logic & Accuracy Testing

• Ability to display more than one contest on the screen

• Ability to display a heading for a single or a group of contests on the screen

- Ability to align the contest cell left, right or center, along with support for font size, bold, italic and underline text

- Ability to playback audio for screen contents for languages that do not have Text-to- Speech support

- Ability to display and record votes for a choice which enables the voter to indicate they do not wish to cast a vote for any of the available choices

- Ability to display a Straight Party ticket and have remaining partisan contests influenced

- Ability to indicate status information using a USB LED poll worker light

- Improved ballot loading time

- Added manual activation of ballot with alphanumeric codes

- Added option to search for tabulator number

- Added support for changing the background color (contest, choice)

- Added ability for technician to modify brightness for Prime tablet

- Add support for Sunzone SUZCR-R59 smart card reader in ICX

- Ability to display contests in multiple columns

- Support for multi-party affiliation

- Ability to limit the number of spoiled ballots

- Corrected condition that produced an error message when viewing the lifetime counter in the PollWorker menu.

- Corrected behavior to limit selections in an endorsed partisan contest to the maximum allowed if that partisan contest was on the same screen as the Straight Party selection contest.

- Corrected behavior in AVS sessions to not have text-to-speech read out punctuation characters at the end of contest descriptions.

ICX (DRE Mode Specific)

- Ability to save results in cast vote record format (Applies to both the DRE VVPAT and DRE Reports Printer Configurations)

- Addition of new VVPAT Printer for the ImageCast X voting application

- Addition of new thermal Report Printer for the ImageCast X voting application

- Ability to verify the VVPAT for an accessible voter

- Added MCF option to specify number of copies of zero and results tapes to print (Applies to both the DRE VVPAT and DRE Reports Printer Configurations)

ICX (BMD Mode Specific)

- Printed QR Ballot now has human readable part printed in an OCR-friendly font

- Improved printing of non-Latin languages (e.g., Chinese)

- Ability to have a QR ballot printed on Legal sized paper

- Improved delay before printing to less than 2 seconds for pages printed after the first page

ICP

- Improvements to Write-in Area detection

- ICP is no longer restricted to 10 pre-defined languages

- Now able to print list of admin areas as part of the tape header

- Added Tabulator name to footer section of the tape

- Cross-endorsed candidates rule implemented

1.1.3 Initial Assessment

Testing from the previous test campaign was used to establish the baseline. The focus of this test campaign would be on the introduction of the ICX Prime hardware which can be configured as a BMD or as a DRE which can utilize a VVPAT or a Report Printer, the introduction of the updated OpenSSL FIPS 140-2 validated modules, and the updated functionality of the D-Suite 5.5 System components. 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

- Dominion Voting Systems Democracy Suite 5.5 Implementation Statement dated 06-21-17

- 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 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

"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 introduction of the ICX Prime hardware which can be configured as a BMD, or as a DRE with either a VVPAT or a Report Printer, the introduction of the Canon DR-M160II document scanner for use with the ICC, as well as the updated

To evaluate the D-Suite 5.5 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
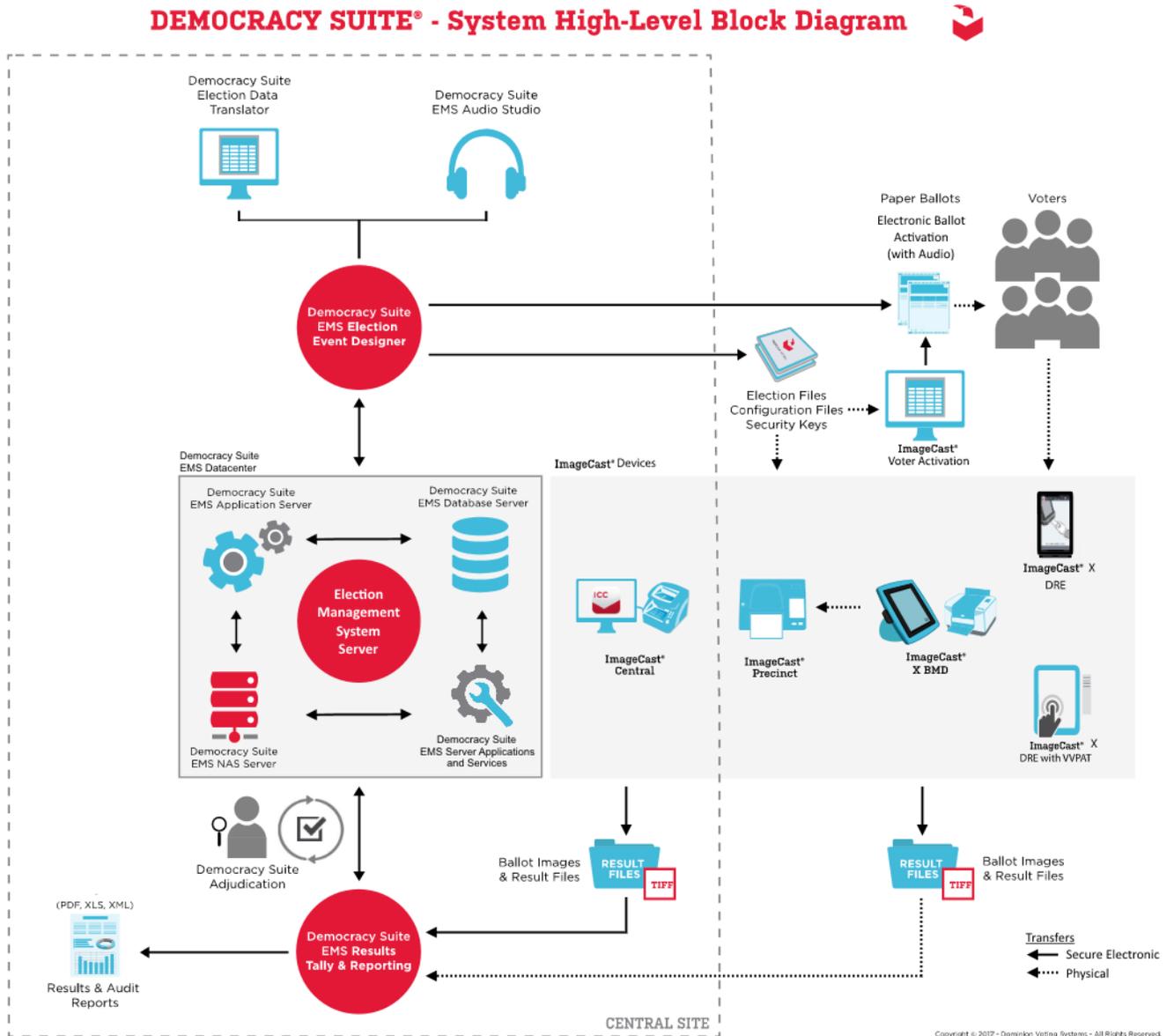

<mark>Figure 1-1. D-Suite 5.5 System Overview</mark>

1.5.2 System Limits

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

Table 1-23. D-Suite 5.5 System Limits by Configuration

Characteristic	Configuration Values		Limiting Component
	Standard	Express	
Ballot positions	292	292	22-inch 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 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 Ballot
Supported languages in an election	5	5	Memory
Number of write-ins	24	24	22-inch Ballot

1.5.3 Supported Languages

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

- Alaska Native
- Apache
- Bengali
- Chinese

- English
- Eskimo
- Filipino
- French
- Hindi
- Japanese
- Jicarilla
- Keres
- Khmer
- Korean
- Navajo
- Seminole
- Spanish
- Thai
- Towa
- Ute
- Vietnamese
- Yuman

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 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 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 5.0 System in order to baseline the current system under test.

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 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 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.

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

Pro V&V will perform a comparison on the submitted source code against the previously certified versions.

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 3-2. Required Test Materials

Material	Description(s)
Tamper Proof Security Seals	Adhesive tamper proof security seal, Novavision Part# XSG21-08RESN
Printer Cartridges	Brother TN-630, HP LaserJet CF226X

Table 3-2. Required Test Materials *(continued)*

Material	Description(s)
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 Compact Flash cards
iButton Security Tokens	iButton Security Token with lanyards
Permanent Markers	Fine Tip Sharpie Permanent Markers
Ethernet Cables	Cat5e Ethernet Cables
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
A/C Power Cables	3-Prong A/C Power Cables
USB Thumb drives	4.0 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 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 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.

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 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.

Additional review will be performed on the implementation of the FIPS cryptographic module in order to:

- Confirm the module (model and version) that is used and implemented is present on the NIST CMVP validated products list.
- Confirm the module in all five instances is configured and used per the NIST published security policy for that module.

4.1.1 Rationale for 'Not Applicable' Requirements

All requirements that were excluded from the previous test campaign (D-Suite 5.0) 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 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 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 does not utilize public networks.
7.6	D-Suite 5.5 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 D-Suite 5.5 Voting System is hybrid paper-based optical scan/DRE voting system which consists of the following major components: the EMS, the ImageCast Central (ICC), the ImageCast Precinct (ICP), and the ImageCast X (ICX). The Democracy Suite is comprised of one proprietary hardware component (ICP), two COTS hardware components (ICC and ICX). All EMS functions are managed by proprietary software running on COTS PCs/servers. The ICX Prime aValue is a new ICX hardware model which has been introduced in this modification. The ICX Prime aValue can be configured as either a BMD or as a DRE. In DRE mode, the ICX Prime aValue can be configured with either a VVPAT printer or a Reports Printer. The ICX Samsung is not included in this modification. The Canon DR-M160II is a newly introduced COTS document scanner for use with the ICC.

4.3 Software System Functions

The software system functions for the previously certified voting system (D-Suite 5.0) remain unchanged for the submitted modifications. The Democracy Suite Election Management System (EMS) consists of a set of applications responsible for all pre-voting and post-voting activities used in election definition and management process. The Democracy Suite EMS applications are as follows:

- EMS Election Event Designer

- EMS Results Tally and Reporting

- EMS Audio Studio

- EMS Adjudication Application

- EMS Adjudication Service

- EMS File System Service

- EMS Election Data Translator

- Smart Card Helper Service

- ImageCast Voter Activation

- EMS Data Center Manager

- EMS Application Server

- EMS Database Server

- EMS NAS Server

The D-Suite 5.5 voting system consists of one software application for all central count tabulator hardware, one software application to run the ICX ballot marking and DRE devices, and a firmware application to run the hybrid precinct tabulator/DRE.

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 5.0). The updates to the modified system (D-Suite 5.5) will require the full suite of hardware and electrical testing as detailed in the 2005 VVSG. These tests are listed below:

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 Testing for the ICX Prime aValue BMD configuration and the ICC Canon DR-M160II Scanner will be performed at the NTS Huntsville facility located in Huntsville, Alabama. Environmental Testing for the ICX Prime aValue DRE configurations will be performed at the NTS Huntsville facility located in Huntsville, Alabama; with the exception of the Temperature Power Variation Test which will be performed at the NTS Longmont facility located in Longmont, Colorado. Electrical Testing for the ICX Prime aValue BMD and DRE configurations will be performed at the TUV SUD Canada facility located in Gormley, Ontario, Canada. 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 TDP is provided in Table 4-2.

Table 4-2. TDP Documents

Document Number	Description	Version
	Adjudication Documents	
2.05	Democracy Suite Adjudication Software Design and Specification	5.5::89
2.08	Democracy Suite Adjudication System Operation Procedures	5.5::136
2.09	Democracy Suite Adjudication System Maintenance Manual	5.5::71
	D-Suite Documents	
2.02	Democracy Suite System Overview	5.5::113
2.06	Democracy Suite System Security Specification	5.5::508
2.07	Democracy Suite System Test and Verification	5.5::163
2.10	Democracy Suite Personnel Deployment and Training Requirements	5.5::105
2.11	Democracy Suite Configuration Management Process	5.5::325
2.12	Democracy Suite Quality Assurance Program	5.5::126
2.13	Democracy Suite System Change Notes	5.5::90
	EMS Documents	
2.03	Democracy Suite EMS Functional Description	5.5::343
2.05	Democracy Suite EMS Software Design and Specification	5.5::292
2.08	Democracy Suite EMS System Operations Procedures	5.5::697
2.09	Democracy Suite EMS System Maintenance Manual	5.5::113
---	Democracy Suite EMS System Installation and Configuration Procedure	5.5::233
	ImageCast Central Documents	
2.03	Democracy Suite ImageCast Central Functionality Description	5.5::153
2.05	Democracy Suite ImageCast Central Software Design and Specification	5.5::91
2.08	Democracy Suite ImageCast Central System Operation Procedures	5.5::180
---	Democracy Suite ImageCast Central Installation and Configuration Procedure	5.5::127
	ImageCast Precinct Documents	

Document Number	Description	Version
2.03	Democracy Suite ImageCast Precinct Functionality Description	5.5::160
2.04	Democracy Suite ImageCast Precinct System Hardware Specification	5.5::127
2.04.1	Democracy suite ImageCast Precinct System Hardware Characteristics	5.5::78
2.05	Democracy Suite ImageCast Precinct Software Design and Specification	5.5::135
2.08	Democracy Suite ImageCast Precinct System Operation Procedures	5.5::254

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

Document Number	Description	Version
2.09	Democracy Suite ImageCast Precinct System Maintenance Manual	5.5::108
	ImageCast X Documents	
2.03	Democracy Suite ImageCast X Functionality Description	5.5::7
2.05	Democracy Suite ImageCast X Software Design and Specification	5.5::8
2.08	Democracy Suite ImageCast X System Operation Procedures	5.5::10
2.09	Democracy Suite ImageCast X System Maintenance Manual	5.5::12
---	Democracy Suite ImageCast X Installation and Configuration Procedure	5.5::17
	User Guides	
---	Democracy Suite ImageCast Adjudication User Guide	5.5::4
---	Canon imageFORMULA DR-G1130 DR-G1100 User Manual	---
---	Canon imageFORMULA DR-M160-II User Manual	---
---	Democracy Suite Election Data Translator User Guide	5.5::9
---	Democracy Suite EMS Audio Studio User Guide	5.5::8
---	Democracy Suite EMS Election Event Designer User Guide	5.5::212
---	Democracy Suite EMS Results Tally and Reporting User Guide	5.5::16
---	Democracy Suite ImageCast Central User Guide	5.5::7
---	Democracy Suite ImageCast Precinct User Guide	5.5::5
---	Democracy Suite ImageCast Voter Activation User Guide	5.5::3
---	ImageCast X User Guide	5.5::15
---	Dell Latitude E7450 Owner's Manual	---
---	SID-15V-Z37-A1R User Manual	Rev. 1.0
---	SID-21V-Z37-A1R User Manual	Rev. 1.0
	Supplementary Documents	
----	Common Industry Format for Usability Test Report ImageCast X 5.2 with VVPAT	5.5::1

Document Number	Description	Version
---	Cyber Acoustics ACM-70B Stereo Headphones Product Sheet	---
---	Democracy Suite ImageCast C++ Coding Standard	5.5::33
---	Democracy Suite C# Automated Code Review Process	5.5::28
---	Dell Latitude E7450/Latitude 7450 Regulatory Compliance Sheet	---
---	Dell OptiPlex 9020 AIO Regulatory Compliance Sheet	---
---	Dell OptiPlex 9030 AIO Regulatory Compliance Sheet	---

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

Document Number	Description	Version
---	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::7
---	Democracy Suite ImageCast Device Configuration Files	5.5::76
---	Democracy Suite ImageCast Printing and Finishing Specification	5.5::72
---	Democracy Suite ImageCast Total Results File Format	5.5::36
---	Democracy Suite ImageCast Precinct Election Definition Files	5.5::47
---	Democracy Suite ImageCast Precinct Extracting Firmware Contents	5.5::24
---	Democracy Suite ImageCast Precinct Firmware Update Procedure	5.5::53
---	Democracy Suite ImageCast Precinct Level One (L1) Maintenance Manual	5.5::49
---	Democracy Suite ImageCast Precinct Technical Guide	5.5::33
---	Usability Test Report of ImageCast Precinct 5.0 with 36 Participants for VVSG 1.0	5.0::14
---	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	---
---	Dell PowerEdge R630 Regulatory Compliance Sheet	Rev. A10
---	Dell Precision T1700 MT Regulatory Compliance Sheet	Rev. A09

Document Number	Description	Version
---	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	---
---	HP M402dne Datasheet	---

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

Document Number	Description	Version
---	HP M203dw User Manual	---
---	Dell Latitude 3480 Owner's Manual	---
---	Dell Latitude 3470 Owner's Manual	---
---	Dell Precision T3420 Owner's Manual	---
---	aValue HID-21V-BTX-A1R User Manual	---
---	aValue SID-15V-Z37-A1R Data Sheet	---
---	aValue SID-21V-Z37-A1R Data Sheet	---
---	APC Installation and Operation Back-UPS Pro BR1000G	---
---	APC Smart-UPS SMT1500 Operation Manual	---
---	Dell OptiPlex 7440 All-In-One Owner's Manual	---
---	Dell OptiPlex 3050 All-In-One Owner's Manual	---
---	Dell P2417H Monitor User's Guide	---
---	Dell PowerEdge R630 Owner Manual	---
---	Lexar Pro USB 3 Dual Slot Reader	---
	Build Documents	
---	Democracy Suite Windows Build Document	5.5::8
---	Democracy Suite ImageCast Precinct Firmware Build and Install	5.5::62
---	ImageCast X Build	5.5::15

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.

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 ICP 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. For DRE-based voting systems the system must correctly capture, store, and report the specific ballot selections, and absence of selections, for each ballot position. DRE configurations which include a VVPAT must also correctly print the ballot selections made by the voter. The accuracy requirements for the ICX DRE will be met by loading elections for each ballot length supported by the system onto DRE units, and using the built-in vote simulation tool, cast votes on the device using predetermined marking patterns. Accuracy testing will be performed on both DRE configurations, one of which includes a connected VVPAT and the other which includes a connected Reports printer. Barcodes printed on VVPAT receipts will be scanned to ensure that the information included within the barcodes correctly matches vote selections.

The ICP 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 DRE units will be tested by using the built-in vote simulation tool to cast a sufficient number of ballots to achieve an accuracy rate greater than 1,549,703 correct ballot positions.

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 Level test for the integrated operation of both hardware and software.

Compatibility of the voting system software components or subsystems with one another, and with other components of the voting system environment, shall be determined through functional tests integrating the voting system software with the remainder of the system.

Additionally, 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 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 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 (±3.6∘F)

- Relative Humidity: Local Site Humidity

- Atmospheric Pressure: Local Site Pressure

- Time Allowable Tolerance: ±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 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 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	Assigned To	Duration	Predecessors
TDP	**06/20/17**	**12/13/17**		**125d**	
Initial Review	06/20/17	06/26/17	Diane	5d	
Compliance Review	09/11/17	11/29/17	Diane	56d	
Final review	11/30/17	12/13/17	Diane	10d	4
Test Plan	**09/18/17**	**11/28/17**		**50d**	
Test Plan Creation	09/18/17	10/05/17	Wendy	14d	
Vendor Review & Comments	10/06/17	10/09/17	Wendy	2d	7
EAC Submission & Review	10/10/17	11/06/17	Wendy	20d	8
EAC Comment Review & Update	11/07/17	11/09/17	Wendy	3d	9
EAC Submission & Review of Revision	11/10/17	11/27/17	Wendy	10d	10
EAC Approved Test Plan	11/28/17	11/28/17	Wendy	1d	11
Source Code	**10/16/17**	**10/23/17**		**6d**	
Source Code Review	10/16/17	10/17/17	Jack	2d	
Source Code Re-Review	10/18/17	10/18/17	Jack	1d	14
Document Review	10/19/17	10/19/17	Jack	1d	15
Compliance Build	10/20/17	10/23/17	Jack	2d	16
System Delivery & Setup	**10/02/17**	**10/25/17**		**18d**	
PCA	10/02/17	10/04/17	Ryan	3d	
System Setup	10/05/17	10/06/17	Ryan	2d	19
System Loads & Hardening	10/24/17	10/25/17	Ryan	2d	17
Hardware Testing	**07/31/17**	**10/30/17**		**66d**	
Electrical Testing	07/31/17	09/27/17	Walker	43d	
Environmental Testing	07/31/17	08/21/17	Walker	16d	
Temp Power	08/28/17	09/21/17	Walker	19d	
Electrical Supply	10/26/17	10/26/17	Ryan	1d	21
Acoustic	10/27/17	10/27/17	Ryan	1d	26
Maintainability	10/30/17	10/30/17	Ryan	1d	27
System Level Testing	**10/26/17**	**12/29/17**		**43d**	
FCA	10/26/17	11/22/17	Ryan	20d	21
Security Administrative	11/09/17	11/10/17	Becky	2d	
Security Physical	11/09/17	11/09/17	Ryan	1d	
Usability	11/27/17	11/28/17	Ryan	2d	30
Accessibility	11/29/17	11/30/17	Ryan	2d	33
Volume & Stress	12/01/17	12/07/17	Ryan	5d	34
Accuracy	12/08/17	12/13/17	Ryan	4d	35
Regression Testing	12/14/17	12/15/17	Ryan	2d	36
Trusted Build	12/18/17	12/19/17	Jack	2d	37
System Loads & Hardening	12/20/17	12/21/17	Ryan	2d	38
Security Technical (include SCAP)	12/22/17	12/27/17	Becky	2d	39
System Integration	12/22/17	12/29/17	Ryan	4d	39
Test Report	**12/18/17**	**02/28/18**		**49d**	
Test Report Creation	12/18/17	01/08/18	Wendy	12d	37
Vendor Review & Comments	01/09/18	01/09/18	Wendy	1d	43
EAC Submission & Review	01/10/18	02/06/18	Wendy	20d	44
EAC Comment Review & Update	02/07/18	02/13/18	Wendy	5d	45
EAC Submission & Review of Revision	02/14/18	02/27/18	Wendy	10d	46
EAC Approved Test Report	02/28/18	02/28/18	Wendy	1d	47