Test Plan for EAC 2005 VVSG Certification Testing
Unisyn Voting Solutions OpenElect 1.3.0.2 Voting System

EAC Project Number: UNS1602

Version: Revision A

Date: 1/24/17
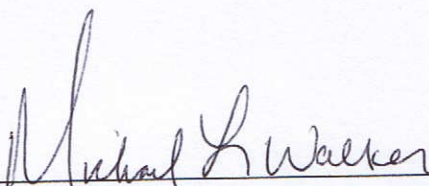
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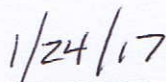
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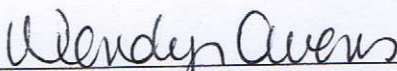
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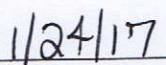
Approved by: _Wendy Owens_   _1/24/17_
              for Jack Cobb, Laboratory Director   Date

REVISIONS

Revision	Description	Date
NR	Initial Release	12/21/16
A	Test Plan updated based on EAC comments	1/24/17

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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 Unisyn Voting Solutions OpenElect Voting System (OVS) Version 1.3.0.2 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, Unisyn submitted an application package to the EAC for certification of the OpenElect 1.3.0.2 Voting System modification to the previously certified OVS 1.3 Voting System (Certification Number: 04211950-1.3). The application was accepted by the EAC and the project was assigned the unique Project Number of UNS1602.

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 OVS consists of the following components:

- **OpenElect Central Suite (OCS)**

- **OpenElect Voting Optical (OVO)**

- **OpenElect Voting Interface (OVI-7)**

- **OpenElect Voting Interface (OVI-VC)**

- **OpenElect Voting Central Scan (OVCS)**

Open Elect Central Suite (OCS)

The OCS System supports elections on the OVO, OVI-VC, OVI-7 and OVCS systems. It includes Ballot Layout Manager, Election Manager, Election Server, Tabulator Client, Tabulator Server, Adjudicator, and Tabulator Reports. In addition, the OCS includes the Software Server (SS) system for updating and validating the OVO, the OVI-7 and the OVI-VC (voting device) software.

OpenElect Voting Optical (OVO)

The OVO is a full-page dual-sided optical scan precinct scanner that scans and validates voter ballot pages and provides a summary of all ballot pages cast. The OVO consists of the following components:

- **Personal Computer (PC) -** Computer component (with a touch panel display) has pre-installed server software (that manages data and communication) and client software that provides a user interface for voting and maintenance. A new election loaded via the Election Server or manually via a Transport Media (TM) sets passwords, parameters, and ballot styles for that election. (Valid ballots for a poll location are reinitialized or set on Election Day startup by scanning a ballot header card).
- **Transport Media (TM)** – 1 GB or larger USB thumb drive that provides the means of transporting audit, optional ballot page images and results files from the precinct on Election Night to Election Headquarters where the central count system resides.
- **Ballot Reader -** Dual-sided scanner connected to the PC to scan data from marked ballot pages. The Ballot Reader ejects accepted ballot pages into an attached ballot box or rejects unaccepted ballot pages back out to the voter.
- **Printer -** 58 mm thermal receipt printer connected to the PC to print receipts and reports at the OVO.
- **UPS** - Uninterruptible power supply is provided as part of the system.

OpenElect Voting Interface (OVI-7)

The OVI-7 is a ballot marking device (BMD) that supports both ADA and Regional Early Voting requirements. The OVI-7 has a 7-inch display and consists of the following components:

- **Personal Computer (PC)** - Computer component (with a touch panel display) has pre-installed server software that manages data and communication and client software that provides user interfaces for voting and maintenance. A new election loaded via the Election Server or manually via a Transport Media (TM) sets passwords, parameters, audio, and ballot styles for that election.
- **Transport Media (TM)** - USB device with 1 GB or larger storage provides the means of transporting audit files to the OCS system.
- **Printer –** 82.5 mm thermal receipt printer is connected to the PC to print OVI Ballots and reports at the OVI.
- **UPS** - Uninterruptible power supply is provided as part of the system.

OpenElect Voting Interface (OVI-VC)

The OVI-VC is a ballot marking device (BMD) that supports both ADA and Regional Early Voting requirements. The OVI-VC has a 15-inch display and consists of the following components:

- **Personal Computer (PC)** - Computer component (with a touch panel display) has pre-installed server software that manages data and communication and client software that provides user interfaces for voting and maintenance. A new election loaded via the Election Server or manually via a Transport Media (TM) sets passwords, parameters, audio, and ballot styles for that election.
- **Transport Media (TM)** - USB device with 1 GB or larger storage provides the means of transporting audit files to the OCS system.

- **Printer** – 82.5 mm thermal receipt printer is connected to the PC to print OVI Ballots and reports at the OVI.
- **UPS** - Uninterruptible power supply is provided as part of the system.

OpenElect Voting Central Scan (OVCS)

The OVCS units reside at election headquarters designated to read absentee, provisional or recount ballots in large jurisdictions or read the entire election's ballots at a central count location in smaller jurisdictions. The OVCS also captures Write-In data images and produces a Write-In image report for manual processing upon request. The OVCS system consists of the following components:

- **PC Desktop** – A desktop PC configuration with the following minimum characteristics:
  - PC: 1.8 GHz Processor, 2 GB RAM, 250GB (or larger) Hard Drive, USB Ports, Network Interface Port (Ethernet), CDRW/DVD, Video Port
  - 16:9 LCD
  - Keyboard and Mouse
- **Bulk Scanner** – A dual-sided scanner that is connected to the PC to scan data from marked ballots.

1.1.1 Baseline Certified System

The baseline system for this modification is the OpenElect 1.3 Voting System. The tables below describe the certified equipment and firmware versions. Detailed descriptions of the OVS 1.3 test campaign are contained in NTS Report No. PR030407-01, Rev. B, which is available for viewing on the EAC's website at www.eac.gov.

Table 1-1. Baseline (OVS 1.3) Software Components

Firmware/Software	Version
Proprietary	
Adjudicator	1.3.0
Ballot Layout Manager	1.3.0
Common (Library)	1.3.0
Election Manager	1.3.0
Election Server	1.3.0
OCS Installer	1.3.0
Regkey Builder	1.3.0
Software Server	1.3.0
Tabulator	1.3.0
Tabulator Client	1.3.0
Tabulator Reports	1.3.0
OVCS Application	1.3.0
OVI Firmware	1.3.0
OVO Firmware	1.3.0
Scripter	1.3.0
Validator	1.3.0
Logger (Library)	1.3.0

Table 1-2. Baseline (OVS 1.3) OCS and OVCS COTS Software Components

Software	Version	Filename	Hash Value (MD5)
Java SE Development Kit	Development Kit 6 Update 2 for Linux j	jdk-6u2-linux-i586.bin	6a488cb0a161a1c3a541a66e3b076f8e
Java SE Runtime Environment	Runtime Environment 6 Update 2	jre-6u2-linux-i586.bin	0d30636b5cd23e161da5eda9409f02d5
Java Cryptography Extension	Jurisdiction Policy Files 6	jce_policy-6.zip	b20f9d6ed14e55d73a5ed204bca01e7a
Apache Tomcat	6.0.13	apache-tomcat- 6.0.13.tar.gz	50442a96332f0ec0cc1fba354f733ad6
PDI Scanner Driver and Libraries for OVCS	2.1.4	PS3_Canon_libraries_2014Jan06A.zip	6b28a3c6dccab539261ca96bd94dd1e5

Table 1-3. Baseline (OVS 1.3) COTS Operating System Software Components

Software	Version	Filename	Hash Value (MD5)
Linux CentOS Distribution for OVS 1.3 (used for the OVO/OVI with old motherboard)	5.0	CentOS-5.0-i386-bin-1of6.iso CentOS-5.0-i386-bin-2of6.iso CentOS-5.0-i386-bin-3of6.iso CentOS-5.0-i386-bin-4of6.iso CentOS-5.0-i386-bin-5of6.iso CentOS-5.0-i386-bin-6of6.iso	f749d7e17fa01604b9956304efba2333; 963258ceafda5c5e6f79be86028b6b3d; a08ec9ccfdc89c24f3d6567219f90c42; b31c239009b780d1c89c311c192e43be ; 0c3990be2271bf44c1495aa0003b5552; 9e6f91a5292f46b02777133765fc03fe
Linux CentOS Distribution (used for the OCS and OVCS)	5.7	CentOS-5.2-i386-bin-DVD.iso	c89db7f5294465d593e7b02c232e0e90 70111487
Linux CentOS Distribution (used for the OVO/OVI with new motherboard)	6.3	CentOS-6.3-i386-bin-DVD1.iso	0285160d8ba3cfc720ea55e98e464eac
Linux CentOS Distribution used for OCS and OVCS	6.5	CentOS-6.5- i386-binDVD1.iso	c98e8040b9ac107153fc1757b4874198

Table 1-4. Baseline (OVS 1.3) OVO Third-Party Software (COTS) Components

Software	Version	Filename	Hash Value (MD5)
Common Files			
Java SE Runtime Environment	Runtime Environment 6 Update 2	jre-6u2-linux-i586.bin	0d30636b5cd23e161da5eda9409f02d5
Java Cryptography Extension	Jurisdiction Policy Files 6	jce_policy-6.zip	b20f9d6ed14e55d73a5ed204bca01e7a
Apache Tomcat	6.0.13	apache-tomcat- 6.0.13.tar.gz	50442a96332f0ec0cc1fba354f733ad6
PDI Scanner Driver and Libraries for OVO	6.3.32	PS3_Canon_libraries_2014Aug12A.zip	6b28a3c6dccab539261ca96bd94dd1e5
Citizen Printer for OVO	1.11.2.7	CSA_JPOS11127_setupEN.bin	d150d08693bf7dbe758adfdab94f655d
OpenCSV	2.3	opencsv-2.3-src-withlibs.tar.gz	d3423d8e3b0ae5c899cee32baa17a36f
Jetway J7F2			
openChrome Video Driver	0.2.900-7.el5	xf86-video-openchrome-0.2.900.tar.gz	3e36895eb4b4d61e21aa27d370f151c8
eGalax Touchscreen Driver	3.00.3719	eGalaxTouch-3.00.3719-32b-k26.tar.gz	51c835408093ccfc4055a9eab9537998
FVWM Desktop Window Manager	2.4.19	fvwm-2.4.19.tar.gz	a2fd2c07061303883d6bf89eb2b259ff
Jetway 2550			
Xenarc Touchscreen Driver	2.5.2107	eGTouch_v2.5.2107.Lx.tar.gz	cfb148b3997257ed0e4a8eb3fa6b3932
Linux Kernel	3.4.13	linux-3.4.13.tar.bz2	9c850d00c898ba792f29eb6a5973961c
Bash	4.1.2-15.el6	bash-4.1.2-15.el6_5.2.i686.rpm	3f85b5595b60f655f646aee702398a93
Java SE Runtime Environment	Runtime Environment 6 Update 2	jre-6u2-linux-i586.bin	0d30636b5cd23e161da5eda9409f02d5
Java Cryptography Extension	Jurisdiction Policy Files 6	jce_policy-6.zip	b20f9d6ed14e55d73a5ed204bca01e7a
Apache Tomcat	6.0.13	apache-tomcat- 6.0.13.tar.gz	50442a96332f0ec0cc1fba354f733ad6
PDI Scanner Driver and Libraries for OVO	6.3.32	PS3_Canon_libraries_2014Jan06A.zip	6b28a3c6dccab539261ca96bd94dd1e5
Citizen Printer for OVO	1.11.2.7	CSA_JPOS11127_setupEN.bin	d150d08693bf7dbe758adfdab94f655d
OpenCSV	2.3	opencsv-2.3-src-withlibs.tar.gz	d3423d8e3b0ae5c899cee32baa17a36f

Table 1-4. Baseline (OVS 1.3) OVO Third-Party Software (COTS) Components *(continued)*

Software	Version	Filename	Hash Value (MD5)
Jetway J7F2			
openChrome Video Driver	0.2.900-7.el5	xf86-video-openchrome-0.2.900.tar.gz	3e36895eb4b4d61e21aa27d370f151c8
eGalax Touchscreen Driver	3.00.3719	eGalaxTouch-3.00.3719-32b-k26.tar.gz	51c835408093ccfc4055a9eab9537998
FVWM Desktop Window Manager	2.4.19	fvwm-2.4.19.tar.gz	a2fd2c07061303883d6bf89eb2b259ff
Jetway 2550			
Xenarc Touchscreen Driver	2.5.2107	eGTouch_v2.5.2107.Lx.tar.gz	cfb148b3997257ed0e4a8eb3fa6b3932
Linux Kernel	3.4.13	linux-3.4.13.tar.bz2	9c850d00c898ba792f29eb6a5973961c
Bash	4.1.2-15.el6	bash-4.1.2-15.el6_5.2.i686.rpm	3f85b5595b60f655f646aee702398a93

Table 1-5. Baseline (OVS 1.3) OVI-7/OVI-VC Third-Party Software (COTS) Components

Software	Version	Filename	Hash Value (MD5)
Common Files			
Java SE Development Kit	Development Kit 6 Update 2 for Linux	jdk-6u2-linux-i586.bin	6a488cb0a161a1c3a541a66e3b076f8e
Java SE Runtime Environment	Runtime Environment 6 Update 2	jre-6u2-linux-i586.bin	0d30636b5cd23e161da5eda9409f02d5
Java Cryptography Extension	Jurisdiction Policy Files 6	jce_policy-6.zip	b20f9d6ed14e55d73a5ed204bca01e7a
RXTX - Library and Jar	2.1-7r2	rxtx-2.1-7-bins-r2.zip	5f21ae633602a24fd3cdd096951476c2
Jetway J7F2			
openChrome Video Driver	0.2.900-7.el5	xf86-video-openchrome-0.2.900.tar.gz	3e36895eb4b4d61e21aa27d370f151c8
eGalax Touchscreen Driver	3.00.3719	eGalaxTouch-3.00.3719-32b-k26.tar.gz	51c835408093ccfc4055a9eab9537998
FVWM Desktop Window Manager	2.4.19	fvwm-2.4.19.tar.gz	a2fd2c07061303883d6bf89eb2b259ff
Jetway 2550			
Xenarc Touchscreen Driver	2.5.2107	eGTouch_v2.5.2107.Lx.tar.gz	cfb148b3997257ed0e4a8eb3fa6b3932
Linux Kernel	3.4.13	linux-3.4.13.tar.bz2	9c850d00c898ba792f29eb6a5973961c

Table 1-6. Baseline (OVS 1.3) Linux Build Machine Third-Party Software (COTS) Components

Software	Version	Filename	Hash Value (MD5)
Java SE Development Kit	Development Kit 6 Update 2 for Linux	jdk-6u2-linux-i586.bin	6a488cb0a161a1c3a541a6 6e3b076f8e
Java 2 Enterprise Edition	1.3.01	j2sdkee-1_3_01-linux.tar.gz	224e9687c73ba48f1186e4 34368ec9b3
Java Cryptography Extension	Jurisdiction Policy Files 6	jce_policy-6.zip	b20f9d6ed14e55d73a5ed2 04bca01e7a
Apache Ant	1.7.0	apache-ant-1.7.0- bin.zip	ac30ce5b07b0018d65203f bc680968f5
Jasper Reports	2.0.5	jasperreports-2.0.5-project.zip	b80bd29e4f95f18bd15da6 5cfd45d1d2
SQL Connector	5.1.7	mysql-connnectorjava-5.1.7.zip	f9a8008367f5b25bdec045c 54100d5b0
Apache Axis	1.4	axis-bin-1_4.zip	9eda42bf82a274349f18c5a ffdd93608
Apache Commons Codec	1.3	commons-codeccurrent.zip	c30c769e07339390862907 504ff4b300
Apache Commons Http	3.0	commons-httpclient-3.0.zip	42d96b0c7d627a2170fd57 280476c8fe
Apache Commons File Upload	1.2	commons-fileupload- 1.2-bin.zip	6fbe6112ebb87a9087da8c a1f8d8fd6a
Apache Commons IO	1.3.2	commons-io-1.3.2- bin.zip	ba31cc4a0d85842e4b0bfdf 2472382ba
Apache Tag Library	1.1.2	jakarta-taglibsstandard-current.zip	f75c964f1b276b022c24a6 77ccc17d4d
PDF Help	4.92b23	pdfhelp.jar	f2542f332e5be4549a48f87 6d63ac915
Javazoom MP3	1.9.4	mp3spi1.9.4.zip	e259e7674d9b19e76f005c ee2810e7f5
Citizen Printer for OVO	1.11.2.7	CSA_JPOS11127_setu pEN.bin	d150d08693bf7dbe758adf dab94f655d
PDI Scanner Driver and Libraries for OVO and OVCS	2.1.4, 6.3.32	PS3_Canon_libraries_ 2014Jan06A.zip	6b28a3c6dccab539261ca9 6bd94dd1e5
RXTX - Library and Jar	2.1-7r2	rxtx-2.1-7-bins-r2.zip	5f21ae633602a24fd3cdd09 6951476c2
PDI Tool For Verification of Binary File	1.0	VisionX_11202008.EXE	af8905f015c7d7ff730b9f8 b0811134b
Fonts for OCS	None	arial.zip; ARIALBD.zip; arialbi.zip; ariali.zip	c7f4d931da264bee5855cbf 69630c81d; 589a0d88320f8a33dbcd4f 2c1929ebce; b868660de8a00fe20f7097 0cca275038; 7968209fd0c62466a27fcde 0f4104fec

Table 1-6. Baseline (OVS 1.3) Linux Build Machine Third-Party Software (COTS) Components *(continued)*

Software	Version	Filename	Hash Value (MD5)
Star 700II Printer	1.4.2_11-b06	starjavapos_linux_200 70317.zip	172b1fcfecae654b00463be 74efc7fbb

Table 1-7. Baseline (OVS 1.3) OVO Equipment

Equipment	Manufacturer	Model	Serial Number
OVO	Unisyn	OpenElect Voting Optical, Rev. A	UNI000018
OVO	Unisyn	OpenElect Voting Optical, Rev. A	UNI000024
OVO	Unisyn	OpenElect Voting Optical, Rev. E	UNI000029
OVO	Unisyn	OpenElect Voting Optical, Rev. E	UNI000036
OVO	Unisyn	OpenElect Voting Optical, Rev. E	UNI000039
OVO	Unisyn	OpenElect Voting Optical, Rev. E	UNI000049
OVO Ballot Box 1	Unisyn	Plastic Rolling	BB-58650-001
OVO Ballot Box 2	Unisyn	Plastic Rolling	UVSCOV001675 UVSBOT001685
OVO Ballot Box 3	Unisyn	Plastic Rolling	UVSCOV001738 UVSBOT001618
OVO Ballot Box 4	Unisyn	Portable (collapsible corrugated plastic)	CBB001 CBB002
OVO Ballot Box 5	Unisyn	OpenElect Ballot Box Version 3	OEBBV3-001
OVO Ballot Box 6	Unisyn	OpenElect Ballot Box Version 3	OEBBV3-002

Table 1-8. Baseline (OVS 1.3) OVI Equipment

Equipment	Manufacturer	Model	Serial Number
OVI 7"	Unisyn	OpenElect Voting Interface, Rev. F	UNI150041
OVI 7"	Unisyn	OpenElect Voting Interface, Rev. F	UNI150049
OVI 15"	Unisyn	OVI-VC, Rev. A	UNI202111
OVI 15"	Unisyn	OVI-VC, Rev. B	UNI203050
OVI 15"	Unisyn	OVI-VC, Rev. A	UNI203118
OVI 15"	Unisyn	OVI-VC, Rev. A	UNI203232

Table 1-9. Baseline (OVS 1.3) OVCS Equipment

Equipment	Manufacturer	Model	Serial Number
OVI 7"	Unisyn	OpenElect Voting Interface, Rev. F	UNI150041

Table 1-10. Baseline (OVS 1.3) OCS Configurations

Equipment	Manufacturer/ Model	Hardware Specifications	Service Tag	Software Config.
PC 1	Dell Precision T3600	Processor: Intel Xeon E5-1620 3.6GHz Memory: 4x 4GB 1600MHz RAM Hard Drive Capacity: 500GB (Mirrored)	CP7GGX1	OVCS/ All OCS applications

Table 1-10. Baseline (OVS 1.3) OCS Configurations (Continued)

Equipment	Manufacturer/ Model	Hardware Specifications	Service Tag	Software Config.
PC 2	Dell OptiPlex 7010	Processor: Intel Core i7-3770 3.4GHz Memory: 4x 4GB 1600MHz RAM Hard Drive Capacity: 500GB	2Y7BGX1	All OCS applications
PC 3	Dell D075	Processor: Intel Core i7-4770S 3.1GHz Memory: 2x 8GB 1600MHz RAM Hard Drive Capacity: 500GB	H407GZ1	All OCS applications
Laptop 1	Dell Latitude E5540	Processor: Intel Core i7-4600U 2.1GHz Memory: 2x 4GB 1600MHz RAM Hard Drive Capacity: 500GB	CH78VZ1	All OCS applications
Laptop 2	HP 2000 Notebook PC	Processor: AMD Dual-Core E1-1500 1.48GHz Memory: 1x 4GB DDR3 SDRAM Hard Drive Capacity: 320GB	2C32NR	All OCS applications

1.1.2 Description of Modification

The submitted modification for this test campaign consisted of an update to the Pennsylvania Straight Party method of voting on the OVI. This update is documented in the Unisyn 1.3.0.2 Enhancement Report dated 11-28-2016. Descriptions of the submitted updates, as taken from the Unisyn documentation, are described below:

- If the jurisdiction selects 'PA Straight Ticket' option in the Election Manger application, the contest has some special behaviors if it is populated as the result of a straight ticket election. (PA Straight Ticket being selected automatically sets Auto Deselect as true). In this scenario, if a voter selects a party from the straight ticket selection contest, the ballot is populated in accordance to the rules set by the Election Manager setting. When the voter views a contest that is a vote for 2 or more and touches any candidate, **then all the candidates selected because of the straight ticket option are deselected** and the candidate that was touched is selected. This occurs even if the candidate belongs to the same party as the party selection in the straight ticket contest.

- The Sound script was updated to explain to the voter what happens when selecting an already selected candidate in an N of M contest. When a vote for two or more is populated from a straight ticket selection, hovering with the keypad over a selected candidate will cause the script to read 'to select this candidate, press the square enter button. Selecting this candidate will deselect all previous selections.'

- Straight ticket selection contest was updated to follow the toggle rule for select/deselect, same as any other vote for one contest.

In addition to the software updates to the Election Manager application and the OVI software, Unisyn submitted hardware modifications. These modifications are described in the OVO OVI

Updates Configuration Management document submitted by Unisyn. The table below contains the updates and brief description of each.

Table 1-11. OVO/OVI Hardware Updates

Item	Reason	OVO	OVI	1.0	1.01	1.1	1.2	1.3	2.0
New Mount for Gate	Improved manufacturing and support	Yes	---	No	No	No	Yes /O	Yes /O	Yes /O
Brass Insert for scanner threads	Updating from plastic to brass insert to secure thread	Yes	---	Yes /O	Yes/ O	Yes /O	Yes /O	Yes /O	Yes /O
Hole in Plate(s) to access scanner screw	Improve Manufacturing	Yes	---	No	No	No	Yes /O	Yes /O	Yes /O
Citizen Power Supply	New, Federal Level VI efficiency compliant AC/DC adapter	Yes	---	No	No	No	Yes /O	Yes /O	Yes /O
Scanner Power Supply	New, Federal Level VI efficiency compliant AC/DC adapter	Yes	---	No	No	No	Yes /O	Yes /O	Yes /O
PC Power Supply	New, Federal Level VI efficiency compliant AC/DC adapter	Yes	---	No	No	No	Yes /O	Yes /O	Yes /O
PC Power Supply	New, Federal Level VI efficiency compliant AC/DC adapter	---	Yes	No	No	No	Yes /O	Yes /O	Yes /O
Star Printer Power Supply	New, Federal Level VI efficiency compliant AC/DC adapter	---	Yes	No	No	No	Yes /O	Yes /O	Yes /O
G Vision Power Supply	New, Federal Level VI efficiency compliant AC/DC adapter	---	Yes	No	No	No	Yes /O	Yes /O	Yes /O
G Vision LCD	New version of the GVision 15" LCD. All functionality is the same	---	Yes	No	No	No	Yes /O	Yes /O	Yes /O
Flat Cable Ferrite added to Scanner	---	Yes	---	---	---	---	Yes /O	Yes /O	Yes /O
Ferrite added to AC filter Output	---	---	Yes	---	---	---	Yes /O	Yes /O	Yes /O
OVI Reset Button	Added reset button to connect from the board to a switch internal to the OVI	---	Yes	Yes /O	Yes/ O	Yes /O	Yes /O	Yes /O	Yes /O
Motherboard Version Update	Vendor updating board	Yes	Yes	No	No	No	Yes /O	Yes /O	Yes /O
Disk Version Update	Moving from 350MBs to 500 MBs - same vendor and version	Yes	Yes	Yes /O	Yes/ O	Yes /O	Yes /O	Yes /O	Yes /O
Updated AC Power Cable	Removes the adapter used on the AC cable with a molded connector	Yes	Yes	No	No	No	Yes /O	Yes /O	Yes /O

1.1.3 Initial Assessment

Prior to development of this Test Plan, Pro V&V performed an evaluation of the results from the previous test campaign along with the changes made to the system to determine the scope of testing required for certification of the OVS 1.3.0.2. Based on this evaluation, Pro V&V determined that testing from the previous test campaigns would establish the baseline and that the focus of this test campaign would be on the system update. It was determined the following tasks would be required to verify compliance of the modifications:

- Limited TDP Review

- Physical Configuration Audit (PCA)

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

- Functional Configuration Audit (execution of the Pennsylvania Test Cases for BMD and Optical Scanner)

- System Integration including the Pennsylvania Certification General Election, Pro V&V's Gen 1 General Election and Pro V&V's Prim 1 Primary election.

- Electrical Hardware Testing of the OVO and OVI

1.1.4 Regression Test

Regression testing for this test campaign will consist of the execution of the Pennsylvania Test Cases and Electrical Hardware Testing on the OVO and OVI components.

1.2 References

- Election Assistance Commission 2005 Voluntary Voting System Guidelines (VVSG) Version 1.0, Volume I, "Voting System Performance Guidelines", and Volume II, "National Certification Testing Guidelines"

- Election Assistance Commission Testing and Certification Program Manual, Version 2.0

- Election Assistance Commission Voting System Test Laboratory Program Manual, Version 2.0

- National Voluntary Laboratory Accreditation Program NIST Handbook 150, 2006 Edition, "NVLAP Procedures and General Requirements (NIST Handbook 150)", dated February 2006

- National Voluntary Laboratory Accreditation Program NIST Handbook 150-22, 2008 Edition, "Voting System Testing (NIST Handbook 150-22)", dated May 2008

- United States 107th Congress Help America Vote Act (HAVA) of 2002 (Public Law 107-252), dated October 2002

- Pro V&V, Inc. Quality Assurance Manual, Revision 7.0

- Election Assistance Commission "Approval of Voting System Testing Application Package" letter dated November 03, 2016

- EAC Requests for Interpretation (RFI) (listed on www.eac.gov)

- EAC Notices of Clarification (NOC) (listed on www.eac.gov)

- Unisyn Voting Solutions Technical Data Package *(A listing of the OpenElect 1.3.0.2 documents submitted for this test campaign is listed in Section 4.6 of this Test Plan)*

- NTS Test Report No. PR030407-01, Rev. B

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

 "NOC" – Notice of Clarification

"OVCS" – OpenElect Voting Central Scan

"OVI-7" – OpenElect Voting Interface

"OVI-VC" – OpenElect Voting Interface

"OVO" – OpenElect Voting Optical

"OVS" – OpenElect Voting System

"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 modifications made to the previously certified OVS 1.3 Voting System, as described in Section 1.1.2.
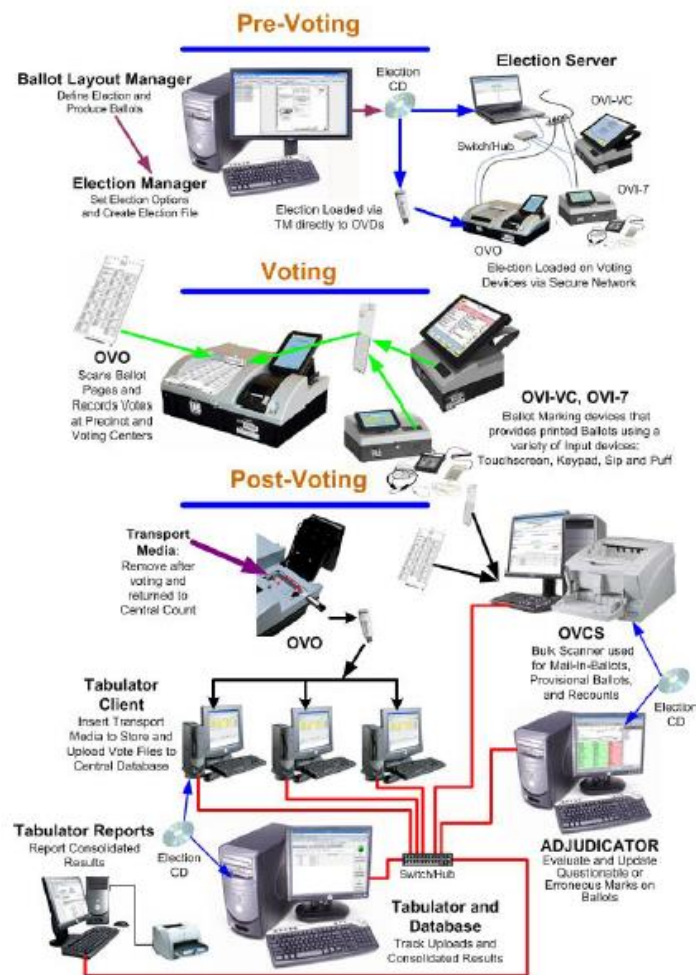
1.5.1 Block Diagram

Figure 1-1. OVS 1.3.0.2 System Overview

1.5.2 System Limits

There were no changes made to the system limits. The system limitations remain the same as the previously certified version.

1.5.3 Supported Languages

There were no changes made to the supported languages.

1.5.4 Supported Functionality

The only change made to the functionality of the voting system is the update concerning the Pennsylvania Straight Party Method of voting.

1.5.5 VVSG

The OVS 1.3.0.2 Voting System shall be evaluated against the relevant requirements contained in the EAC 2005 VVSG, Volumes I and II.

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

All NOCs released by the EAC as of the date of this Test Plan that pertain to this test campaign and were not in effect at the time of the baseline system certification are listed below:

- NOC 15-01 Test Readiness Review
- NOC 16-02 Trusted Build
- NOC 16-03 Test Case Upload

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 OVS 1.3 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 OVS 1.3.0.2 modifications were considered for this test campaign.

2.3   Known Field Issues

<mark>OVS 1.3.0.2 is a modification to a previously certified system and has not been fielded. The baseline system 1.3 has been fielded and there are no known field issues reported at the time of this test plan creation.</mark>

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 OVS 1.3.0.2 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.

Table 3-1. Voting System Software

OVS 1.3.0.2 Software Components

Firmware/Software	Version
Adjudicator	1.3.0.2
Ballot Layout Manager	1.3.0.2
Common (Library)	1.3.0.2
Election Manager	1.3.0.2
Election Server	1.3.0.2
OCS Installer	1.3.0.2
Regkey Builder	1.3.0.2
Software Server	1.3.0.2
Tabulator	1.3.0.2
Tabulator Client	1.3.0.2
Tabulator Reports	1.3.0.2
OVCS Application	1.3.0.2
OVI Firmware	1.3.0.2
OVO Firmware	1.3.0.2
Scripter	1.3.0.2
Validator	1.3.0.2
Logger (Library)	1.3.0.2

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.

Table 3-2. Voting System Equipment

Equipment Description	Serial Number
OVI-VC (+ 2 power cables)	UVS203030 Rev B
OVO-JA (2550) (+1 power cables)	UV5000035 Rev E
MinuteMan Entrust 1500 UPS Model ETR1500, PN 90000769	AE58080900498
USB 1 GB HGST SLUFD1GUZTU	131220-P05-001
USB 1 GB HGST SLUFD1GUZTU	140225-P05-003
USB 1 GB STEC SLUFD1GUZTU	111101-P05-007
USB 1 GB STEC SLUFD1GUZTU	120221-P05-003
Laptop Dell Lattitude E5540 Core i7, 2 Resource Disks, 2 Manuals	1XVTQ32
Laptop Power Brick Model LA90PM130	NSW26272

3.3   Test Materials

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

Table 3-3. Required Test Materials

Equipment Description	Serial Number
15 Blank CDR	---
6 Rolls Large Paper	---
6 Rolls Small Paper	---
2 Pkgs Ballot Paper	---

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 Unisyn OVS 1.3.0.2 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 OVS 1.3.0.2 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.

Physical Configuration Audit (PCA)

A PCA will be performed to compare the voting system submitted for certification testing to the manufacturer's technical documentation. The purpose of the PCA will be to verify that the submitted hardware is unmodified from the previously certified voting system.

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.

Functional Configuration Audit

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 insure the OVS 1.3.0.2 function as a complete system testing both Straight Party and Pennsylvania Straight Party Method of voting.

Electrical Hardware Testing of the OVO and OVI

Electrical hardware testing shall be performed on both the OVO and OVI to ensure changes to the system did not alter the system performance under these conditions.

4.1.1 Rationale for 'Not Applicable' Requirements

All requirements that were excluded from the previous test campaign (OVS 1.3) were also deemed not applicable to this test campaign due to the submitted modifications not impacting the specific requirements.

Pro V&V determined that the OVO and OVCS source code and software has not been changed for this modification therefore, Pro V&V will not be performing an accuracy test as documented in the EAC 2005 VVSG version 1.0. The data from all testing will be analyzed and examined to insure the totals for each test are accurate.

4.2 Hardware Configuration and Design

The hardware configuration and design for the modification are detailed in Table 1-10.

4.3 Software System Functions

The software system functions for the previously certified voting system (OVS 1.3) remain unchanged for the submitted modifications.

4.4 Test Case Design

Pro V&V will be utilizing the test procedures from the Pro V&V Quality Management System (QMS). These test procedures will be augmented by the Test cases developed by the Commonwealth of Pennsylvania for "Certification for Use" in the Commonwealth of Pennsylvania.

4.4.1 Hardware Qualitative Design

Previous hardware examinations were performed on the certified baseline system (OVS 1.3). The updates to the modified system (OVS 1.3.0.2) require additional hardware testing to be performed on the OVI and OVO units.

Electrical Tests:

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

4.4.2   Hardware Environmental Test Case Design

Previous hardware examinations were performed on the certified baseline system (OVS 1.3). The updates to the modified system (OVS 1.3.0.2) require no additional environmental hardware testing to be performed. Pro V&V will utilize a third-party test facility for performance of the electrical tests. All pre/post-tests shall be conducted by Pro V&V personnel.

4.4.3   Software Module Test Case Design

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 that were modified. During the Source Code Review, Compliance Builds, and Security Testing, Pro V&V will utilize limited structural-based techniques (white-box testing). A comparative source code review will be performed comparing the OVS 1.3 source code to the OVS 1.3.0.2 version of source code. 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

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. ==The source code changes needed for the PA Straight Ticket will be evaluated for any potential security issues.==

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 OVS 1.3.0.2 TDP is provided below:

- OpenElect Voting System Release 1.3.0.2 Trusted Build – Applications 1.3.0.2, Document Number: 04-00553, Version 1.17
- OpenElect Central Suite Ballot Layout Manager Release 1.3 Ballot Layout Manager UserGuide Document Number: 04-00428, Version 1.0
- OpenElect Central Suite Election Manager Release 1.3.0.2 Election Manager User Guide Document Number: 04-00427, Version 1.0
- OpenElect Voting Systems Release 1.3.0.2 System Operations Procedures: Election Day Poll Worker's Guide OVO and OVI Document Number: 04-00462, Version 1.0
- OpenElect Voting System Release 1.3.0.2 System Overview Document Number: 04-00446, Version 1.0

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 Unisyn 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 Unisyn 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 Unisyn for resolution.

5.2   Test Data Criteria

The OVS1.3.0.2 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.

5.3   Test Data Reduction

Test data shall be processed and recorded in the test log book and the relevant Test Cases.

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 subject to the test parameters and tolerances defined by VVSG. If not specified in VVSG, the test facilities' standard parameters and tolerances will be used. These 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 Unisyn 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 Unisyn 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 OVS1.3.0.2 will be evaluated against all applicable requirements in the EAC 2005 VVSG. There is no required sequence for test performance.

7.0 TEST OPERATIONS PROCEDURES

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 <mark>Unisyn 1.3.0.2</mark> 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.

7.1   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.

APPENDIX A

PROJECT SCHEDULE

Task Name	Start Date	End Date	Assigned To	Duration	Predecessors
Readiness for Testing (TRR)	**04/15/16**	**04/29/16**		**11d**	
EAC Application Submitted	10/05/16	10/05/16	Jack	1d	
Preliminary Source Code Delivered	10/05/16	10/05/16	Jack	1d	
TDP Delivered	10/05/16	10/05/16	Diane	1d	
Source Code Delivered (Remaining)	10/05/16	10/05/16	Jack	0	5
Equipment Delivered	10/05/16	10/05/16	Jack	0	5
TDP Verification	10/06/16	10/06/16	Diane	1d	5
Source Code Verification	10/06/16	10/06/16	Jack	1d	6
Equipment Verification	11/02/16	11/02/16	Jack	1d	
System Setup	11/02/16	11/02/16	Jack	1d	
Mark Reading Test	11/02/16	11/02/16	Jack	1d	
VRT Status Update	11/02/16	11/02/16	Jack	0	
Application Approved by EAC	11/02/16	11/03/16	Jack	2d	13
TDP	**10/06/16**	**12/23/16**		**57d**	
Initial Review	10/06/16	10/12/16	Diane	5d	5
Compliance Review	10/13/16	12/09/16	Diane	42d	16
Final review	12/12/16	12/23/16	Diane	10d	17
Test Plan	**11/14/16**	**02/07/17**		**62d**	
Test Plan Creation	11/14/16	12/16/16	Wendy	25d	
Vendor Review & Comments	12/19/16	12/20/16	Wendy	2d	20
EAC Submission & Review	12/21/16	01/13/17	Wendy	18d	21
EAC Comment Review & Update	01/16/17	01/23/17	Wendy	6d	22
EAC Submission & Review of Revision	01/24/17	02/06/17	Wendy	10d	23
EAC Approved Test Plan	02/07/17	02/07/17	Wendy	1d	24
Source Code	**10/07/16**	**10/21/16**		**11d**	
Automated Review	10/07/16	10/07/16		1d	
Source Code Review	10/10/16	10/14/16	Jack	5d	27
Source Code Re-Review	10/17/16	10/18/16	Jack	2d	28
Document Review	10/19/16	10/19/16	Jack	1d	29
Compliance Build	10/20/16	10/21/16	Jack	2d	30
System Delivery & Setup	**11/03/16**	**11/07/16**		**3d**	
PCA	11/03/16	11/03/16	Jack	1d	
System Setup	11/04/16	11/07/16	Jack	2d	33
System Loads & Hardening	11/03/16	11/04/16	Jack	2d	
Hardware Testing	**11/03/16**	**11/09/16**		**5d**	
Electrical Testing (OVO)	11/03/16	11/09/16	William	5d	
Electrical Testing (OVI)	11/03/16	11/09/16	William	5d	
System Level Testing	**12/12/16**	**01/05/17**		**19d**	
FCA	12/12/16	12/23/16	Jack	10d	
Regression Testing	12/26/16	12/27/16	Jack	2d	40
Trusted Build	12/28/16	12/29/16	Jack	2d	41
System Loads & Hardening	12/30/16	01/02/17	Jack	2d	42
System Integration	01/03/17	01/05/17	Jack	3d	43
Test Report	**12/28/16**	**03/27/17**		**64d**	
Test Report Creation	12/28/16	01/24/17	Wendy	20d	41
Vendor Review & Comments	01/25/17	01/26/17	Wendy	2d	46
EAC Submission & Review	02/08/17	03/07/17	Wendy	20d	25
EAC Comment Review & Update	03/08/17	03/10/17	Wendy	3d	48
EAC Submission & Review of Revision	03/13/17	03/24/17	Wendy	10d	49
EAC Approved Test Report	03/27/17	03/27/17	Wendy	1d	50