# wyle
## laboratories

# CERTIFICATION TEST PLAN
## EAC Application Number UNS1102

### Prepared for:

| Manufacturer Name | Unisyn Voting Solutions, Inc. |
|---|---|
| Manufacturer System | OpenElect Voting System |
| EAC Application No. | **UNS1102** |
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<u>APPENDICES</u>

## 1.0 INTRODUCTION

The purpose of this Test Plan is to document the procedures that Wyle will follow to perform certification testing of the Unisyn Voting Solutions, Inc., OpenElect Voting System (OVS), Version 1.1. The previous version of this system, Unisyn OVS, Version 1.0.1, has been fully tested to the EAC 2005 VVSG. As a result of this testing, Unisyn OVS Version 1.0.1 was granted certification under EAC Certification No. UNS10121966-OE-WI. Since that time, Unisyn Voting Solutions has incorporated modifications and hardware changes to the certified system, resulting in the release of the Unisyn OVS, Version 1.1. These modifications include enhancements to the Ballot Layout Manager, Tabulator, Election Manager, and OpenElect Voting Central Scan applications, as well as enhancements to the OVI and OVO Firmware, security enhancements, and the addition of the Adjudicator application to the OpenElect Central Suite. Unisyn has also introduced a 15" LCD touchscreen as an option for OpenElect Voting Interface (OVI) units. As a result of these modifications, regression testing is required.

The full system details for the previous test campaigns, including system, performance, security, telecommunication, usability, system verification, and TDP deliverables can be reviewed in the EAC test report "Unisyn Voting Solutions, Inc., OpenElect Voting System Version 1.0 VSTL Certification Test Report Revision B" and "Unisyn Voting Solutions, Inc., OpenElect Voting System Version 1.0.1 VSTL Certification Test Report Revision A", both of which are listed on the EAC website (www.eac.gov).

At test conclusion, the results of all testing performed as part of this test program will be submitted to the EAC in the form of a final report. All supplied equipment and software furnished to Wyle for this program, except for hardware from the initial certification test campaign, shall be returned to the customer at the conclusion of testing unless otherwise agreed in writing.

## 1.1 References

The list below includes all documents cited in the Test Plan and used in the development of the Test Plan. The documents listed shall be utilized to perform certification testing.

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

- Election Assistance Commission Testing and Certification Program Manual, Version 1.0, effective date January 1, 2007

- Election Assistance Commission Voting System Test laboratory Program Manual, Version 1.0, effective date July 2008

- 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

- Wyle Laboratories' Test Guidelines Documents: EMI-001A, "Wyle Laboratories' Test Guidelines for Performing Electromagnetic Interference (EMI) Testing", and EMI-002A, "Test Procedure for Testing and Documentation of Radiated and Conducted Emissions Performed on Commercial Products"

- Wyle Laboratories' Quality Assurance Program Manual, Revision 5

## 1.0    INTRODUCTION (CONTINUED)

### 1.1    References (continued)

- ANSI/NCSL Z540-1, "Calibration Laboratories and Measuring and Test Equipment, General Requirements"

- ISO 10012-1, "Quality Assurance Requirements for Measuring Equipment"

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

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

- EAC Quality Monitoring Program residing on:

  http://www.eac.gov/testing_and_certification/quality_monitoring_program.aspx

- Unisyn Voting Solutions, Inc., OpenElect Voting System Version 1.0 VSTL Certification Test Report Revision B (listed on www.eac.gov)

- Unisyn Voting Solutions, Inc., OpenElect Voting System Version 1.0.1 VSTL Certification Test Report Revision A (listed on www.eac.gov)

- Unisyn Voting Solutions, Inc., Open Elect Voting System Version 1.1 Technical Data Package

### 1.2    Terms and Abbreviations

Table 1-1 defines all terms and abbreviations applicable to the development of this Test Plan.

**Table 1-1 Terms and Abbreviations**

| Term | Abbreviation | Definition |
|---|---|---|
| Adjudicator | ADJ | Allows a jurisdiction to evaluate ballots with questionable markings and change them if need, in accordance with the perceived intent of the voter. |
| Americans with Disabilities Act of 1990 | ADA | ADA is a wide-ranging civil rights law that prohibits, under certain circumstances, discrimination based on disability. |
| Ballot Layout Manager | BLM | Unisyn OVS application used to layout ballot information. |
| Configuration Management | CM | --- |
| Commercial Off the Shelf | COTS | Commercial, readily available hardware or software. |
| Direct Record Electronic | DRE | --- |
| United States Election Assistance Commission | EAC | Commission created per the Help America Vote Act of 2002, assigned the responsibility for setting voting system standards and providing for the voluntary testing and certification of voting systems. |
| Election Manager | EM | Utilizes the election definition file from the Ballot Layout Manager, adds jurisdiction voting device specific options and produces the CD used to load the election onto the voting devices and OVCS. |
| Election Management System | EMS | Within the OpenElect system, the EMS equivalent is OCS. |
| Election Server | ES | A component of the OCS, the ES updates the system clock and downloads new Election data to the voting devices prior to each election, typically at the warehouse. |
| Equipment Under Test | EUT | --- |
| Functional Configuration Audit | FCA | Exhaustive verification of every system function and combination of functions cited in the manufacturer's documentation. |

## 1.0 INTRODUCTION (CONTINUED)

## 1.2 Terms and Abbreviations (continued)

### Table 1-1 Terms and Abbreviations (continued)

| Term | Abbreviation | Definition |
|---|---|---|
| Help America Vote Act | HAVA | Act created by United States Congress in 2002. |
| National Institute of Standards and Technology | NIST | Government organization created to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhances economic security and improves our quality of life. |
| OpenElect Central Suite | OCS | Set of applications supplied by Unisyn to run at the Election Headquarters to support elections on the OVO, OVI, and OVCS systems. Includes: Ballot Layout Manager, Election Manager, Election Server, Tabulator Client, Tabulator Server and Tabulator Reports. In addition, the OCS includes the Software Server (SS) system for updating and validating OVO and OVI (voting device) software. The Adjudicator application allows a Jurisdiction to review and change ballots based on perceived voter intent. |
| OpenElect Voting Central Scan | OVCS | A bulk scanner solution at the Central Site, used for casting provisional and mail-in ballots; can also be used to perform recounts. |
| OpenElect Voting Interface | OVI | Used as an ADA solution and early voting device. |
| OpenElect Voting Optical Scan | OVO | Scanning and tabulating voting device located at the precinct and used during early voting. |
| OpenElect Voting System | OVS | The Unisyn voting system submitted for certification testing. |
| Personal Computer | PC | Computer component of the OpenElect Voting System |
| Physical Configuration Audit | PCA | Review by accredited test laboratory to compare voting system components submitted for certification testing to the manufacturer's technical documentation, and confirmation the documentation meets national certification requirements. A witnessed build of the executable system is performed to ensure the certified release is built from tested components. |
| Quality Assurance | QA | --- |
| Software Server | SS | Updates and validates voting device client software. |
| Tabulator | TAB | The Tabulator receives and consolidates election results from the counted OVO and OVCS ballots that have been uploaded by the Tabulator Client (in the case of OVO results) and directly by the OVCS. The Tabulator stores the vote data in the database, provides a status for uploaded vote data and handles Rank Choice Voting functionality. |
| Tabulator Client | TC | Retrieves vote files from Transport Media devices and provides that data to the tabulator. |
| Technical Data Package | TDP | Manufacturer documentation related to the voting system required to be submitted as a precondition of certification testing. |
| Tabulator Reports | TR | Accesses data from the Tabulator database to generate the necessary unofficial and official reports. |
| Uninterruptible Power Supply | UPS | --- |
| Voluntary Voting System Guidelines | EAC 2005 VVSG | Published by the EAC, the third iteration of national level voting system standards. |
| Wyle Operating Procedure | WoP | Wyle Test Method or Test Procedure |

## 1.0    INTRODUCTION (CONTINUED)

### 1.3    Scope of Testing

This test campaign includes the following tests:

- Source code review in accordance with 2005 EAC VVSG.

- Technical Data Package review to ensure all modifications are documented as applicable.

- A limited Physical Configuration Audit (PCA) to baseline the modified system.

- Security test to verify that no security vulnerabilities are introduced by the modifications to the system or the addition of the Adjudicator application.

- Functional Configuration Audit of the new features and enhancements made to the voting system.

- All functionality performed by new or modified subsystems/modules.

- Volume and Stress test to verify that the system modifications do not impact the systems' ability to process large amounts of voting data or the accuracy of the system.

- EMI Testing of the 15-inch OVI touchscreen by performing the following EMI tests: Electromagnetic Radiation test, Electrostatic Discharge test, Electromagnetic Susceptibility test and the Conducted RF Immunity test.

- Usability and Accessibility test to verify that the 15-inch OVI screen conforms to Usability and Accessibility requirements.

### 1.3.1    Enhancements

Enhancements have been implemented in the Unisyn OVS Version 1.1. These include enhancements to individual applications or components, multiple components, and security enhancements. A partial list of these enhancements, and the respective components to which they apply, is provided below. A complete list of enhancements included in the Unisyn OVS Version 1.1 is included in Appendix A.

- Support for multi-page ballots – BLM

- Support for single sided ballots – BLM

- Adjustable candidate fonts – BLM

- Full page-width measures – BLM

- Sample ballot creation – BLM

- Multiple header configurations – BLM

- Write-In management – TAB

- Multi-Seat ranked choice voting – TAB

- Addition of screen calibration option – OVO and OVI

- On-Screen ballot alerts – OVO

- Archive old logs – OCS

## 1.0    INTRODUCTION (CONTINUED)

### 1.3    Scope of Testing (continued)

### 1.3.2    Hardware

Unisyn has incorporated various hardware changes into the previously certified versions of this system (versions 1.0 and 1.0.1). These changes are fully implemented in the current test campaign for version 1.1. These changes were submitted by Unisyn to Wyle for evaluation and are detailed in the following types of Unisyn documents: Engineering Change Orders (ECO's), Engineering Approval Changes (EAC's), an Initial Release (IR), and a Configuration File Approval Change (CFAC). Each modification was deemed by Wyle to be De Minimis and was accepted as such by the EAC. The changes include: new headphones, new Transport Media, an updated power supply due to labeling changes, two new RAM modules, and a 15-inch screen for use in OVI units, and a configuration file change made to enhance the system as well as qualifying alternative components for use in the OVO and OVI units. Additionally, Unisyn is certifying a new model of personal computer for the Election Management System. The introduction of the alternative RAM modules necessitates the performance of an Electromagnetic Radiation Analysis to determine what effect the hardware change has on the OVO unit's electronic signature.

These hardware updates and enhancements, along with the corresponding document number, are listed below.

EAC 1002 – The part number of an AC/DC Adapter used in the OVO units has been changed by the manufacturer. The part number of the Eurasia STD-2412P (RoHS/CEC) 30w Switching Power Adapter used in OVO units has been changed to UA30-1024 by the manufacturer.

EAC 1004 – The 24V DC Universal Power supply manufactured by Star Micronics has undergone some labeling changes to meet regulatory and safety standards. The first labeling change has resulted in a part number change from 30781751 to 30781752. The second labeling change has resulted in a part number change from 3078172 to 30781753.

The Koss KPH5 stereo headphones are being introduced as a replacement for the Sony MDR-210 LP headphones currently used with OVI units.

The Delkin Devices US01GISPP-XX000-D 1GB Industrial USB Flash Drive is being introduced as an alternative to the STEC SLUFD1GU2U 1GB Industrial USB Flash Drive currently used in OVO and OVI units.

Two alternative RAM memory modules are being introduced for use in OVO units. These memory modules are the Innodisk M2UK-1GPCQCH4-D 1GB RAM module and the Dataram DTM63323D 1GB RAM module.

EAC 1005 – The thermal head of the Star Micronics TSP700II thermal printer used in the OVI has been updated. This resulted in the manufacturer changing the part number of the thermal head from 37469060 to 37469061. The cutter unit of the TSP700II was also updated. This resulted in the manufacturer changing the part number of the cutter unit from 37970000 to 37981240.

EAC 1006 – The cutter unit of the Star Micronics TSP700II thermal printer used in the OVI has been updated. This resulted in the manufacturer changing the part number of the cutter unit from 37981240 to 37981241.

## 1.0    INTRODUCTION (CONTINUED)

### 1.3    Scope of Testing (continued)

### 1.3.2    Hardware (continued)

EAC 1007 – The STEC SLUFD1GU2TU 1GB Industrial USB Flash Drive and the Delkin Devices UV0GSAXSY-XN000-D 1GB Industrial USB Flash Drive are being introduced as alternatives to the STEC SLUFD1GU2U 1GB Industrial USB Flash Drive currently used in OVO and OVI units.

EAC 1008 – The Seasonic SSA-0901-12 Universal AC Power Adapter is being introduced as an alternative to the MGP F10903-C Universal AC Power Adapter used to power the PC and Display in OVO and OVI units.

EAC 1009 – The Western Digital WD3200AAKX 320GB SATA hard drive is being introduced as an alternative to the Western Digital WD3200AAJS 320GB SATA hard drive currently used in OVO and OVI units.

ECO 16865 – This ECO adds the EAC Certification Label to the build of materials (BOM) for both the OVO and the OVI.  The Shipping Carton has also been added to the build of materials (BOM) of the OVO.

ECO 16869 – The Jetway J7F2WE1G5S-OC-LF 1.5GHz motherboard and processor previously introduced for use in the OVO may now be used in the OVI as well.

ECO 16870 – This ECO includes changes to the OVO scanner mounting plate to improve clearances and remedy a mismatched hole, changes in the clearance hole for the RJ-45 connector, improvements to the dimensions for the lock cam, and a change to the labeling of the LCD Touchscreen.

ECO 16871 – Spacers located between the OVI motherboard and the OVI PC Case have been removed.

IR 00515 – The OVI PC box was changed to accommodate the motherboard connector faceplate, as the PC box cutout did not correctly align with the connector faceplate.  This change accompanies ECO 16871 listed above.

CFAC 1001 – The xorg.conf configuration file has been edited to simulate the generic Linux video driver (VESA) and force a screen resolution of 800x600.

### 1.3.3    Adjudicator Application

The Adjudicator application is a new component of the OCS suite of applications.  It provides jurisdictions with the ability to access ballot images and data so that ballots with erroneous or questionable marks can be evaluated, and if needed, change marks on the ballot in accordance with perceived voter intent.  Any changes made will be reflected in election reports.  The addition of the Adjudicator application requires functional and system level testing to verify functionality and integration of the Adjudicator application with the other components of the OVS.

## 1.0 INTRODUCTION (CONTINUED)

### 1.4 Testing Responsibilities

Prior to the development of this test plan, Wyle evaluated test results from previous test campaigns performed by EAC accredited VSTL's as well as test cases and results of any developmental testing conducted by Unisyn during the pre-certification process that were provided by Unisyn in their TDP. The purpose of this evaluation was to determine the scope of testing required for system certification.

Following the review, Wyle determined that testing from previous test campaigns could be utilized to satisfy many requirements of this test campaign. All other core and non-core software and hardware certification testing will be conducted under the guidance of Wyle by personnel verified by Wyle to be qualified to perform the testing.

Review of test cases and results of developmental testing conducted by Unisyn during the pre-certification process also allowed for assessment of Unisyn's efforts to develop and test the system and to correct any known defects.

### 1.4.1 Project Schedule/Owner Assignments/Dependencies

This information is contained in a Wyle-generated Microsoft Project schedule, presented in Appendix C. The dates on the schedule are not firm dates but planned estimates presented for informational purposes.

### 1.4.2 Test Case Development

Wyle will utilize the "Wyle Baseline Test Cases" for the Functional Configuration Audit (FCA), Usability and System Integration Tests. These will be augmented with specially designed test cases tailored to the Unisyn OVS Version 1.1. Wyle has designed specific election definitions for the Operational Status Check and the Logic & Accuracy Tests. The initial "Baseline" functional test cases, "Baseline" usability test cases, and the election definitions will be provided under separate cover.

### 1.4.2.1 Test Procedure Development and Validation

Wyle will utilize the Wyle Operating Procedures (WoPs) during the duration of this test program. These procedures are validated and are being submitted as part of the test plan package.

### 1.5 Target of Evaluation Description

The following sections address the design methodology and product description of the Unisyn OVS Version 1.1, as taken from the Unisyn technical documentation.

### 1.5.1 System Overview

The Unisyn OVS Version 1.1 consists of:

- OpenElect Central suite (OCS): System with 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 OVO and OVI (voting device) software.

## 1.0 INTRODUCTION (CONTINUED)

## 1.5 Target of Evaluation Description (continued)

## 1.5.1 System Overview (continued)

- OpenElect Voting Optical (OVO): A full-page dual-sided optical scan system that scans and validates voter ballot pages and provides a summary of all ballot pages cast. The OVO consists of a Personal Computer (PC), transport media, Ballot Reader, printer, and uninterruptible power supply (UPS).

- OpenElect Voting Interface (OVI): A voter interface that supports both AA and Early Voting Requirements. Voters input selections via the ADA keypad, touchscreen or Sip & Puff device. The OVI consists of a Personal Computer (PC), transport media, printer, and uninterruptible power supply (UPS).

- OpenElect Voting Central Scan (OVCS): Scanner that resides 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 consists of a Personal Computer (PC) Desktop and a COTS Cannon DR-X10C scanner.
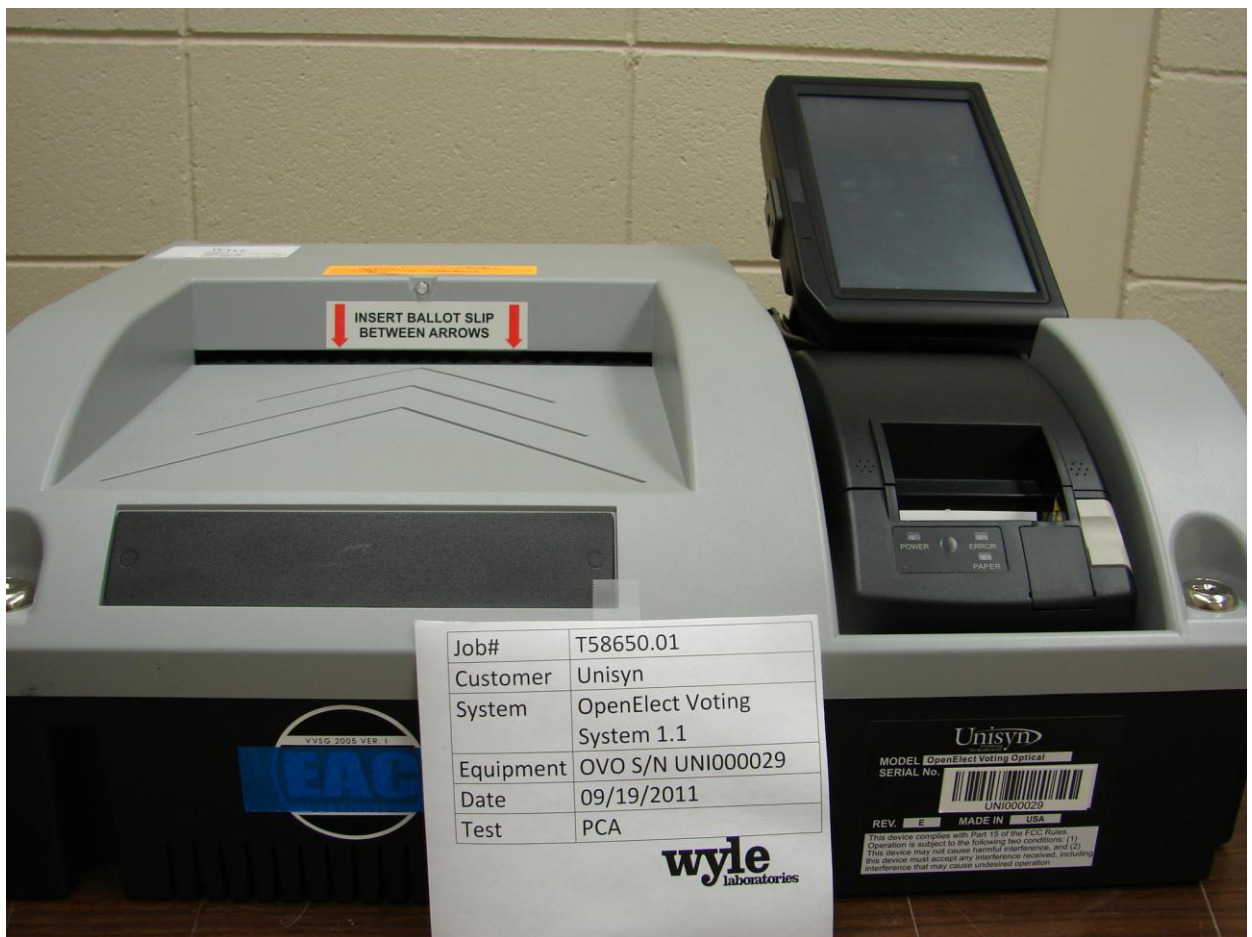


**Photograph 1: OVO**

## 1.0     INTRODUCTION (CONTINUED)

## 1.5     Target of Evaluation Description (continued)

## 1.5.1   System Overview (continued)



**Photograph 2: OVI**

## 1.0 INTRODUCTION (CONTINUED)

## 1.5 Target of Evaluation Description (continued)

## 1.5.1 System Overview (continued)



**Pre-Voting**

**Ballot Layout Manager**
Define Election and
Produce Ballots

**Election Manager**
Set Election Options
and Create Election File

Election CD

**Election Server**

OVI

OVO          OVO

Election Loaded on Voting
Devices via Secure Network

**Voting**

**OVO**
Scans Ballot
Pages and
Records Votes
at Precinct

**OVI**
Voting device that
provides printed Voter
Assisted Ballots using
a variety of Input
devices:
Touchscreen, Keypad,
Sip and Puff

**Post-Voting**

**Transport Media:**
Remove after
voting and
returned to
Central Count

**OVO**

**Tabulator Client**
Insert Transport
Media to Upload
Vote Files to Central
Database

**OVCS**
Bulk Scanner used
for Mail-In-Ballots,
Provisional Ballots,
and Recounts

Election CD

**Tabulator Reports**
Report Consolidated
Results

Election CD

Switch/Hub

**Tabulator and Database**
Track Uploads and
Consolidated Results

**ADJUDICATOR**
Evaluate and Change
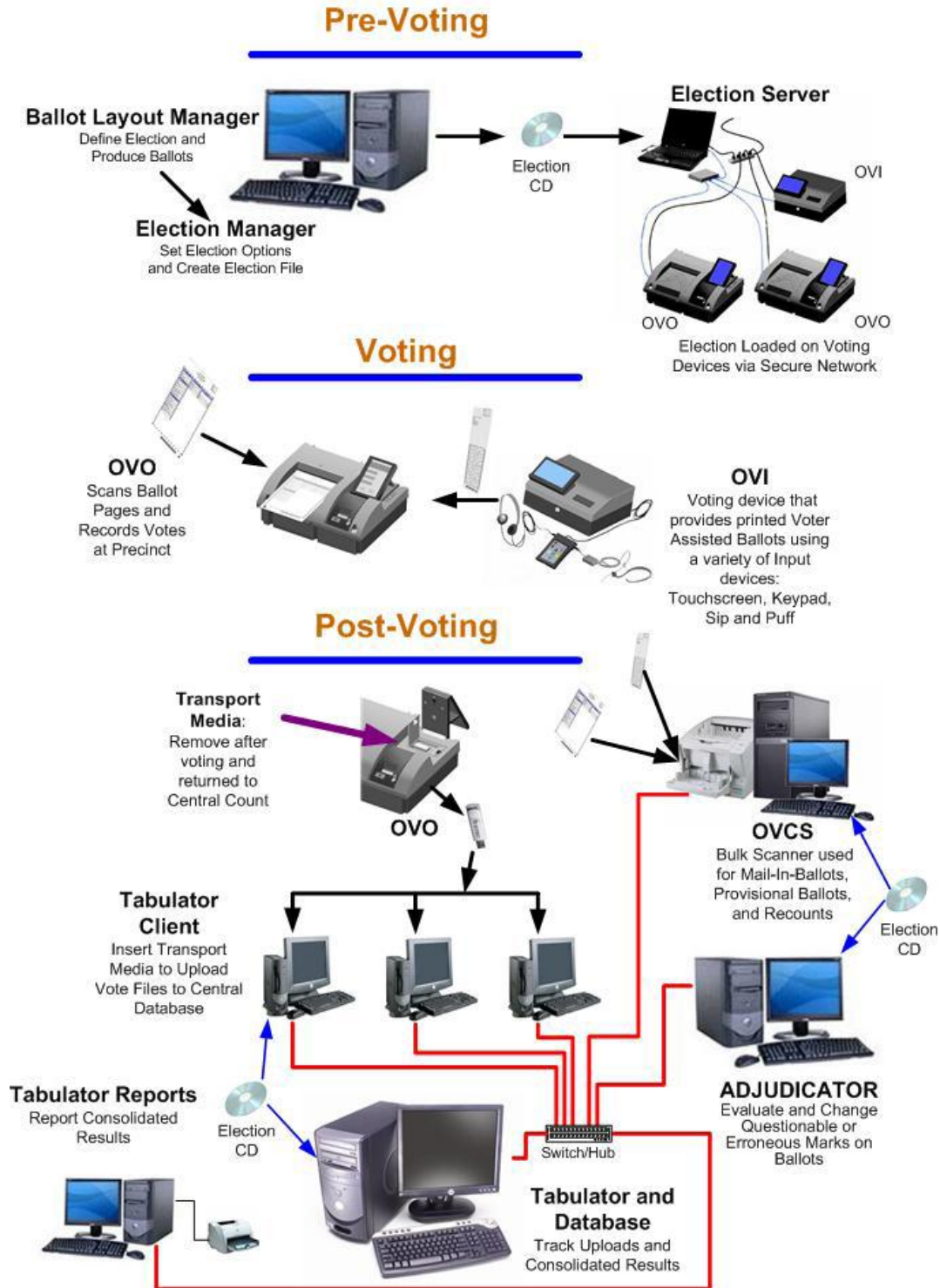Questionable or
Erroneous Marks on
Ballots

**Figure 1-1 System Diagram**

## 1.0    INTRODUCTION (CONTINUED)

### 1.5    Target of Evaluation Description (continued)

### 1.5.2    System Limits

The system does not include functions for:

- Voter registration (other than uploading Voter Registration data to Tabulation for reporting purposes)
- Cumulative voting
- Slate party voting
- Open blanket primary
- Multi-party candidate endorsements
- Open primary multi-party ballots

In the end-to-end OVS, a single election is limited to:

- Up to 12 political parties (including non-partisan) voting their own ballot in a Primary Election and up to 12 political parties (including non-partisan) voting in a General Straight Ticket Election.  A total of 24 parties may appear on the ballot for candidates.
- Up to 2,000 precincts
- Up to 120 candidates per contest, with a limit of 3,000 combined count of candidates and contests
- Up to 10 language translations
- Up to 3 ballot pages per ballot
- Up to 5,000 ballot pages processed (cast votes) at an OVO during a single voting session

### 1.5.3    Supported Functionality

The system is designed to support the following voting variations:

- General elections
- Closed primaries
- Open primaries
- Early voting
- Primary presidential delegation nominations
- Decline to State primary voting
- Partisan offices
- Non-partisan offices
- Write-in voting
- Straight ticket voting
- Presidential-only voting

## 1.0 INTRODUCTION (CONTINUED)

### 1.5 Target of Evaluation Description (continued)

### 1.5.3 Supported Functionality (continued)

- Ballot rotation

- Split precincts

- Multi-page ballots

- Multiple selection contests: vote for N of M

- Procedures for and tabulation of Provisional or challenged ballots

- Procedures for and tabulation of Absentee ballots

- Recount tabulation

- Ranked Choice Voting (RCV)

- Vote by Ballot Style

The system accounts for:

- Checking and notification of overvote and undervote conditions

- Ballots in multiple languages

- Ballots consisting of multiple ballot pages

## 2.0 PRE-CERTIFICATION TESTING AND ISSUES

Currently, no pre-certification testing has been completed. Per EAC Notice of Clarification (NOC) 09-001, Wyle views the Certification Test Plan as a living document. It will be updated with "As Run" testing and resubmitted to the EAC as major areas of testing have been completed.

Wyle has performed the first pass review for all source code submitted by Unisyn for the OVS Version 1.1 System. The issues with compliance to the EAC 2005 VVSG were reported back to Unisyn for resolution. Subsequent submissions will be reviewed by comparing the new submission against the last submission to ensure all documented issues are resolved before the source code review is completed.

An initial Technical Data Package (TDP) review has been performed on the modified documents contained in the submitted TDP to determine compliance with the EAC 2005 VVSG and EAC requirements. The results of this review were reported to Unisyn for resolution. Any incidences of non-certification issues (editing issues such as spelling or formatting) will be noted to Unisyn as informational comments for them to decide whether to address them.

### 2.1 Evaluation of Prior VSTL Testing

The previous version of this system, Unisyn OVS Version 1.0.1, has been fully tested to the EAC 2005 VVSG. As a result of this testing, Unisyn OVS Version 1.0.1 was granted certification under EAC Certification No. UNS10121966-OE-WI. The data collected during that test campaign will be utilized to satisfy requirements for this test campaign.

## 3.0 MATERIALS REQUIRED FOR TESTING

The materials required for certification testing of the Unisyn OVS, Version 1.1, which include software, hardware, test materials, and deliverable materials, were shipped directly to Wyle by Unisyn with the exception of the OVCS high speed scanner which was shipped to Wyle by VisionShape, Inc. Some of the equipment to be used during this test effort is the same equipment used during the original certification campaign performed by Wyle.

## 3.1 Software

The table below lists the software the manufacturer must submit for testing. This section lists all software required for operation and testing of the voting system being certified. This includes software used for testing telecommunications, security and system integration; as well as supporting software required for the test environment including compilers, assemblers, and database managers, etc. Both COTS and non-COTS software components are listed in this section.

**Table 3-1 Software Submitted for Testing**

| Software Required For Testing | Software Version |
|---|---|
| **Proprietary Software** | |
| Adjudicator | 1.1.0 |
| Ballot Layout Manager | 1.1.0 |
| Common (Library) | 1.1.0 |
| Election Manager | 1.1.0 |
| Election Server | 1.1.0 |
| OCS Installer | 1.1.0 |
| Regkey Builder | 1.1.0 |
| Software Server | 1.1.0 |
| Tabulator | 1.1.0 |
| Tabulator Client | 1.1.0 |
| Tabulator Reports | 1.1.0 |
| OVCS Application | 1.1.0 |
| OVI Firmware | 1.1.0 |
| OVO Firmware | 1.1.0 |
| Scripter | 1.1.0 |
| Validator | 1.1.0 |
| Logger (Library) | 1.1.0 |
| **COTS Software** | |
| CentOS Linux | 5.6 |
| Java JRE + Unlimited Cryptographic Extension | 1.6.0_02 |
| Apache-Tomcat Application Server | 6.0.13 |
| My SQL Data base (BLM, EM, and Tab only) | 5.0.45-7 |
| JasperReports | 2.0.5 |

## 3.0 MATERIALS REQUIRED FOR TESTING (CONTINUED)

### 3.2 Equipment

The equipment the manufacturer submitted for testing listed in Table 3-2. Each test element is included in the list of the equipment required for testing of that element, including system hardware, general purpose data processing and communications equipment, and any required test instrumentation.

Every effort is made to verify that the COTS equipment has not been modified for use. Wyle will perform research using the COTS equipment manufacturers' websites based on the serial and service tag numbers for each piece of equipment and will evaluate COTS hardware, system software and communications components for proven performance in commercial applications other than elections. For PCs, laptops, and servers, the service tag information is compared to the system information found on each machine. Physical external and internal examination is also performed to the best of Wyle's abilities when the equipment is easily accessible without the possibility of damage. Hard drives, RAM memory, and other components are examined to verify that the components match the information found on the COTS equipment manufacturers' websites.

**Table 3-2 Test Equipment**

| Equipment | Description | Serial Numbers |
|---|---|---|
| **Proprietary Hardware** | | |
| OVO 1 | Model: OpenElect Voting Optical, Rev. E Firmware Version 1.1.0 | UNI000036 |
| OVO 2 | Model: OpenElect Voting Optical, Rev. E Firmware Version 1.1.0 | UNI000029 |
| OVO 3 | Model: OpenElect Voting Optical, Rev. E Firmware Version 1.1.0 | UNI000044 |
| OVI 1 | Model: OpenElect Voting Interface, Rev. F Firmware Version 1.1.0 | UNI150037 |
| OVI 2 | Model: OpenElect Voting Interface, Rev. F Firmware Version 1.1.0 | UNI150049 |
| **COTS Hardware** | | |
| EMS PC | Dell Precision T3500 (with all EMS applications installed) | 3Y20ZQ1 |
| OVCS High Speed Scanner | Canon ImageFormula DR-X10C | ED300631 |
| UPS | Minuteman Entrust Series ETR1500 | AE580906PA114 |
| Headphones | Koss KPH5 Stereo Headphones | HP-T58650-001, HP-T58650-002 |
| Transport Media | STEC SLUFD1GU2U 1GB USB Drive | TM100100, TM100125, TM100132, TM100141 |
| Transport Media (ECO) | STEC SLUFD4GU2TU 4GB USB Drive | TM100156, TM100157 |
| Gigabit LAN Switch | Linksys SR2024 Business Series 24-Port 10/100/1000 Gigabit Switch | REM30H600558 GGR1807 JJ |

**3.0    MATERIALS REQUIRED FOR TESTING (CONTINUED)**

**3.3    Test Tools/Material**

This subsection enumerates any and all test materials needed to perform voting system testing.  The scope of testing determines the quantity of a specific material required.

**Table 3-3 Test Materials**

| Test Material | Quantity |
|---|---|
| Software tools (i.e. ExamDiff Pro for source code analysis) | as required |
| Elections | as required |
| Miscellaneous Office equipment and supplies (such as report paper) | as required |
| Printer Thermal Paper Rolls | as required |
| External DVD-ROM Drive | 1 |
| Printed Ballots | as required |
| Dell E1911F LCD Monitor | 1 |

**3.4    Deliverable Materials**

The materials listed below are to be delivered as part of the Unisyn OVS Version 1.1 to the end users:

**Table 3-4 Deliverable Materials**

| Deliverable Material | Version | Description |
|---|---|---|
| OCS | 1.1 | EMS software suite |
| OVO | 1.1 | Precinct ballot scanner |
| OVI | 1.1 | Accessible voting station |
| OVCS | 1.1 | Central Count scanner |
| Ballot Box | | OVO ballot receptacle |
| Transport media | Delkin 1 GB | USB Flash Drive X 2 |
| Minuteman UPS | ETR1500 | UPS X 2 |
| Headphones (optional) | Koss KPH5 | Stereo headphones |
| Sip and Puff (optional) | AirVoter | Binary input device |
| 04_00446 System Overview.doc | | TDP Document |
| 04-00459 System Maintenance Procedures | | TDP Document |
| 04-00454 Quality Assurance Plan | | TDP Document |
| 04-00494 OVS Acronyms | | TDP Document |
| 04-00428 Ballot Layout Manager User Guide | | TDP Document |
| 04-00427 Election Manager User Guide | | TDP Document |
| 04-00429 Election Server User Guide | | TDP Document |
| 04-00430 Software Server User Guide | | TDP Document |
| 04-00431 Tabulator Client User Guide | | TDP Document |
| 04-00432 Tabulator User Guide | | TDP Document |
| 04-00433 Tabulator Reports User Guide | | TDP Document |
| 04-00495 OVCS User Guide | | TDP Document |

## 3.0 MATERIALS REQUIRED FOR TESTING (CONTINUED)

### 3.4 Deliverable Materials (continued)

**Table 3-4 Deliverable Materials (continued)**

| Deliverable Material | Version | Description |
|---|---|---|
| 04_00460 OVS System Operations Guide Warehouse Technician's Guide | | TDP Document |
| 04_00461 OVS System Operations Guide EDay Operators | | TDP Document |
| 04_00462 OVS System Operations Guide EDay Troubleshooters | | TDP Document |
| 04_00463 OVS System Operations Guide EDay Pollworkers | | TDP Document |
| 04-00503 OVS Paper Specification | | TDP Document |

### 3.5 Proprietary Data

All proprietary data that is marked shall be distributed only to those persons that the manufacturer identifies as needing the information to conduct system testing. The manufacturer is required to mark all proprietary documents as such. All organizations and individuals receiving proprietary documents shall ensure those documents are not available to non-authorized persons.

### 4.0 TEST SPECIFICATIONS

Certification testing of the Unisyn OVS Version 1.1 is the configuration submitted in the EAC application UNS1102. Wyle qualified personnel will ensure that all certification testing performed on the manufacturer's voting system follows Wyle's procedures for testing and the specific test cases to ensure the requirements of the EAC 2005 VVSG and EAC Testing and Certification Program Manual are met. Below is a list of EAC Request for Interpretations (RFI) and Notice of Clarifications (NOC) that will be incorporated in the test campaign:

Interpretations

2010-08 EAC Decision on Calling Sequence

2010-07 EAC Decision on Module Length

2010-06 EAC Decision on DRE Accessibility Requirements and Other Accessible Voting Stations

2010-05 EAC Decision on Testing of Modifications to a Certified System

2010-04 EAC Decision on Functional Requirements with Respect to Security

2010-03 EAC Decision on Database Coding Conventions

2010-01 EAC Decision on Voltage Levels and ESD Test

2009-06 EAC Decision on Temperature and Power Variation

2009-05 EAC Decision on T-Coil Requirements

2009-04 EAC Decision on Audit Log Events

2009-03 EAC Decision on Battery Backup for Central Count Systems

**4.0     TEST SPECIFICATIONS (CONTINUED)**

Interpretations (continued)

2009-02 EAC Decision on Alternate Languages

2009-01 EAC Decision on VVPAT Accessibility New

2008-12 EAC Decision on Ballot Marking Device/Scope of Testing

2008-10 EAC Decision on Electrical Fast Transient

2008-09 EAC Decision on Safety Testing

2008-08 EAC Decision on Automatic Bar Code Readers

2008-07 EAC Decision on Zero Count to Start Election

2008-06 EAC Decision on Battery Backup for Central Count

2008-05 EAC Decision on Durability

2008-04 EAC Decision on Supported Languages

2008-03 EAC Decision on OS Configuration

2008-02 EAC Decision on Battery Backup for Optical Scan Voting Machines

2008-01 EAC Decision on Temperature and Power Variation

2007-06 EAC Decision on Recording and Reporting Undervotes

2007-05 EAC Decision on Testing Focus and Applicability

2007-04 EAC Decision on Presentation of Alternative Language

2007-03 EAC Decision on Summative Usability Testing

2007-02 EAC Decision on Variable Names

2007-01 EAC Decision on Accessible Design

## **Notice of Clarifications**

NOC 09-005 – Development and Submission of Test Plans for Modifications to EAC Certified Systems

NOC 09-004 – Development and Submission of Test Reports

NOC 09-003 – De Minimis Change Determination Requirement

NOC 09-002 -- Laboratory Independence Requirement

NOC 09-001 -- Requirements for Test Lab Development and Submission of Test Plans

NOC 08-003 -- EAC Conformance Testing Requirements

NOC 08-002 -- EAC Mark of Certification

NOC 08-001 -- Validity of Prior Non-core Hardware Environmental and EMC Testing

NOC 07-005 -- Voting System Test Laboratory Responsibilities in the Management and Oversight of Third Party Testing

NOC 07-004 -- Voting System Manufacturing Facilities

## 4.0    TEST SPECIFICATIONS (CONTINUED)

**Notice of Clarifications (continued)**

NOC 07-003 -- State Testing Done in Conjunction with Federal Testing within the EAC Program

NOC 07-002 -- VSTL Work with Manufacturers Outside of Voting System Certification Engagements

NOC 07-001 -- Timely Submission of Certification Application

### 4.1    Requirements

The strategy for evaluating the Unisyn OVS, Version 1.1, will be to review the change log, source changes, and the Technical Data Package (TDP).  Wyle Laboratories will assess whether or not any additional functionality was added to the modified system that would add additional requirements that were not tested in the previous test campaign.

Wyle has determined that the software changes affect the following requirements in the 2005 VVSG Volume 1:  Section 2.4.2; Section 2.4.3 a, c, d, f – h, & j; Section 4.1.5.1 c, d i - iv; Section 5.4.4 b & d and Volume 2:  Section 4.7.1.1.  Regression testing of the software to these requirements will be part of this test campaign.

As defined in the scope of testing, this test campaign includes the following tests:

- Source code review in accordance with 2005 EAC VVSG.

- Technical Data Package review to ensure all modifications are documented as applicable.

- A limited Physical Configuration Audit (PCA) to baseline the modified system.

- Security test to verify that no security vulnerabilities are introduced by the modifications to the system or the addition of the Adjudicator application.

- Functional Configuration Audit of the new features and enhancements made to the voting system.

- All functionality performed by new or modified subsystems/modules.

- Volume and Stress test to verify that the system modifications do not impact the systems' ability to process large amounts of voting data or the accuracy of the system.

- EMI Testing of the 15-inch OVI touchscreen by performing the following EMI tests: Electromagnetic Radiation test, Electrostatic Discharge test, Electromagnetic Susceptibility test and the Conducted RF Immunity test.

- Usability and Accessibility test to verify that the 15-inch OVI screen conforms to Usability and Accessibility requirements.

Wyle personnel shall maintain a test log of the procedure(s) employed.  This log identifies the system and equipment by model and serial number. In the event that the project engineer deems it necessary to deviate from requirements pertaining to the test environment, the equipment arrangement and method of operation, the specified test procedure, or the provision of test instrumentation and facilities, the deviation shall be recorded in the test log.  (A discussion of the reasons for the deviation and the effect of the deviation on the validity of the test procedure shall also be provided and approved.)

**4.0     TEST SPECIFICATIONS (CONTINUED)**

**4.1     Requirements (continued)**

The designated Wyle Operating Procedures (WoP's) for this program are listed below together with the identification and a brief description of the hardware and software to be tested and any special considerations that affect the test design and procedure.

- WoP 1 Operations Status Checks

- WoP 2 Receipt Inspection

- WoP 3 Technical Data Package Review

- WoP 4 Test Plan Preparation– Unisyn OpenElect Voting System Version 1.1 *(This document)*

- WoP 5a Source Code Compliance Review

- WoP 5d Source Code COTS Review

- WoP 5e Automated Source Code Review

- WoP 6 Security

- WoP 6a Security

- WoP 6c Security (Software)

- WoP 6d Security (Access)

- WoP 7 Trusted Build

- WoP 7a Trusted Build Form

- WoP 7b Compliance Build

- WoP 7c Compliance Build Form

- WoP 9 Electromagnetic Emissions

- WoP 10 Electrostatic Disruption

- WoP 11 Electromagnetic Susceptibility

- WoP 14 Conducted RF Immunity

- WoP 17 Hardware Testing – Vibration Test

- WoP 24-1 Usability

- WoP 24-1a Usability-Usability Testing

- WoP 24-1b Usability-Functional Capabilities

- WoP 24-1c Usability-Alternative Languages

- WoP 24-1d Usability-Cognitive Issues

- WoP 24-1e Usability-Perceptual Issues

- WoP 24-1f Usability-Interaction Issues

- WoP 24-1g Usability-Privacy

- WoP 24-2 Accessibility

## 4.0    TEST SPECIFICATIONS (CONTINUED)

### 4.1    Requirements (continued)

- WoP 24-2a Accessibility-General

- WoP 24-2b Accessibility-Vision

- WoP 24-2c Accessibility-Dexterity

- WoP 24-2d Accessibility-Mobility

- WoP 24-2e Accessibility-Hearing

- WoP 24-2f Accessibility-Speech

- WoP 24-2g Accessibility-English Proficiency

- WoP 24-2h Accessibility-Cognition

- WoP 25 Physical Configuration Audit

- WoP 26 Functional Configuration Audit

- WoP 30 System Level Test

- WoP 34 Test Report

- WoP 40 System Level Stress and Volume Test

For the Functional Configuration Audit (FCA) and the Volume and Stress Test, the EMS version 1.1 will be loaded on the COTS desktop computer with a COTS scanner attached to the EMS. The OVO will be configured with firmware version 1.1. Three OVO units will be used during system level testing. The OVI shall be configured with firmware version 1.1. Two OVI units will be used during system level testing. For hardware testing including EMI and Vibration tests, a single OVI unit will be used.

### 4.2    Hardware Configuration and Design

The submitted hardware changes for this test campaign are documented in Section 1.3. Wyle Laboratories has conducted an engineering analysis of the system performance characteristics in accordance with Volume II, Appendix A, Section 4.3.1 of the 2005 VVSG and determined that the best approach to verifying that the proposed alternative RAM memory modules are electronically and mechanically interchangeable with the existing RAM module is to perform an Electromagnetic Radiation Analysis and compare the electronic signatures of a baseline OVO, versus the electronic signatures of an OVO with each new memory module installed.

Hardware testing of the 15-inch OVI touchscreen will consist of four operational EMI tests and one non-operational hardware test in addition to those already outlined in this test plan. These tests are: Electromagnetic Radiation, Electrostatic Disruption, Electromagnetic Susceptibility, and Conducted RF Immunity. Due to the addition of the monitor bracket and structural changes to the OVI, a Vibration test will be performed. Wyle Laboratories views this analysis as the minimum hardware testing that needs to be performed. Based on the data collected in these tests further testing maybe required. Wyle Laboratories shall analyze the data collected to determine if further testing is required. If further testing is required this test plan shall be updated as needed.

## 4.0   TEST SPECIFICATIONS (CONTINUED)

### 4.3   Software System Functions

For this test campaign Wyle will be using automated tools, as well as a 10% manual review of changed headers, to review the source code of the Unisyn OVS 1.1. The automated tool that will be used is the Eclipse Integrated Development Environment (IDE) running the source code analyzer plug-in Checkstyle, with all JavaDocs coding standards turned on. The manufacturer submitted Java Coding Conventions published industry-accepted documentation (per RFI 2010-02 -- EAC Decision on Coding Conventions) will be evaluated for all existing requirements contained therein. The automated tool will be evaluated as to its enforcement of the requirements discovered. Upon completion of the source code review, the usage of automated tools will be reviewed to assess their performance regarding the enforcement of the chosen understandability, maintainability, consistency, and documentation of the code in general and of the header content specifically. Wyle will include an opinion regarding the usage of automated tools in source code review in the test report.

The submitted changes for this test campaign are documented in Section 1.3. The enhancements to the system shall be tested using "Regression testing". Regression testing shall be used to ensure the enhancements did not introduce any defects into unchanged areas. Wyle plans to use partial regression testing which shall be used to test the directly interacting elements at both the Component and Integration Levels of testing.

The strategy for evaluating the depth of regression testing shall be to review the source code modifications during the source code review. Minor enhancements to variables, input fields, and restrictions shall be tested by inputting both valid and invalid data to the documented modification. Once the physical modification has been observed the interacting functions shall be fully regression tested to ensure the enhancement performs as expected. The Adjudicator application will be tested by performance of a Functional Configuration Audit, during which the new functionality will be exercised to verify correct operation. After the Adjudicator application and the enhancements to the system have been tested on a component level a full system level test shall be performed to ensure all interacting components function as a system without issues.

### 4.4   Security

The enhancements added to the Unisyn OVS Version 1.1 include security enhancements. A few examples of the security enhancements are: MYSQL log rotation, intrusion detection, and the freeing up of old unused OCS passwords after a period of 24 months has passed. Security testing will be performed to verify that the security enhancements do not compromise the security of the system, as well as to verify the security features of the Adjudicator application.

### 4.5   Usability and Accessibility

The addition of the 15-inch OVI touchscreen as a hardware option necessitates the performance of a limited Usability and Accessibility test. As the OVI is an ADA device, the change to the main interface between the voter and the terminal requires that the 15-inch touchscreen be tested to verify that it complies with applicable Usability and Accessibility requirements.

## 5.0    TEST DATA

### 5.1    Data Recording

All equipment utilized for test data recording shall be identified in the test data package. For hardware environmental and operational testing, the equipment shall be listed on the Instrumentation Equipment Sheet for each test. 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 output reports and submitted to Unisyn Voting Solutions, Inc. for resolution. Additionally, all test results, including functional test data, shall be recorded on the relevant WoP's and Test Cases. Results shall also be recorded real-time in engineering log books.

### 5.2    Test Data Acceptance Criteria

Wyle shall evaluate all test results against the Unisyn Voting Solutions, Inc. provided technical documentation for the Unisyn OVS, Version 1.1, and the requirements set forth in the EAC 2005 VVSG. The Unisyn OVS, Version 1.1, shall be evaluated for its performance against the EAC 2005 VVSG. The acceptable range for system performance and the expected results for each test case shall be derived from the Unisyn OVS Version 1.1 documentation. Per the EAC 2005 VVSG, these parameters shall encompass the test tolerances, the minimum number of combinations or alternatives of input and output conditions that can be exercised to constitute an acceptable test of the parameters involved, and the maximum number of interrupts, halts or other system breaks that may occur due to non-test conditions (excluding events from which recovery occurs automatically or where a relevant status message is displayed).

## 6.0    TEST PROCEDURE AND CONDITIONS

This section describes Wyle's proposed test procedures and the conditions under which those tests shall be conducted.

The following subsections describe test procedures and a statement of the criteria by which readiness and successful completion shall be indicated and measured.

### 6.1    Test Facilities

All testing shall be conducted at the Wyle, Huntsville, AL facility unless otherwise annotated. Hardware operating testing shall be conducted at the appropriate test site with the required support equipment. All instrumentation, measuring, and test equipment used in the performance of this test campaign shall be listed on the Instrumentation equipment Sheet for each test and shall be calibrated in accordance with Wyle's Quality Assurance Program, which complies with the requirements of ANSI/NCSL Z540-1 and ISO 10012-1. Standards used in performing all calibrations are traceable to the National Institute of Standards and Technology (NIST) by report number and date. When no national standards exist, the standards are traceable to international standards or the basis for calibration is otherwise documented.

Unless otherwise specified herein, all remaining tests, including system level functional testing, shall be performed at standard ambient conditions:

- Temperature:                 25°C ± 10°C (77°F ± 18°F)

- Relative Humidity:        20 to 90%

- Atmospheric Pressure:    Local Site Pressure

## 6.0    TEST PROCEDURE AND CONDITIONS (CONTINUED)

### 6.1    Test Facilities (continued)

Unless otherwise specified herein, the following tolerances shall be used:

- Time                                                     $\pm$ 5%

- Temperature                                        $\pm$ 3.6°F (2°C)

- Vibration Amplitude                            $\pm$ 10%

- Vibration Frequency                            $\pm$ 2%

- Random Vibration Acceleration

  20 to 500 Hertz                                     $\pm$ 1.5 dB

  500 to 2000 Hertz                                 $\pm$ 3.0 dB

- Random Overall grms                          $\pm$ 1.5 dB

- Acoustic Overall Sound Pressure Level    +4/-2 dB

### 6.2    Test Set-Up

All voting machine equipment (hardware and software), shall be received and documented utilizing Wyle Receiving Ticket (WL-218, Nov'85) and proper Quality Assurance (QA) procedures.  When voting system hardware is received, Wyle Shipping and Receiving personnel shall notify Wyle QA personnel. With Wyle QA personnel present, each test article shall be unpacked and inspected for obvious signs of degradation and/or damage that may have occurred during transit.  Noticeable degradation and/or damage, if present, shall be recorded, photographs shall be taken, and the Unisyn Voting Solutions, Inc. representative shall be notified.  Wyle QA personnel shall record the serial numbers and part numbers. Comparison shall be made between those numbers recorded and those listed on the shipper's manifest. Any discrepancies noted shall be brought to the attention of the Unisyn Voting Solutions, Inc. representative for resolution.

TDP items, including all manuals, and all source code modules received shall be inventoried and maintained by the Wyle Project Engineer assigned to the test program.

For hardware test setup, the system shall be configured as it would be for normal field use.  This includes connecting all supporting equipment and peripherals.  Wyle personnel shall properly configure and initialize the system, and verify that it is ready to be tested, by following the procedures detailed in the Unisyn OVS Version 1.1 technical documentation.  Wyle will use the operational status test and will measure the system performance levels used during the original certification.

## 6.0 TEST PROCEDURE AND CONDITIONS (CONTINUED)

### 6.3 Test Sequence

The components of the Unisyn OVS, Version 1.1, shall only undergo the tests described in Table 6-1. There is no specific sequencing enforced for the execution of the required tests.

**Table 6-1 Unisyn OpenElect Voting System 1.1, Testing Sequence**

| Test | Description | Procedure | Test Level | Specimen |
|---|---|---|---|---|
| *Technical Data Package (TDP) Review (Pre-testing Activity)* | Documentation review for compliance, correctness, and completeness | WHVS07.1 WOP 3 | Document | TDP package |
| *Compliance Source Code Review (Pre-testing Activity)* | Source code review for compliance | WHVS07.2 WOP 5a | Component | Source Code packages |
| *COTS Source Code Review (Pre-testing Activity)* | Source code review to examine third party products for modification and versions | WHVS07.2 WOP 5d | Component | Source Code packages |
| *Automated Source Code Review (Pre-testing Activity)* | Automated review of source code for compliance | WHVS07.2 WOP 5e | Component | Source Code packages |
| *Compliance Build* | Use the build documents and source code to construct the application | WHVS07.3 WOP 7b WOP 7c | Component & System | Source Code packages |
| *Physical Configuration Audit* | Audit hardware and software models and versions | WHVS07.3 WOP 25 | Component & System | --- |
| *Electromagnetic Radiation* | FCC Part 15 Class B for both radiated and conducted emissions | WOP 9 | Component | OVI |
| *Electrostatic Disruption* | IEC 61000-4-2 (Edition 2.0, 2008-12) 15kV air discharge and 8kV contact discharge | WOP 10 | Component | OVI |
| *Electromagnetic Susceptibility* | IEC 61000-4-3 electromagnetic field of 10V/m modulated by a 1kHZ, 80% AM modulation at 80MHz to 1000MHz frequency | WOP 11 | Component | OVI |
| *Conducted RF Immunity* | IEC 61000-4-6 (1996-04) conducted radio frequency energy | WOP 14 | Component | OVI |

## 6.0 TEST PROCEDURE AND CONDITIONS (CONTINUED)

### 6.3 Test Sequence (continued)

**Table 6-1 Unisyn OpenElect Voting System 1.1, Testing Sequence**

| Test | Description | Procedure | Test Level | Specimen |
|---|---|---|---|---|
| *Vibration* | MIL-STD-810D, Method 514.3 physical shock and vibration during handling and transport | WOP17 | Component | OVI |
| *Usability/Accessibility* | Test of effective use of OVS. | WOP 22<br>WOP 24-1<br>WOP 24-1a<br>WOP 24-1b<br>WOP 24-1c<br>WOP 24-1d<br>WOP 24-1f<br>WOP 24-1g<br>WOP 24-2<br>WOP 24-2a<br>WOP 24-2b<br>WOP 24-2c<br>WOP 24-2d<br>WOP 24-2e<br>WOP 24-2f | Component | OVI |
| *Functional Configuration Audit* | Functional testing to the system documentation and 2005 VVSG requirements | WHVS07.4<br>WOP 26 | Component & Integration | --- |
| *Security* | Security testing of hardware and software | WHVS07.8<br>WOP 6a | Component & System | --- |
| *Security(Software)* | Security testing of software | WHVS07.8<br>WOP 6c | Component & System | --- |
| *Security(Access)* | Security testing of access controls | WHVS07.8<br>WOP 6d | Component & System | --- |
| *Volume and Stress* | Test to investigate the system's response to larger amounts of data than it is expecting. | WOP 40 | System | --- |
| *System Integration Test* | Test of all system hardware, software and peripherals. | WOP 30<br>Gen-01-03<br>Prim-01-03 | System | --- |
| *Trusted Build* | Creation and installation of the final system software | WHVS07.6<br>WOP 7<br>WOP 7a | Component | Source Code packages |

## 6.0    TEST PROCEDURE AND CONDITIONS (CONTINUED)

### 6.4    Test Operation Procedures

Wyle shall provide the step-by-step procedures for each test case to be conducted.  Each step is assigned a test step number and this number, along with critical test data and test procedures information, shall be tabulated onto a Test Control Record for control and the recording of test results.

Any test failures shall be recorded on WH1066, Notice of Anomaly form.  These Anomalies shall be reported to the manufacturer and the EAC.

### 6.5    System Level Test

After functional testing of the enhancements and the Adjudicator application has been completed, a full system level test shall be performed to ensure all interacting components function as a system without issues.  Wyle has chosen the Volume and Stress Test for system level testing due to the addition of support for multi-page ballots.  Both the OVO and OVCS units will be subjected to the Volume and Stress Test during which the OVO units and the OVCS will scan at least 1,549,703 ballot positions in order to fulfill Accuracy Testing requirements.  The Volume and Stress Test will verify that the modifications made to the system, the addition of multi-page ballot support in particular, do not affect the system's ability to read, process, and interpret large amounts of voting data correctly.

**APPENDIX A**

**FUNCTIONALITY REQUIREMENTS MATRIX**

| Item | Description | Test | Comments |
|------|-------------|------|----------|
| E-01 | Support for multi-page ballots added. The system supports up to three single or double sided pages. | FCA, Volume and Stress Test | Wyle will use the GEN-01 General Election for the FCA. The Volume and Stress test will be performed to verify that the system can handle voting data from multiple page ballots. |
| E-02 | The manufacturers ID on USB drives are no longer being validated. | PCA, FCA | |
| E-03 | The Tabulator application now supports N of M voting in Ranked Choice Voting contests. | FCA | |
| E-04 | Operating system in now installed/created using the default CentOS distribution and Dominions configuration files on a USB drive. | PCA, FCA | |
| E-05 | OVO and OVCS driver updates. | FCA, System Integration | |
| E-06 | The system supports the following ballot lengths: 11, 14, 17, 19 & 21 inch. | FCA | |
| E-07 | Screen Calibration is now a selectable option on the OVO and OVI interface. | FCA | |
| E-08 | In the EM application, an option can be set for the election which will cause ballot alerts to display on the OVO screen during voting. | FCA | |
| E-09 | Support for single sided ballots has been added to the BLM application. | FCA | |
| E-10 | The BLM application allows the user to manage the length of the stub at the top of printed paper ballots. | FCA | |
| E-11 | In the BLM application, multiple font sizes are available for printing and display of candidates on the ballot. | FCA | |

| Item | Description | Test | Comments |
|------|-------------|------|----------|
| E-12 | In the BLM application, party icons can now be placed next to candidates on the ballot. | FCA | |
| E-13 | Measures can extend the full width of the ballot page, in the BLM application. | FCA | |
| E-14 | In the BLM application, additional text can now be added under the "Vote For" text in a contest header. | FCA | |
| E-15 | The BLM application validates that the selected font sizes fit in the available space on the ballot. This is a background process. | FCA | |
| E-16 | The BLM application can create sample ballots which contain no barcodes or timing marks and have the word "Sample" down the middle of the ballot. | FCA | |
| E-17 | In the BLM application, blank space can be inserted between contests on the ballot. | FCA | |
| E-18 | The height of the ballot header can be set as 1" or 2". | FCA | |
| E-19 | Grey vote selection boxes are now supported by the system. | FCA | |
| E-20 | In the BLM application, candidates can be setup so that they take up multiple ¼" spaces on the ballot. | FCA | |
| E-21 | An increased amount of text is allowed in the contest headers, depending on size and font, when laying out a contest in the BLM application. | FCA | |
| E-22 | A user with proper permissions can remove an uploaded OVO or OVCS session from a Run, in the Tabulator application. | FCA | |

| Item | Description | Test | Comments |
|------|-------------|------|----------|
| E-23 | In the Tabulator application, valid write-in candidates can be added to a contest, so that votes can be assigned to the candidate through adjudication. | FCA | |
| E-24 | More detail has been added on upload, to show precincts that have and have not been uploaded, in the Tabulator application. | FCA | |
| E-25 | A Precinct Summary report has been added to the Tabulator Reports application. The Precinct summary can be displayed and printed as an official or unofficial report. | FCA | |
| E-26 | MySQL logs that reach a certain size are closed and new ones are created. | PCA, Security | |
| E-27 | Logging security update to the OCS operating system. | FCA, Security | |
| E-28 | Print notification security update to the OCS operating system. | FCA, Security | |
| E-29 | Intrusion detection security update to the OCS operating system. | FCA, Security | |
| E-30 | Software packages included in the CentOS operating system will be upgraded to protect against security vulnerabilities. | FCA, Security | |
| E-31 | OCS applications archive audit log entries 22 months or older. The entries are placed in a PDF file then removed from the database. | FCA | |
| E-32 | The OVO can export ballot page images to the TM for use in adjudication. This functionality is available from the Maintenance menu. | FCA, Volume and Stress | The Volume and Stress test will be used to verify that the OVO can handle the export of large amounts of ballot page image data to the TM, and the subsequent importing of that data into the EMS for use in the Adjudicator application. |

| Item | Description | Test | Comments |
|------|-------------|------|----------|
| E-33 | Political party icons can be displayed on the OVI screen while voting. | FCA | |
| E-34 | The OVCS displays which ballot in a sequence of ballots fed into the OVCS, is invalid. | FCA | |
| E-35 | EM can now export elections that contain multiple customer keys. | FCA | |
| E-36 | An expiration date has been added to registration keys, for licensing purposes. | FCA, Security | |
| E-37 | Registration Key validation has been added to the OCSInstaller application. | FCA, Security | |
| E-38 | A TOC (validation file) is created for each OCS application on install, so that the OCS applications can validate themselves each time the application is opened. | PCA, Security | |
| E-39 | After 24 months, the system releases old unused passwords so they can be reused. | FCA, Security | |
| E-40 | Adjudicator application has been added as a component of the system. | FCA, System Integration | |

**APPENDIX B**

**TEST PROCEDURE DESCRIPTION**

| Test Procedure | Test Procedure Description |
|---|---|
| WoP 1 Operational Status Checks | When all tests, inspections, repairs, and adjustments have been completed, normal operation shall be verified by conducting an operational status check.<br>During this process, all equipment shall be operated in a manner and under environmental conditions that simulate election use to verify the functional status of the system. Prior to the conduct of each of the environmental hardware non-operating tests, a supplemental test shall be made to determine that the operational state of the equipment is within acceptable performance limits. |
| WoP 2 Receipt Inspection | Documenting the receiving inspection of equipment. |
| WoP 3 Technical Data Package Review | Track all enhancements, new features, and hardware changes through the technical data package. |
| WoP 4 Test Plan Preparation – Unisyn OpenElect Voting System Revision 1.1 (*This Document*) | Approval of this document shall fulfill the requirements of this procedure. |
| WoP 5a Source Code Compliance Review | Compare the source code to the vendor's software design documentation to ascertain how completely the software conforms to the vendor's specifications.<br>Source code inspection shall also assess the extent to which the code adheres to the requirements in the 2005 VVSG, Volume I, Section 5. |
| WoP 5d Source Code COTS Review | Unmodified, general purpose COTS non-voting software will be examined to confirm the specific version of software being used against the design specification to confirm that the software has not been modified. Portions of COTS software that have been modified by the manufacturer in any manner are subject to review. |
| WoP 5e Automated Source Code Review | Wyle qualified personnel will compare the source code submitted by the manufacturer to the published industry-accepted Coding Conventions documentation submitted by the manufacturer to ascertain how completely the software conforms to the published document. This comparison will be performed by Wyle personnel utilizing an automated source code review tool submitted by the manufacturer. This comparison is intended to verify compliance to the published standard for a given application development language.<br><br>In addition a 10% manual source code inspection shall be used to assess the extent to which the source code adheres to the requirements in the 2005 VVSG Volume I, Section 5.2.7 a. The source code will also be compared to the manufacturer's software design documentation to ascertain how completely the software conforms to the manufacturer's specifications. |
| WoP 6 Security | The security test is designed and performed to test the capabilities of the voting system against the requirements defined in Volume I Section 7. These procedures shall focus on the ability of the system to detect, prevent, log, and recover from a broad range of security risks identified. This test will also examine system capabilities and safeguards claimed by Unisyn in the TDP to go beyond these risks. The range of risks tested is determined by the design of the system and potential exposure to risk. |
| WoP 6a Security | Provides a number of generic security tests. |

| Test Procedure | Test Procedure Description |
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| WoP 6c Security (Software) | Wyle Laboratories will conduct tests of system capabilities and review the access control policies and procedures submitted by the vendor to identify and verify the access control features implemented as a function of the system. For those access control features built in as components of the voting system, Wyle Laboratories will design tests to confirm that these security elements work as specified. |
| WoP 6d Security (Access) | Wyle Laboratories will conduct tests of system capabilities and review the access control policies and procedures submitted by the vendor to identify and verify the access control features implemented as a function of the system. For those access control features built in as components of the voting system, the Wyle Laboratories will design tests to confirm that these security elements work as specified.<br><br>Wyle Laboratories may meet these testing requirements by confirming proper implementation of proven commercial security software. In this case, the vendor must provide the published standards and methods used by the U.S. Government to test and accept this software, or it may provide references to free, publicly available publications of these standards and methods, such as government web sites. |
| WoP 7 Trusted Build | To ensure that the system version tested is the correct version, Wyle Laboratories personnel shall witness the build of the executable version of the system immediately prior to or as part of, the physical configuration audit. (Additionally, should components of the system be modified or replaced during the testing process, Wyle Laboratories shall require Unisyn Voting Solutions, Inc. to conduct a new "build" of the system to ensure that the certified executable release of the system is built from tested components). |
| WoP 7a Trusted Build Form | Form required to be filled out as part of the Trusted Build Process which describes the software built during the Trusted Build Process as well as the build environment and source code used to perform the build. |
| WoP 7b Compliance Build | To ensure that the system version tested is the correct version, Wyle Laboratories personnel will witness the build of the executable version of the system immediately prior to or as part of, the physical configuration audit. (Additionally, should components of the system be modified or replaced during the testing process, the accredited test lab shall require the manufacturer to conduct a new "build" of the system to ensure that the certified executable release of the system is built from tested components) |
| WoP 7c Compliance Build Form | Form required to be filled out as part of the Compliance Build Process which describes the software built during the Compliance Build Process as well as the build environment and source code used to perform the build. |
| WoP 9 Electromagnetic Emissions | This test verifies that radiated and conducted emissions, from the voting system hardware do not exceed the allowable limits of CFR Part 15, Class B. |
| WoP 10 Electrostatic Disruption | This test demonstrates that the voting system's hardware is capable of withstanding electrostatic discharges during normal operation. |

| Test Procedure | Test Procedure Description |
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| WoP 11 Electromagnetic Susceptibility | This test demonstrates the capability of the voting system's hardware to withstand radiated electromagnetic fields during normal operation. |
| WoP 14 Conducted RF Immunity | This test demonstrates the voting system's hardware's ability to withstand conducted RF energy on power and Input/Output lines during normal operation. |
| WoP 17 Hardware Testing – Vibration Test | The vibration test simulates stresses faced during transport of voting machines and ballot counters between storage locations and polling places. |
| WoP 24-1 Usability | Usability testing will determine if a voting system can be used comfortably and efficiently by voters, and will provide voters with confidence that they have cast their votes correctly. |
| WoP 24-1a Usability – Usability Testing | Demonstrate that voters can comfortably and efficiently use a voting machine and provide voters with confidence that they have cast their votes correctly. |
| WoP 24-1b Usability – Functional Capabilities | This test demonstrates that the voting system provides certain functional capabilities to support voter Usability. |
| WoP 24-1c Usability – Alternative Languages | This test demonstrates the voting system's ability to present information to the voter in alternative languages to support voter Usability. |
| WoP 24-1d Usability – Cognitive Issues | This test demonstrates that the voting system is designed to minimize cognitive difficulties for the voter to support voter Usability. |
| WoP 24-1e Usability – Perceptual Issues | This test demonstrates that the voting system is designed to minimize perceptual difficulties for the voter to support voter Usability. |
| WoP 24-1f Usability – Interaction Issues | This test demonstrates that the voting system is designed to minimize interaction difficulties for the voter. |
| WoP 24-1g Usability – Privacy | This test demonstrates that the voting system is designed to protect the privacy of the voter throughout the voting process while supporting voter Usability. |
| WoP 24-2 Accessibility | Accessibility testing will determine if a voting system can be used comfortably and efficiently by voters, and will provide voters with confidence that they have cast their votes correctly. |
| WoP 24-2a Accessibility – General | Demonstrate that voters can comfortably and efficiently use a voting machine and provide voters with confidence that they have cast their votes correctly. |
| WoP 24-2b Accessibility – Vision | This test demonstrates that the voting system is designed to accommodate voters with visual disabilities. |
| WoP 24-2c Accessibility – Dexterity | This test demonstrates that the voting system is designed to accommodate voters who lack fine motor control or use of their hands. |
| WoP 24-2d Accessibility – Mobility | This test demonstrates that the voting system is designed to accommodate the mobility needs of voters. |
| WoP 24-2e Accessibility – Hearing | This test demonstrates that the voting system is designed to accommodate voters with hearing disabilities. |
| WoP 24-2f Accessibility – Speech | This test demonstrates that the voting system is designed to accommodate voters with speech disabilities. |
| WoP 24-2g Accessibility – English Proficiency | This test demonstrates that the voting system is designed to accommodate voters who lack proficiency in reading English. |
| WoP 24-2h Accessibility – Cognition | This test demonstrates that the voting system is designed to accommodate voters with cognitive disabilities. |

| Test Procedure | Test Procedure Description |
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| WoP 25 Physical Configuration Audit | Establish a configuration baseline of software and hardware to be tested; confirm whether manufacturer's documentation is sufficient for the user to install, validate, operate, and maintain the voting system.<br>Verify software conforms to the manufacturer's specifications; inspect all records of manufacturer's release control system; if changes have been made to the baseline version, verify manufacturer's engineering and test data are for the software version submitted for certification.<br>Review drawings, specifications, technical data, and test data associated with system hardware, if non-COTS, to establish system hardware baseline associated with software baseline.<br>Review manufacturer's documents of user acceptance test procedures and data against system's functional specifications; resolve any discrepancy or inadequacy in manufacturer's plan or data prior to beginning system integration functional and performance tests.<br>Subsequent changes to baseline software configuration made during testing, as well as system hardware changes that may produce a change in software operation are subject to re-examination. |
| WoP 26 Functional Configuration Audit | The functional configuration audit encompasses an examination of manufacturer's tests, and the conduct of additional tests, to verify that the system hardware and software perform all the functions described in the manufacturer's documentation submitted for the TDP. In addition to functioning according to the manufacturer's documentation tests shall be conducted to insure all applicable 2005 VVSG requirements are met. |
| WoP 30 System Level Test | System Level certification test address the integrated operation of both hardware and software, along with any telecommunication capabilities. Compatibility of the voting system software components or subsystems with one another, and with other components of the voting system environment, shall be determined through functional tests integrating the voting system software with the remainder of the system. |
| WoP 34 Test Report | National Certification Test Report |
| WoP 40 System Level Stress and Volume Test | Tests to investigate the system's response to transient overload conditions, processing more than the expected number of ballots/voter per precinct and processing more than expected number of precincts. Polling place devices shall be subjected to ballot processing at the high volume rates at which the equipment can be operated to evaluate software response to hardware-generated interrupts and wait states. Central counting systems shall be subjected to similar overloads, including, for systems that support more than one card reader, continuous processing through all readers simultaneously. This test is an attempt to overload the system's capacity to process, store, and report data |