Certification Test Plan – Modification

Unisyn OpenElect Voting System 2.0.A.2

UNI-20A2-CTP-01

Prepared for:

Vendor Name	*Unisyn Voting Solutions, Inc.*
Vendor System	*OpenElect Voting System 2.0.A.2*
EAC Application No.	*UNS10121966-2.0.A.2*
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Accredited by the Election Assistance Commission (EAC) for Selected Voting System Test Methods or Services

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Revision History

Date	Release	Author	Revision Summary
Sept. 26th, 2018	1.0	*M. Santos*	Initial Draft
Oct. 22nd, 2018	1.1	*M. Santos*	Updates to section 1.5.1 for EAC comments

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1 INTRODUCTION

This Modification Test Plan outlines the test approach SLI Compliance will follow when performing system modification testing on the ***Unisyn OVS 2.0.A.2*** voting system against the 2005 Voluntary Voting System Guidelines (VVSG). The purpose of this document is to provide a clear understanding of the work SLI will conduct and a detailed plan outlining the test effort.

The ***Unisyn OVS 2.0.A.2*** voting system is a modification of the **OVS 2.0.A** voting system, that consists of two updates. One update is implemented to properly handle an adjustment of write in assignments through the Auditor application which keeps the number of Assigned and Unassigned write-ins balanced for reporting purposes. The second update is implemented to increase the size of extracted bar code images, which are used in the Adjudication screen.

When the testing is complete, SLI will submit a Certification Test Report that details all test results and findings from the Certification Test effort, as well as a recommendation to the EAC.

1.1 Overview of the Unisyn Voting System

This system contains a description of the previously certified system, the specific modifications to the current system version, and the impact of those modifications on the system and certification testing.

1.1.1 Definition of the Baseline Certified System

The OVS is a paper ballot precinct voting system that uses touch screen and scan technology to scan and validate ballots, provides voter assisted ballots for special needs voters, and tabulates precinct results.

The OVS consists of:

- **OpenElect® Central Suite (OCS)**
- **OpenElect® Voting Optical (OVO)**
- **OpenElect® Voting Interface (OVI-VC)**
- **OpenElect® FreedomVote Tablet (FVT)**
- **OpenElect® Voting Central Scan (OVCS)**

Open<u>Elect</u> Central Suite (OCS)

The OCS System supports elections on the OVO, OVI-VC, FVT 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, FVT 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) -** The PC utilizes a Mini-ITX form factor motherboard and is configured with either a VIA C7 motherboard or an Intel Atom. Computer component (with a touch panel display) has Unisyn pre-installed server software (that manages data and communication) and Unisyn pre-installed 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 vote 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-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)** - The PC utilizes a Mini-ITX form factor motherboard and is configured with either a VIA C7 motherboard or an Intel

Atom. Computer component (with a touch panel display) has Unisyn pre-installed 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 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 FreedomVote Tablet (FVT)
The FVT is a tablet ballot marking device that enables voters to make their vote selections and to print their voted ballot. The FVT presents each contest on the ballot style to the voter in visual and/or audio formats. It facilitates special needs voters through a variety of methods including wheelchair access, sip and puff, zoom-in ballot function and audio assistance for the visually impaired. The voter with limited vision can navigate through the ballot using an audio ballot and the ADA keypad or touchscreen to input their selections. Once the ballot is printed, it is taken to the OVO to be cast. Each FVT can support multiple languages for both visual and audio ballots, allowing the voter to choose their preferred language.

The FVT consists of the following components:
- Tablet – The Android tablet has a 13.3 in. touchscreen and comes with pre-installed software that provides user interfaces for voting and maintenance. Election files generated by the EM are loaded manually via a USB. The election files will allow the jurisdiction to determine the FVT's mode such as early voting or training, sets passwords, parameters, audio, and ballot styles for that election.
- Barcode Reader - 2D USB Barcode reader will read the 2D barcodes produced by the EM such as the initialize barcode and administrative/maintenance barcodes. It will also read the 'populate' barcode produced by other qualified systems.
- USB Hub – A four port USB hub is installed in the FVT case to connect the printer, barcode scanner, and keypad to the tablet.
- Printer – 82.5 mm thermal receipt printer is connected to the Tablet to print BMD ballots and reports.
- Optional ADA Devices – 10-key keypad with Sip and Puff Interface, Headphones, Sip and Puff Device.

OpenElect Voting Central Scan (OVCS)

The OVCS units reside at election headquarters and are 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. Scanners used are the Canon DR-X10C and Canon M160 COTS scanners.

1.2 References

The following key documents were used in preparing this test plan.

1. Election Assistance Commission Voluntary Voting System Guidelines (EAC VVSG), 2005 Version 1.0 Volumes I and II.
2. NIST Handbook 150: 2016.
3. NIST Handbook 150-22: 2008.
4. EAC Voting System Testing and Certification Program Manual, United States Election Assistance Commission, v 2.0, May 2015
5. SLI VSTL Quality System Manual, Rev. 2.4, prepared by SLI, dated October 20th, 2017.

1.3 Terms and Abbreviations

The following terms and abbreviations will be used throughout this document:

Table 1 – Terms and Abbreviations

Term	Abbreviation	Description
American Association for Laboratory Accreditation	A2LA	A nonprofit, non-governmental, public service, membership society whose mission is to provide comprehensive services in laboratory accreditation and laboratory-related training.

Term	Abbreviation	Description
Ballot Marking Device	BMD	An accessible computer-based voting system that produces a marked ballot (usually paper) that is the result of voter interaction with visual or audio prompts.
Central Count Scanner	CCS	High Speed Optical Scanner is a mark sense-based ballot and vote counting device typically located at a central count facility and is operated by an automated multi-sheet feeding capability.
Compact Flash card	CF	This is a type of flash memory card in a standardized enclosure often used in voting systems to store ballot and/or vote results data.
Commercial Off the Shelf	COTS	Term used to designate computer software, hardware or accessories that are ready-made and available for sale, lease, or license to the general public
Direct Recording Electronic	DRE	Voting systems that, using Touch Screen or other user interfaces, directly record the voter's selections in each race or contest on the ballot in electronic form.
Election Assistance Commission	EAC	An independent, bipartisan commission created by the Help America Vote Act (HAVA) of 2002 that operates the federal government's voting system certification program.
Election Management System	EMS	Typically a database management system used to enter jurisdiction information (district, precincts, languages, etc.) as well as election specific information (races, candidates, voter groups (parties), etc.). In addition, the EMS is also used to layout the ballots, download the election data to the voting devices, upload the results and produce the final results reports.
Electromagnetic Compatibility	EMC	The goal of EMC is to validate the correct functioning of different equipment in the same environment and the avoidance of any interference effects between them.
Functional Configuration Audit	FCA	The testing activities associated with the functional testing of the system.
Institute of Electrical and Electronics Engineers	IEEE	A non-profit professional association for the advancement of technology.

Term	Abbreviation	Description
National Institute of Standards and Technology	NIST	A non-regulatory federal agency within the U.S. Dept. of Commerce. Its mission is to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life.
National Voluntary Laboratory Accreditation Program	NVLAP	A division of NIST that provides third-party accreditation to testing and calibration laboratories.
Physical Configuration Audit	PCA	The testing activities associated with the physical aspects of the system (hardware, documentation, builds, source code, etc.).
Precinct Count Scanner	PCS	A precinct-count optical scanner is a mark sense-based ballot and vote counting device located at a precinct and is typically operated by scanning one ballot at a time.
Request For Information	RFI	A means used by testing laboratories and manufacturers to request that the EAC provide an interpretation of a technical issue related to testing of voting systems.
Requirements Matrix	N/A	A matrix that traces the VVSG requirements to the various test modules and test methods.
Technical Data Package	TDP	The data package supplied by the vendor, which includes Functional Requirements, Specifications, End-user documentation, Procedures, System Overview, Configuration Management Plan, Quality Assurance Program, and manuals for each of the required hardware, software, firmware components of a voting system.
Voluntary Voting System Guidelines	VVSG	A set of specifications and requirements against which voting systems can be tested to determine if the systems provide all of the basic functionality, accessibility and security capabilities required for EAC certification.
Voter Verifiable Paper Audit Trail	VVPAT	An independent verification system for voting machines designed to allow voters to verify that their vote was cast correctly, to detect possible election fraud or malfunction, and to provide a means to audit the stored electronic results.
Voting System Test Lab	VSTL	An independent testing organization accredited by NVLAP and the EAC to conduct voting system testing for EAC certification.
Voting System Under Test	VSUT	The designation for a voting system that is currently being tested.

Term	Abbreviation	Description
Voting Test Specialist	VTS	An SLI employee within the Compliance division who has been qualified to perform EAC voting system certification testing.

1.4 Testing Responsibilities

The following project schedule contains owner assignments and identifies test procedure (module) development, test case (suite) development, 3rd party tests, and EAC and Manufacturer dependencies.

1.4.1 Project Schedule

The subsections below describe the project schedule.

1.4.1.1 Owner Assignments

- System Analysis and Review will be conducted by Source Code Review, Security and Voting Test Specialists, with oversight by the Test Manager
- Source code review will be conducted by Source Code Review Specialists, with oversight by the Test Manager
- Test Suite Development will be conducted by Voting Test Specialists, utilizing SLI's formal Test Methods, with oversight by the Test Manager
- Formal Test Execution will be conducted by Voting Test Specialists, with oversight by the Test Manager

1.4.1.2 Test Suite Development

Test Suites will be developed to help group and focus testing around key areas of the modification being implemented. The Test Suites will contain multiple test modules providing clear and traceable test scripts and information.

1.4.1.3 Formal Test Execution

Formal execution of the approved Test Suites and modules will be conducted to verify the system's compliance with the VVSG requirements.

1.4.1.4 EAC & Manufacturer Dependencies

The Test Plan will require EAC approval prior to finalization.

Unisyn will be required to provide all source code, documentation, equipment and supporting materials identified as part of the voting system.

The source code must have all discrepancies resolved, be able to be built successfully, installed, as well as successfully complete operational status checks prior to Formal Test Execution.

In addition, **Unisyn** is required to provide training on the voting system and support, as needed, throughout the life of the project.

1.5 Scope of Testing

The test engagement described in this Certification Test Plan utilizes only standard VSTL test methods that conform to the EAC Testing and Certification Program Manual and the identified voting system standard.

1.5.1 Modifications

An issue was found with the Tabulator application, when managing write-ins and needing to commit changes more than once. An algorithm being utilized was being applied inappropriately, after the first commit, causing subtraction operations to be applied to counts in summary reports, which resulted in incorrect values being reported.

The change incorporated utilizes the algorithm only when appropriate.
A fix for this issue is implemented in the release under review, and will be verified.

An issue was found that was manifested within the Auditor application, where the extracted barcode area, which is used to detect front and back barcodes on ballots, in one instance was insufficient for proper detection, which resulted in the images being transposed.

A change was incorporated to increase the size of the extracted barcode area, which will provide sufficient image area for proper detection of the front and back barcodes on the ballot.

1.5.2 Initial Assessment of Impact of the Modifications

Assessment of the impact of the modifications on the system indicates that the algorithm utilization modification is an isolated fix to the Tabulator application. The modification deals solely with how the Tabulator handles commits of work done within the Auditor application.

The increase of size of the extracted barcode area is an isolated fix to the Auditor application. The modification deals solely with how the Auditor front and back barcode is detected within the application.

1.5.3 Regression Testing

This section describes what system elements will be regression tested to establish assurance that the modifications have no adverse impact on the compliance, integrity or performance of the system.

The system will be regression tested to verify the fixes put in place for the handling of committing data, as well as for providing sufficient image area for proper detection of the front and back barcodes on the ballot.

1.5.4   EAC Interpretations – RFI

This Certification Test Plan and the execution of tests for the voting system identified in this plan do not include any additional EAC Requests For Information.

1.5.5   EAC Notices of Clarification

Additional EAC clarifications that affect the test plan and test methodology are as follows:

- No additional EAC Clarifications affect this test plan.

2   PRE-CERTIFICATION TESTING AND ISSUES

2.1 Evaluation of prior VSTL testing

SLI evaluated the published Final Test Report for the **OVS 2.0.A.2** voting system in order to baseline the current system under test.

VSTL testing performed for the State of Pennsylvania found an issue in how data was being committed in the **Auditor** application.

This issue is corrected in this release under review, and will be verified.

2.2 Evaluation of prior Non-VSTL testing

No prior non-VSTL testing of the OVS 2.0.A.2 modification was considered for this test campaign.

2.3 Known Field Issues

OVS 2.0.A.2 is a modification to a previously certified system and has not been fielded. The system version **OVS 2.0.A** has not been fielded either, and there are no known field issues reported at the time of this test plan creation, other than the issue described in "Evaluation of prior VSTL testing", above.

3 MATERIALS REQUIRED FOR TESTING

Any materials that are used in an election cycle must be provided to SLI to facilitate testing of the voting system. This section outlines these required materials.

3.1 Software/Firmware

All software and firmware that is to be used by the declared voting system, whether directly or indirectly, in a production environment, must be validated during the certification process.

The following software/firmware is required for the execution of hardware, software, telecommunications, and security tests. This includes all supporting software such as operating systems, compilers, assemblers, application software, firmware, any applications used for burning of media, transmission of data or creation/management of databases.

3.1.1 Manufacturer Software/Firmware

Table 2 – Unisyn OVS 2.0.A.2 Software/Firmware

Firmware/Software	Version
OVO	2.0.A
FVT – Tablet Voting Device	2.0.A
	2.0.A.1
OVI VC – 15' Screen	2.0.A
OVCS	2.0.A
Ballot Layout Manager(BLM)	2.0.A
Election Manager(EM)	2.0.A
Tabulator Client(TC)	2.0.A
Tabulator(Tab)	2.0.A.2
Tabulator Reports(TR)	2.0.A
Auditor	2.0.A.2
Common	2.0.A
Unisyn Security	2.0.A
Logger	2.0.A
Scripter	2.0.A
Validator	2.0.A

COTS Software/Firmware

The following tables provide details of the 2.0.A.2 system and its components.

OVS 2.0.A COTS Software Components

FVT, OVO and OVI-VC Device Software	Version
CentOS Linux (OVO and OVI-VC)	6.3
Java JRE + Unlimited Cryptographic Extension	1.6.0_02
Android OS (FVT)	4.4.4

OCS and OVCS COTS Software Components

OCS and OVCS Device Software	Version
CentOS Linux	6.5 and 6.8
Java JRE + Unlimited Cryptographic Extension	1.6.0_02
Apache-Tomcat Application Server	6.0.13
MySQL Database (BLM, EM, A, and Tab only)	5.0.45-7
JasperReports	2.0.5
OpenVPN	2.4.4
OpenSSL	1.0.1f
OpenSSL FIPS Object Module	2.0.10 (cert #1747)

COTS HARDWARE

The following tables provide details of the 2.0.A.2 system and its components.

Voting System COTS Hardware

Hardware	Make	Model
OVO		
Duplex Ballot Scanner		
Duplex Ballot Scanner	PDI Scan	Pagescan III
Scanner Power Adapter	eUrasia Power	uA36-1024
58 mm Thermal Printer		
58 mm Thermal Printer	Citizen Printer	CT-5281
Printer Power Adapter	Citizen Printer	28AD4
Computer		
Chassis	Morex	Morex 2699
Power Adapter	DC/DC converter	MX-0608F
Motherboard	Jetway	JNF9D-2550
Memory	SuperTalent - Onboard RAM	3120-21282
Hard Drive	Western Digital	WD5000AZLX
Adapter	EDAC	EA 10951c-120
1 Gb USB TM		

Innodisk	1 Gb USB	DEUA1-01G172AC1SB-B088
Delkin	1 Gb USB	SLC-MLC
Hardware	**Make**	**Model**
7" LCD Touchscreen Display		
7" LCD Touchscreen Display	Xenarc Technologies	700TSV
AC Power In Module		
AC Power In Module	Delta	Emi 10BEEG3G
OVI-VC		
Sip and Puff (Optional)		
Sip and Puff (Optional)	Origin Instruments	AirVoter
Headphone (Optional)		
Headphone (Optional)	Koss On-Ear Headphones	KPH5
15 in LCD Touchscreen Display		
15 in LCD Touchscreen Display	GVision	P15BX 2450-30120
82.5 mm Thermal Printer		
82.5 mm Thermal Printer	Star	TSP743IID-24, serial interface
Printer Adapter	Star	PS60A-24B 1
Computer		
Power Adapter Kit	DC-DC Converter	MX-0608F
Motherboard	Jetway	JNF9D-2550
Memory	SuperTalent - Onboard RAM	3120-21282
Hard Drive	Western Digital	WD5000AZLX
Adapter	EDAC	EA 10951c-120
1 Gb USB TM		
Innodisck	1 Gb USB	DEUA1-01G172AC1SB-B088
Delkin	1 Gb USB	SLC-MLC
AC Power In Module		
AC Power In Module	Delta	Emi 10BEEG3G
OVCS		
Large Volume Scanner		
Large Volume Scanner	Cannon	DR-X10C
Desktop Scanner		
Desktop Scanner	Cannon	DR-M160II
FVT		
13.3 in Touchscreen Tablet		
13.3 in Touchscreen Tablet	Android Tablet	GVision - T13
Tablets Battery Charger	Sager Power System	GC30B-4P1J
82.5 mm Thermal Printer		
82.5 mm Thermal Printer	Star	TSP743IIU-24
Printer Adapter	Lind 60W 24VDC	ST2425-626
Barcode Reader 1D,2D series		

Barcode Reader 1D,2D series	Newland	FM420
Hardware	**Make**	**Model**
USB Hub		
USB Hub	Tripp Lite	USB Hub
Hub Adapter	Meanwell	PSD-15A-05
1 Gb USB TM		
Innodisck	1 Gb USB	DEUA1-01G172AC1SB-B088
Delkin	1 Gb USB	SLC-MLC
Micro SD		
Micro SD	Innodisk Industrial	Micro SD 2.0
Battery		
Battery Pack 12 V 6.0 AH	Powers Sonic	PSH-1255-FR
Adapter	Mean Well	GC30B-4PIL
AC Power In Module		
AC Power In Module	Delta	Emi 10BEEG3G
Sip and Puff (Optional)		
Sip and Puff	Origin Instruments	AirVoter
Headphone (Optional)		
Headphone	Cyber Acoustics	ACM-70
USB to Ethernet RJ45 Adapter (Optional)		
USB to Ethernet RJ45 Adapter	D-Link	DUB-E100
UPS		
Minuteman Power Technologies	Para Systems, Inc.	Entrust

OVCS System COTS Software Components

OVS Hardware	**Version**
Desktop for non-redundant solutions	Dell OptiPlex
Desktop for redundant solutions	Dell Precision
Canon Scanner (OVCS)	Canon DR-X10C or DR-M160II
Laptop	Dell Latitude

3.2 Equipment

The following equipment is required for the execution of the hardware, software, telecommunications, and security tests. This includes system hardware, general purpose data processing and communications equipment, and any test instrumentation required.

3.2.1 Manufacturer Equipment

The following manufacturer equipment will be used in testing:

- 1 **OVO** precinct level optical scanner
- 1 **OVI-VC** ballot marking device
- 1 OVI -FVT ballot marking device
- 1 **OVCS** central scan system

3.2.2 COTS Equipment

The following Commercial Off-the-Shelf equipment will be used in testing:

- 1 EMS laptop
- 2 Transport Media thumb drives

3.2.3 Additional Supporting Test Equipment

No additional support equipment will be used in testing.

3.3 Test Materials

The following test materials are required for the performance of testing including, as applicable, test ballot layout and generation materials, test ballot sheets, test ballot cards and control cards, standard and optional output data report formats, and any other materials used in testing.

- Ballots
- Transport Media
- Ballot marking pens
- Printer paper rolls

3.4 Deliverable Materials

The following are documents to be delivered as a part of the **Unisyn OVS 2.0.A.2** system.

Document Number	Description	Version	Release
04-00427	Election Manager User Guide	1.1	2.0.A
04-00428	Ballot Layout Manager User Guide	1.2	2.0.A
04-00431	Tabulator Client User Guide	1.0	2.0.A
04-00432	Tabulator User Guide	1.0	2.0.A

04-00433	Tabulator Reports User Guide	1.1	2.0.A
04-00444	System Functionality Description	1.1	2.0.A
04-00445	Personnel Training and Deployment Requirements	1.0	2.0.A
04-00446	OVS System Overview	1.0	2.0.A.2
04-00447	System Security Specification	1.1	2.0.A
04-00448	Configuration Management Plan	1.0	2.0.A
04-00449	System Coding Standards	1.0	2.0.A
04-00453	System Test and Verification Plan	1.0	2.0.A
04-00454	Quality Assurance Plan	1.0	2.0.A
04-00458	System Hardware Specification	1.0	2.0.A
04-00459	System Maintenance Procedures	1.1	2.0.A
04-00460	Systems Operations Procedure: Warehouse Technician's Guide	1.1	2.0.A
04-00462	Election Day Troubleshooter's Guide	1.0	2.0.A
04-00463	Election Day Poll Worker's Guide	1.0	2.0.A.2
04-00464	Software Design and Specification	1.0	2.0.A
04-00469	Final Quality Assurance Report	1.0	2.0.A
04-00494	OVS Acronyms	1.0	2.0.A
04-00495	OVCS User Guide	1.0	2.0.A
04-00503	OVS Paper Specification	1.0	2.0.A
04-00512	Technical Data Package-Document List and Version Control	1.1	2.0.A
04-00530	Auditor Users Guide	1.0	2.0.A
04-00549	EOS Linux and OCS Installation Guide	1.2	2.0.A

3.5 Proprietary Data

No proprietary data is used in this certification project.

4 TEST SPECIFICATIONS

The following are the specifications for testing to be conducted on the **Unisyn OVS 2.0.A.2** system. The specifications contain details on the focus of testing, configuration(s), and the functions to be tested

4.1 Requirements

The **Unisyn OVS 2.0.A.2** will be tested to the pertinent 2005 VVSG requirements:

The algorithm utilization modification will be tested against the following requirements:

- 2.1.2.c Accuracy – Record each voter precisely as indicated by the voter and produce an accurate report of all votes cast
- 2.4.3.d Producing Reports – Produce a consolidated printed report of the results for each contest of all votes case that includes the votes cast for each selection, the count of undervotes and the count of overvotes.

The extracted barcode area modification, which is used to detect front and back barcodes on ballots, will be tested against the following requirement:

- 2.4.2 Consolidating Vote Data – All systems shall provide a means to consolidate vote data from all polling places, and optionally from other sources such as absentee ballots, provisional ballots, and voted ballots requiring human review (e.g., write-in votes)

4.2 Hardware Configuration and Design

The **Unisyn OVS 2.0.A.2** as declared in the application for certification submitted to the EAC, consists of:
- An EMS workstation.
- At the precinct level, optical scanners (OVO) and ballot marking devices (OVI-VC and FVT).
- The central count location employs high speed COTS scanners (DR-X10C and M160) OVCS for tabulation of absentee ballots.
- The consolidation, tally and reporting location employs a workstation as well as a printer.

4.3 Software System Functions

The **Unisyn OVS 2.0.A.2** system operations documentation was reviewed relative to the updates implemented in this modification. Based on this review, the applicable system functions have been identified for testing. The following key areas of voting system functionality were evaluated.

4.3.1 OVS Auditor

The **OVS Auditor** will be tested not only for the regression testing of the modifications implemented, as detailed in section 1.5.3 Regression Testing, but will also be examined continued system robustness, that no issues were introduced.

4.3.2 System-level Test Design

System level test suites will include the following:

- **General Election**

  This is a General election that will include N of M voting, partisan offices, non-partisan offices, straight party voting (Pennsylvania Straight Party Method), ballot formatting, precincts and districts, and precinct level voting on the OVI-VC, FVT, OVO and OVCS as well as tally and reporting functionality.

4.4 TDP Evaluation

SLI will complete an assessment of the deliveries of the Technical Data Package pertinent to the **Unisyn OVS 2.0.A.2** voting system modifications.

4.4.1 Document Review

SLI will conduct a PCA review of all vendor traced documents submitted for review in the delivery of the **Unisyn OVS 2.0.A.2** TDP. These include:

- System configuration overview
- User/system operations procedures
- System change notes

4.5 Source Code Review

4.5.1.1 Source Code Review

The certification campaign for the **Unisyn OVS 2.0.A.2** voting system includes software and firmware that have been created as proprietary to **Unisyn** as well as review of any commercial off the shelf products. SLI will conduct a source code review of all modified proprietary source code and modified COTS products submitted in the voting system TDP for compliance to the VVSG, version 2005, Volume 2, Section 6.6. The coding languages involved in the vendor's applications include:

- Java

Source Code Review Tools utilized by SLI include

- Module Finder: an SLI proprietary application used to parse module names from C/C++ and VB code and populate the identified module names into the review documents
- ExamDiff Pro: a commercial application used to compare revised code to previously reviewed code

Any subsequent re-reviews of source code will be the result of fixes to discrepancies identified in the Functional Configuration Audit activities.

4.6 Trusted Build

The Trusted Build will be conducted prior to SLI's official testing and will be completed on site at SLI's facility or a secure lab at the vendor's facility approved by SLI. SLI will use its approved standard lab procedure that details the processes for controlling, managing, and conducting the Trusted Build. This process includes the following:

- Preparation for the Trusted Build – SLI will obtain and review **Unisyn**'s procedure for constructing the build platform, verify the target build platform, and acquire and verify the necessary materials.

- Execution of the Trusted Build – SLI will perform the Trusted Build by using the step-by-step build procedure provided by **Unisyn** to create a pristine build environment. SLI records and ascertains the following items throughout the build process:

  - o Build environment and file hashes at various key points
  - o Build environment hardware characteristics
  - o Build results from code compilation and file hashes
  - o Final software install files and file hashes
  - o Build virtual machine files

- Deliverables to Testing – Upon completion of the Trusted Build, certain items are sent to the SLI test group. The final result will be media containing the following:

  - o Final software install files
  - o Hash values to validate install files

- Final Record Keeping and Archiving Procedures – At the conclusion of the Trusted Build process, SLI completes all final record keeping and archiving procedures at SLI's facility. This record keeping includes any unique identifiers, results of the build with version numbers and dates, and descriptions of all hashes and images in the repository.

4.7 Standard VSTL Test Methods and Uncertainty of Test Data Measurement

This test campaign utilizes Standard VSTL test methods and nominal type test data only.

5 TEST DATA

Test data for the **Unisyn OVS 2.0.A.2** voting system has been compiled such that all functionality pertinent to the modifications will be tested to determine conformance to the standards.

5.1 Data Recording

SLI has evaluated the system functionality, as described by manufacturer technical documentation, as well as requirements as listed in the EAC 2005 VVSG, and made determinations as to expected results of all data inputs into the **Unisyn OVS 2.0.A.2** voting system. This includes:

- Election type
- Voting variations employed, specifically straight party, utilizing the Pennsylvania Straight Party Method
- Votes cast for each candidate, as relevant to the Pennsylvania Straight Party Method

The data is contained in one master data record, including each input and each expected output. This data is incorporated into the appropriate test suite, populating test modules with exact expected data for the function being tested.

Testing information is recorded in the test suites, as well as in test notebooks, which are utilized according to SLI's standard lab procedure *SLP-VC-30 - Test Notebooks*.

5.2 Test Data Criteria

SLI has evaluated the system functionality as implemented for the Pennsylvania Straight Party Method, and made determinations as to expected output of all data inputs into the **Unisyn OVS 2.0.A.2** voting system, particularly for the OVI-VC and FVT ballot marking devices. Additionally, and pertinent to the modification of the A data matrix has been recorded into one master data record that couples data inputs to their expected output, as determined above. The system's execution shall be measured against the expected results.

TEST PROCEDURE AND CONDITIONS

This section describes the test conditions and procedures for execution of tests. If a particular sequence is mandatory for the execution of suites, a rationale will be given. Additionally, this section is used to describe procedures for setting up equipment that will be utilized in the execution of the test suites.

5.3 Facility Requirements

Testing will be performed on site at SLI in Colorado.

All TDP and test documentation is stored on site at SLI's facility in a secure project directory on SLI's secure Voting server.

5.4 Test Setup

All delivered **OVS 2.0.A.2** equipment will be set up as detailed in Unisyn documentation.

Operational Status Checks will be performed prior to test execution. Successful completion of operational status checks will indicate that the system is ready for test execution.

5.5 Test Operations Procedures

An inventory has been performed to verify the voting equipment received contains hardware and software elements as defined in the TDP prior to commencement of testing.

Throughout the testing effort, test suites and modules will be marked as follows:

- **Accept –** Test is accepted as successful.
- **Reject –** Test is rejected as unsuccessful.
- **NT –** Not Testable is used for test modules that cannot be completed. For example, if failure of one test modules failure precludes attempting subsequent test modules, the latter will be marked as NT.

Test results **Reject** and **NT** will include comments by the VTS explaining the reason for the result.

Issues encountered during review and testing will be documented on the Discrepancy Report. Test findings showing that an aspect of the voting system does not conform to the requirements of the identified test standard will be marked as **Documentation Discrepancies** or **Functional Discrepancies**.

Issues that are encountered during testing or documentation review but are not addressed by the applicable standard will be added to the Discrepancy report and

noted as **Informational**. The vendor has the option whether to address Informational issues. All responses provided by the vendor are noted in the Discrepancy Report attachment to the Certification Test Report.

6 Approval Signatures

SLI:

VSTL Director
October 22nd, 2018

End of Certification Test Plan