

**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  
5.0-A Voting System

EAC Project Number: DVS1701

Version: Initial Release

Date: 4/14/17

---

U.S. Election Assistance Commission

**VSTL**

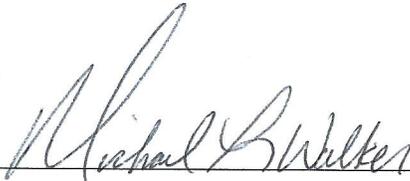
EAC Lab Code 1501

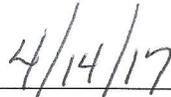
**NVLAP<sup>®</sup>**

NVLAP LAB CODE 200908-0

SIGNATURES

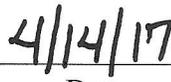
Approved by:

  
\_\_\_\_\_  
Michael Walker, VSTL Project Manager

  
\_\_\_\_\_  
Date

Approved by:

  
\_\_\_\_\_  
Wendy Owens, VSTL Program Manager

  
\_\_\_\_\_  
Date

**REVISIONS**

<b>Revision</b>	<b>Description</b>	<b>Date</b>
NR	Initial Release	4/14/17

## TABLE OF CONTENTS

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

4.4.1	Hardware Qualitative Test Case Design .....	24
4.4.2	Hardware Environmental Test Case Design .....	25
4.4.3	Software Module Test Case Design and Data .....	25
4.4.4	Software Functional Test Case Design and Data.....	25
4.4.5	System-Level Test Case Design .....	26
4.5	Security Functions .....	26
4.6	TDP Evaluation.....	26
4.7	Source Code Review.....	29
4.8	QA & CM System Review .....	29
<b>5.0</b>	<b>TEST DATA .....</b>	<b>30</b>
5.1	Test Data Recording .....	30
5.2	Test Data Criteria.....	30
<b>6.0</b>	<b>TEST PROCEDURES AND CONDITIONS .....</b>	<b>30</b>
6.1	Facility Requirements .....	30
6.2	Test Set-Up .....	31
6.3	Test Sequence .....	31
6.4	Test Operations Procedure.....	31
	 <b>PROJECT SCHEDULE.....</b>	 <b>A-1</b>

## 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) 5.0-A Voting System to the requirements set forth for voting systems in the U.S. Election Assistance Commission (EAC) 2005 Voluntary Voting System Guidelines (VVSG), Version 1.0. Prior to submitting the voting system for testing, Dominion Voting Systems submitted an application package to the EAC for certification of the D-Suite 5.0-A Voting System. The application was accepted by the EAC and the project was assigned the unique Project Number of DVS1701.

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 5.0 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 the ImageCast X (ICX).

#### **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 server and client components 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.
- **EMS Audio Studio:** A client application that represents an end-user helper application used to record audio files for a given election project. As such, it is utilized during the pre-voting phase of the election cycle.
- **EMS Election Data Translator:** End-user application used to export election data from election project and import election data into election project.
- **EMS Election Event Designer:** A client application that integrates election definition functionality together with ballot styling capabilities and represents a main pre-voting phase end-user application

- ImageCast Voter Activation: An application, installed on a workstation or laptop at the polling place, which allows the poll workers to program smart cards for voters. The smart cards are used to activate voting sessions on ImageCast X.
- EMS Results Tally and Reporting: A client application that integrates election results acquisition, validation, tabulation, reporting, and publishing capabilities and represents the main post-voting phase end-user application.

Back-end/Server applications:

- EMS Adjudication Service: Represents a server side application which provides ballot information such as contests, candidates and their coordinates from EMS to the Adjudication application.
- EMS Application Server: Represents a server side application responsible for executing long running processes, such as rendering ballots, generating audio files and election files, etc.
- EMS Database Server: Represents a server side RDBMS repository of the election project database which holds all the election project data, including pre-voting and post-voting data.
- EMS Data Center Manager: A server application that represents a system level configuration application used in EMS back-end data center configuration.
- EMS Election Device Manager: Application used for production and programming of election files, and other accompanying files, for ImageCast X terminals.
- EMS File System Service: A client 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 three major functionalities: ballot scanning and tabulation, accessible voting, and ballot review and second chance voting. 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. Second Chance voting refers to scenarios in which an error has been detected on the voter’s ballot (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. The ICP scans marked paper ballots, interprets voter marks on the paper ballot and stores and tabulates each vote from each paper ballot. The ICP contains a small touch-screen LCD to allow the poll worker to access diagnostic and configuration settings.

**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 Electronic Mobile Ballots. 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.

**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](http://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

**Table 1-1. Democracy Suite 5.0 EMS Software Component Descriptions** (continued)

Software	Version	Filename	Configuration	
			Standard	Express
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
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	ICCSetsup_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	
Microsoft SQL Server 2012 SP2 Express with Advanced Services	2012 SP2	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	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

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

Firmware/Software	Version	Filename	Configuration	
			Standard	Express
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 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
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
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

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

<b>Firmware/Software</b>	<b>Version</b>	<b>Filename</b>
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**

<b>Firmware/Software</b>	<b>Version</b>	<b>Filename</b>
OpenSSL	1.1.2	Openssl-fips-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**

<b>Firmware/Software</b>	<b>Version</b>	<b>Filename</b>
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
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-fips-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	vc redistrib_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

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

<b>Firmware/Software</b>	<b>Version</b>	<b>Filename</b>
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-fips-1.2.tar.gz
ActivePerl	5.20.2	ActivePerl-5.20.2.2002-MSWin32-x86-64int-299195.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
PDF Printing	2.9.5.2	PDFPrinting.zip
Entity Framework	6.1.3	entityframework.6.1.3.nupkg

**Table 1-13. Democracy Suite 5.0 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
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-fips-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

**Table 1-16. Democracy Suite 5.0 Adjudication Software Build Environment Component Descriptions (continued)**

<b>Firmware/Software</b>	<b>Version</b>	<b>Filename</b>
Toggle Switch Control Library	1.1.1	ToggleSwitch 1.1.1.zip
Infragistics NetAdvantage Ultimate 2013.1	2013.1	NetAdvantage_dotNet_20131_WithSamplesAndHelp.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**

<b>Firmware/Software</b>	<b>Version</b>	<b>Filename</b>
SharpZipLib	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**

<b>Firmware/Software</b>	<b>Version</b>	<b>Filename</b>
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**

<b>Firmware/Software</b>	<b>Version</b>	<b>Filename</b>
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

**Table 1-19. Democracy Suite 5.0 ImageCast Precinct Firmware Build Environment Component Descriptions (continued)**

Firmware/Software	Version	Filename
OpenSSL	1.1.2	Openssl-fips-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
<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 Samsung Tablet	[DVS-Samsung ICX-001], RF2GB01W0GD, RF2GB01V4HF, RF2GB01V5RL
ICX Inline EMI Filter	[DVS-EMIFILTER-001] thru [DVS-EMIFILTER-003]
<i>COTS Hardware</i>	
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, HVNPF2
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

**Table 1-22. Voting System Support Equipment**

<b>Component</b>	<b>Serial Number</b>
<i>COTS Hardware</i>	
Dell Ultrasharp 24" Monitor U2414H	1PVZ152, 62VZ152
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]
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]

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

<b>Component</b>	<b>Serial Number</b>
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 5.0-A Voting System is a modified voting system configuration that introduces updated OpenSSL FIPS 140-2 validated cryptographic modules to the certified Democracy Suite 5.0 system configuration. The list below includes changes between this system and the baseline of the Democracy Suite 5.0 Voting System:

#### **EMS**

- Updated OpenSSL FIPS 140-2 validated cryptographic modules

#### **ADJ**

- Updated OpenSSL FIPS 140-2 validated cryptographic modules

#### **ICC**

- Updated OpenSSL FIPS 140-2 validated cryptographic modules

#### **ICX**

- Updated OpenSSL FIPS 140-2 validated cryptographic modules

#### **ICP**

- Updated OpenSSL FIPS 140-2 validated cryptographic modules

### 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 updated OpenSSL FIPS 140-2 validated modules. 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
- Limited Technical Documentation Package (TDP) Review

- Limited Functional Configuration Audit (FCA)

#### **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 5.0-A Implementation Statement dated 03-10-17
- 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, 2006 Edition, “NVLAP Procedures and General Requirements (NIST Handbook 150)”, dated February 2006
- National Voluntary Laboratory Accreditation Program NIST Handbook 150-22, 2008 Edition, “Voting System Testing (NIST Handbook 150-22)”, dated May 2008
- United States 107<sup>th</sup> Congress Help America Vote Act (HAVA) of 2002 (Public Law 107-252), dated October 2002
- Pro V&V, Inc. Quality Assurance Manual, Revision 7.0
- 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](http://www.eac.gov))
- EAC Notices of Clarification (NOC) (listed on [www.eac.gov](http://www.eac.gov))
- Dominion Voting Systems Technical Data Package (*A listing of the D-Suite 5.0 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

“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  
“VVSG” – Voluntary Voting System Guidelines

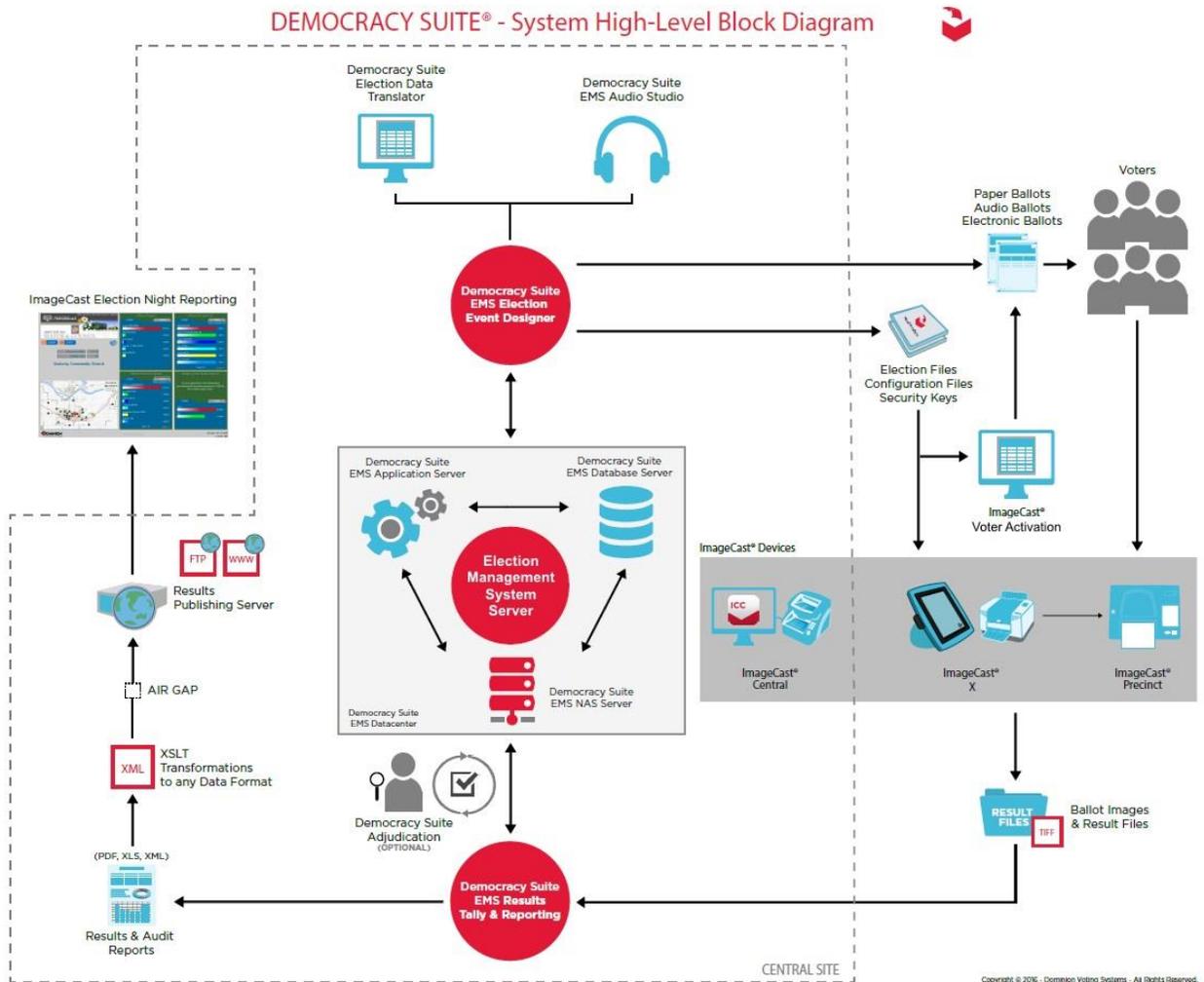
#### **1.4 Project Schedule**

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 is limited to the introduction of the updated OpenSSL FIPS 140-2 validated cryptographic modules to the certified Democracy Suite 5.0 system configuration.

## 1.5.1 Block Diagram



**Figure 1-1. D-Suite 5.0-A System Overview**

## 1.5.2 System Limits

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

**Table 1-23. D-Suite 5.0-A System Limits by Configuration**

Characteristic	Configuration Values		Limiting Component
	Standard	Express	
Ballot positions	462	462	Ballot
Precincts in an election	1000	250	EMS
Contests in an election	4000	250	EMS
Candidates/Counters in an election	40000	2500	EMS
Candidates/Counters in a precinct	462	462	Tabulator
Candidates/Counters in a tabulator	10000	2500	Tabulator
Ballot Styles in an election	4000	750	Tabulator
Ballot IDs in a tabulator	200	200	ICP
Contests in a ballot style	125	125	Tabulator
Candidates in a contest	462	231	EMS
Ballot styles in a precinct	5	5	Tabulator
Number of political parties	30	30	Tabulator
“vote for” in a contest	30	30	Tabulator
Supported languages in an election	5	5	Tabulator
Number of write-ins	462	462	Ballot

### 1.5.3 Supported Languages

The submitted voting system supports:

- Bengali
- Chinese
- English
- French
- Hindi
- Japanese
- Korean
- Spanish
- Thai

Due to the limited scope of testing, only English and Spanish language ballots will be cast during the performance of functional testing.

#### **1.5.4 Supported Functionality**

The D-Suite 5.0-A is designed to support the following voting variations:

- General Election
- Closed Primary
- Open Primary
- Early Voting
- Partisan/Non-Partisan Offices
- Write-In Voting
- Primary Presidential Delegation Nominations
- Split Precincts
- Vote for N of M
- Ballot Rotation
- Provisional or Challenged Ballots

#### **1.5.5 VVSG**

The D-Suite 5.0-A 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 5.0-A modifications were considered for this test campaign.

### **2.3 Known Field Issues**

D-Suite 5.0-A 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 5.0-A 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.

No source code was changed to implement the updated FIPS modules/libraries, which are called upon in the build process and included in the compile. The source code submitted for the D-Suite 5.0-A is identical to the final source code for the D-Suite 5.0 System; however, Dominion will provide an increment of the version number for each compiled software component upon test completion.

#### **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**

<b>Material</b>	<b>Description(s)</b>
Tamper Proof Security Seals	Adhesive tamper proof security seal, Novavision Part# XSG21-08RESN
Printer Cartridges	Brother TN-630, 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 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 5.0-A 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 5.0-A 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:

### Limited Technical Documentation Package (TDP) Review

A limited 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.

### Source Code Review, Compliance Build, Trusted Build, and Build Document Review

The source code review will be based on the source code changes made since the previous system was certified. In addition, the source code submitted will be reviewed for implementations of the FIPS certified cryptographic module.

### Limited Functional Configuration Audit (FCA)

The FCA for this test campaign will include an assessment of the submitted modifications and will include inputs of both normal and abnormal data during test performance. This evaluation will utilize baseline test cases as well as specifically designed test cases and will include predefined election definitions for the input data.

### System Integration Test

The system integration tests will be performed to ensure the D-Suite 5.0-A functions as a complete system.

#### **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)
- Volume I, Section 7.52-7.54 (Telecommunications and Data Transmission)
- Volume I, Section 7.6 (Use of Public Networks)
- Volume I, Section 7.7 (Wireless Communications)
- Volume I, Section 7.9 (Voter Verifiable Paper Audit Trail Requirements)

The rationale for not evaluating the D-Suite 5.0-A to the indicated sections is described in following table. Specific requirements that are excluded from this test campaign are identified in the EAC online matrix tool.

**Table 4-1. Not Applicable Requirements**

<b>EAC 2005 VVSG Version 1 Volume I, Section</b>	<b>Rationale for ‘Not Applicable’</b>
6.2.6	These requirements are written for use of public networks. The D-Suite 5.0-A does not utilize public networks.
7.5.2-7.5.4	These requirements are written for use of public networks. The D-Suite 5.0-A does not utilize public networks.
7.6	D-Suite 5.0-A does not support transmission over public networks.
7.7	No wireless technology is utilized in this system.
7.9	This system does not contain a Voter Verifiable Paper Audit Trail (VVPAT).

#### **4.2 Hardware Configuration and Design**

The hardware configuration and design for the modification are unchanged from the baseline system. The D-Suite 5.0-A Voting System is a paper-based optical scan voting system that 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), one COTS hardware component (ICC), and one integrated COTS component (ICX). All EMS functions are managed by proprietary software running on COTS PCs/laptops/servers.

#### **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
- EMS Election Device Manager

The D-Suite 5.0-A voting system consists of one central count tabulator, one ballot marking device which run software applications, and one precinct tabulator which runs a firmware application.

#### **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 5.0-A) require no additional hardware testing to be performed.

#### **4.4.2 Hardware Environmental Test Case Design**

Previous hardware examinations were performed on the certified baseline system (D-Suite 5.0). The updates to the modified system (D-Suite 5.0-A) require no additional environmental hardware testing to be performed.

#### **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 system security functions for the modification remain unchanged from the previously certified system. Additional review will be performed on the implementation of the FIPS cryptographic module. No other security testing will be performed.

#### 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 5.0-A TDP is provided in Table 4-2.

**Table 4-2. TDP Documents**

<b>Document Number</b>	<b>Description</b>	<b>Version</b>
<i>Adjudication Documents</i>		
2.05	Democracy Suite Adjudication Software Design and Specification	5.0-A::79
2.08	Democracy Suite Adjudication System Operation Procedures	5.0-A::123
2.09	Democracy Suite Adjudication System Maintenance Manual	5.0-A::62
<i>D-Suite Documents</i>		
2.02	Democracy Suite System Overview	5.0-A::74
2.06	Democracy Suite System Security Specification	5.0-A::488
2.07	Democracy Suite System Test and Verification	5.0-A::148
2.10	Democracy Suite Personnel Deployment and Training Requirements	5.0-A::90
2.11	Democracy Suite Configuration Management Process	5.0-A::303

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

<b>Document Number</b>	<b>Description</b>	<b>Version</b>
2.12	Democracy Suite Quality Assurance Program	5.0-A::117
2.13	Democracy Suite System Change Notes	5.0-A::50
<i>EMS Documents</i>		
2.03	Democracy Suite EMS Functional Description	5.0-A::323
2.05	Democracy Suite EMS Software Design and Specification	5.0-A::274
2.08	Democracy Suite EMS System Operations Procedures	5.0-A::678
2.09	Democracy Suite EMS System Maintenance Manual	5.0-A::104
---	Democracy Suite EMS System Installation and Configuration Procedure	5.0-A::135
<i>ImageCast Central Documents</i>		
2.03	Democracy Suite ImageCast Central Functionality Description	5.0-A::138
2.05	Democracy Suite ImageCast Central Software Design and Specification	5.0-A::81
2.08	Democracy Suite ImageCast Central System Operation Procedures	5.0-A::170
---	Democracy Suite ImageCast Central Installation and Configuration Procedure	5.0-A::88
<i>ImageCast Precinct Documents</i>		
2.03	Democracy Suite ImageCast Precinct Functionality Description	5.0-A::153
2.04	Democracy Suite ImageCast Precinct System Hardware Specification	5.0-A::121
2.04.1	Democracy suite ImageCast Precinct System Hardware Characteristics	5.0-A::72
2.05	Democracy Suite ImageCast Precinct Software Design and Specification	5.0-A::129
2.08	Democracy Suite ImageCast Precinct System Operation Procedures	5.0-A::248
2.09	Democracy Suite ImageCast Precinct System Maintenance Manual	5.0-A::102
<i>ImageCast X Documents</i>		
2.03	Democracy Suite ImageCast X Functionality Description	5.0-A::35
2.05	Democracy Suite ImageCast X Software Design and Specification	5.0-A::53
2.08	Democracy Suite ImageCast X System Operation Procedures	5.0-A::98
2.09	Democracy Suite ImageCast X System Maintenance Manual	5.0-A::39
---	Democracy Suite ImageCast X Installation and Configuration Procedure	5.0-A::25
<i>User Guides</i>		
---	Democracy Suite ImageCast Adjudication User Guide	5.0-A::111
---	Canon imageFORMULA DR-G1130 DR-G1100 User Manual	---

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

<b>Document Number</b>	<b>Description</b>	<b>Version</b>
---	Democracy Suite Election Device Management User Guide	5.0-A::13
---	Democracy Suite EMS Audio Studio User Guide	5.0-A::66
---	Democracy Suite EMS Election Data Translator User Guide	5.0-A::70
---	Democracy Suite EMS Election Event Designer User Guide	5.0-A::159
---	Democracy Suite EMS Mobile Ballot Production User Guide	5.0-A::38
---	Democracy Suite EMS Results Tally and Reporting User Guide	5.0-A::90
---	Democracy Suite ImageCast Central User Guide	5.0-A::97
---	Democracy Suite ImageCast Precinct User Guide	5.0-A::48
---	Democracy Suite ImageCast Voter Activation User Guide	5.0-A::38
---	ImageCast X Ballot Marking Device User Guide	5.0-A::65
---	Dell Latitude E7450 Owner's Manual	---
---	SID-15V-Z37-A1R User Manual	Rev. 1.0
---	SID-21V-Z37-A1R User Manual	Rev. 1.0
---	Samsung GALAXY Note PRO Android Tablet User Manual	---
<i>Supplementary Documents</i>		
---	AT4 Wireless Test Report No. (NIE) 39698RSE.001 (Tecla Shield)	---
---	Cyber Acoustics ACM-70B Stereo Headphones Product Sheet	---
---	Democracy Suite ImageCast C++ Coding Standard	5.0-A::25
---	Democracy Suite C# Automated Code Review Process	5.0-A::20
---	Dell Latitude E7450/Latitude 7450 Regulatory Compliance Sheet	---
---	Dell OptiPlex 9020 AIO Regulatory Compliance Sheet	---
---	Dell OptiPlex 9030 AIO Regulatory Compliance Sheet	---
---	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 B2360d and B2360dn Brochure	---
---	Dominion Voting Systems Java Coding Standards	1.0
---	Dominion Voting Systems JavaScript Coding Standards	1.0
---	Democracy Suite ImageCast Device Configuration Files	5.0-A::67
---	Democracy Suite ImageCast Printing and Finishing Specification	5.0-A::58
---	Democracy Suite ImageCast Total Results File Format	5.0-A::28

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

<b>Document Number</b>	<b>Description</b>	<b>Version</b>
---	Democracy Suite ImageCast Precinct Election Definition Files	5.0-A::39
---	Democracy Suite ImageCast Precinct Extracting Firmware Contents	5.0-A::18
---	Democracy Suite ImageCast Precinct Firmware Update Procedure	5.0-A::29
---	Democracy Suite ImageCast Precinct Level One (L1) Maintenance Manual	5.0-A::43
---	Democracy Suite ImageCast Precinct Technical Guide	5.0-A::27
---	Canon imageCLASS LNP6230dw Technical Specification Sheet	---
---	YEDU.E95462 Uninterruptible Power-supply Equipment Sheet	---
---	Dell Latitude E7440 Regulatory Compliance Sheet	Rev. A09
---	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	---
---	LAVA STS Product Family User Manual	Rev. A01
---	APC Smart-UPS 230V Product Information Sheet	---
---	SAMSUNG Android Tablet Health and Safety and Warranty Guide	---
<i>Build Documents</i>		
---	Democracy Suite EMS Software Build Document	2.3.1::9
---	Democracy Suite ImageCast Precinct Firmware Build and Install	5.0-A::53
---	ImageCast X Build	5.0.11

**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.

## **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 5.0-A 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 5.0-A 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 5.0-A 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**

<b>Task Name</b>	<b>Start Date</b>	<b>End Date</b>	<b>Assigned To</b>	<b>Duration</b>	<b>Predecessors</b>
<b>Readiness for Testing (TRR)</b>	<b>03/10/17</b>	<b>04/05/17</b>		<b>19d</b>	
EAC Application Submitted	03/10/17	03/10/17	Ryan Wilson	1d	
TDP Delivered	03/10/17	03/10/17	Ryan Wilson	1d	
TDP Verification	03/29/17	03/29/17	Diane Gray	1d	5
Equipment Verification	03/29/17	03/29/17	Ryan Wilson	1d	7
System Setup	03/29/17	03/29/17	Ryan Wilson	1d	10
Mark Reading Test	04/02/17	04/02/17	Ryan Wilson	1d	11
Application Approved by EAC	04/05/17	04/05/17	Ryan Wilson	1d	13
<b>TDP</b>	<b>05/12/17</b>	<b>05/12/17</b>		<b>1d</b>	
Compliance Review	05/12/17	05/12/17	Diane Gray	1d	16
<b>Test Plan</b>	<b>04/10/17</b>	<b>05/11/17</b>		<b>24d</b>	
Test Plan Creation	04/10/17	04/13/17	Wendy Owens	4d	3
Vendor Review & Comments	04/13/17	04/13/17	Ryan Wilson	1d	20
EAC Submission & Review	04/13/17	05/10/17	Ryan Wilson	20d	21
EAC Approved Test Plan	05/11/17	05/11/17	Ryan Wilson	1d	24
<b>Source Code</b>	<b>05/12/17</b>	<b>05/15/17</b>		<b>2d</b>	
<b>Manual Review</b>	05/12/17	05/15/17		2d	
Source Code Review	05/12/17	05/15/17	Jack Cobb	2d	27
Document Review	05/12/17	05/15/17	Jack Cobb	2d	29
Compliance Build	05/12/17	05/15/17	Jack Cobb	2d	30
<b>Automated Review</b>	05/12/17	05/15/17		2d	
Source Code Review	05/12/17	05/15/17	Jack Cobb	2d	32
Document Review	05/12/17	05/15/17	Jack Cobb	2d	34
Compliance Build	05/12/17	05/15/17	Jack Cobb	2d	35
<b>System Delivery &amp; Setup</b>	<b>05/16/17</b>	<b>05/18/17</b>		<b>3d</b>	
PCA	05/16/17	05/16/17	Ryan Wilson	1d	
System Setup	05/16/17	05/18/17	Ryan Wilson	3d	38
System Loads & Hardening	05/16/17	05/18/17	Ryan Wilson	3d	36
<b>System Level Testing</b>	<b>05/19/17</b>	<b>05/30/17</b>		<b>8d</b>	
FCA	05/19/17	05/19/17	Ryan Wilson	1d	
Security (include SCAP)	05/19/17	05/19/17	Ryan Wilson	1d	49
Trusted Build	05/22/17	05/22/17	Jack Cobb	1d	55
System Loads & Hardening	05/23/17	05/25/17	Ryan Wilson	3d	56
System Integration	05/26/17	05/30/17	Ryan Wilson	3d	57
<b>Test Report</b>	<b>05/31/17</b>	<b>06/30/17</b>		<b>23d</b>	
Test Report Creation	05/31/17	06/01/17	Wendy Owens	2d	55
Vendor Review & Comments	06/01/17	06/01/17	Ryan Wilson	1d	60
EAC Submission & Review	06/02/17	06/29/17	Ryan Wilson	20d	61
EAC Submission & Review of Revision	06/29/17	06/29/17	Ryan Wilson	1d	63
EAC Approved Test Report	06/30/17	06/30/17	Ryan Wilson	1d	64