Test Plan for EAC 2005 VVSG Certification Testing
Unisyn Voting Solutions OpenElect 2.2.3 Voting System

EAC Project Number: UNS10121966-2.2.3

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SIGNATURES

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Pro V&V attests to the following: 1) all testing prescribed by the approved and published test plan or amended test plan will be performed as identified or the divergence from the test plan will be properly documented in the resulting test report, 2) all identified voting system anomalies or failures will be reported and resolved, and 3) the resulting test report will be accurate and complete. There will be no opinions or interpretations included in the resulting report, except as noted under 'Recommendations'.

REVISIONS

Revision	Description	Date
00	Initial Release	01/05/2023
01	Updated per EAC comments	02/08/2023

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1.0 INTRODUCTION

The purpose of this Test Plan is to document the procedures that Pro V&V, Inc. will follow to perform certification testing during a system modification campaign for the Unisyn Voting Solutions OpenElect Voting System (OVS) Version 2.2.3 to the requirements set forth for voting systems in the U.S. Election Assistance Commission (EAC) 2005 Voluntary Voting System Guidelines (VVSG), Version 1.0. Prior to submitting the voting system for testing, Unisyn submitted an application package to the EAC for certification of the OpenElect 2.2.3 Voting System. The application was accepted by the EAC, and the project was assigned the unique Project Number of UNS10121966-2.2.3.

At test conclusion, the results of all testing performed as part of this test campaign will be submitted to the EAC in the form of a national certification test report.

1.1 Description and Overview of EAC Certified System Being Modified

OVS 2.2.3 is a paper ballot voting system using touch screen and scan technology to scan and validate ballots, provide voter assisted ballots to accommodate voters with special needs, and tabulate results. OVS 2.2.3 consists of the following major components:

- **OpenElect Central Suite (OCS)**

- **OpenElect Voting Optical (OVO)**

- **OpenElect Voting Interface – Vote Center (OVI-VC)**

- **FreedomVote Tablet (FVT)**

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

- **FreedomVote Scan (FVS)**

The OVO, FVS, FVT, and OVI-VC are the OVS components designed to accept voter input. The FVT and OVI-VC are the OVS ballot marking devices (BMDs). The OVO can collect and tally precinct votes, generate reports, and store election data internally. The FVS is a full-page dual-sided optical scan system. It scans and validates BMD ballots produced on the FVT and OVI-VC, as well as full-page ballots. The OVCS is the bulk scanner used for mail-in ballots, provisional ballots, and recounts.

The OVS 2.2.3 configuration submitted for testing is a modification from the EAC approved OVS 2.2 system configuration.

1.1.1 Baseline Certified System

The EAC Certified System that is the baseline for the submitted modification is described in the following subsections. All information presented was derived from the previous Certification Test Report, the EAC Certificate of Conformance and/or the System Overview.

The baseline system for this modification is the OVS 2.2 Voting System. Detailed descriptions of the OVS 2.2 test campaign are contained in Pro V&V Report No.TR-01-01-UNI-06-01.03, which is available for viewing on the EAC's website at www.eac.gov.

The following subsections describe the baselined OVS 2.2 Voting System.

OpenElect Central Suite (OCS)

The OCS System supports elections on the OVO, FVS, OVI-VC, FVT, and OVCS systems. The Election Management System (EMS) consists of the following components running as either a front-end/client application or as a back-end/server application:

Ballot Layout Manager (BLM) – uses a database to create and store precinct and district information and an interface to create, check, translate, and produce the ballot styles needed by a jurisdiction for an election. The BLM output is printer ready artwork of all ballots in all languages and the Unisyn election definition file.

Election Manager (EM) – converts the Unisyn election definition file to a Unisyn-specific XML format and prepares compressed, encrypted election files for output to CD or USB. The EM allows the jurisdiction to add voting device specific options for elections, i.e. whether to check the contests for undervotes, and whether to allow or disallow certain features such as sounds, party icons, reports, etc. The EM also creates and manages Supervisor and Maintenance technician logins and passwords.

Tabulator Client (TC) – retrieves vote files and ballot images from a Transport Media (TM) device (USB), stores them on its disk, and transfers the files to the Tabulator and notifies the Tabulator that a new file is present.

Tabulator (TAB) – receives and validates uploaded voting data and provides a status of uploaded files as well as handling Rank Choice Voting (RCV) functionality. It also updates the database with adjudicated ballots from the Auditor application. The Tabulator maintains the Tabulator database, which stores the results from all precincts.

Auditor – accesses ballot images and data from the OVCS and TC PCs to allow jurisdiction personnel to evaluate ballots with questionable or erroneous marks and change votes in accordance to the voter's perceived intent. The Auditor can also be used to process write-in votes. All changes uploaded to the Tabulator database and actions are password controlled.

Tabulator Reports (TR) – accesses data from the Tabulator database to generate the necessary reports.

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 election is loaded from an Election TM. On Election Day, an OVO at each poll location scans and validates voters' ballots and provides precinct tabulation and reporting. The OVO runs Logic Tests and Training Elections in addition to General and Primary Elections.

The OVO unit can also paired with OVI-VC and FVT units for early voting to scan and tabulate early voting ballots and election support at voting centers. Additionally, OVO units can be used at election headquarters to read absentee, provisional or recount ballots in smaller jurisdictions.

The OVO consists of the following components:

- **Personal Computer (PC) -** Computer component (with a touch panel display) has the OVO application installed that manages data and provides a user interface for voting and maintenance. A new election loaded via a Transport Media (TM) sets passwords, parameters, and ballot styles for that election. (Valid ballots for a poll location are reinitialized or set on Election Day startup by scanning a ballot header card).

- **Transport Media (TM)** – 1 GB or larger USB thumb drive that provides the means of transporting audit, optional ballot page images and results files from the precinct on Election Night to Election Headquarters where the central count system resides.

- **Ballot Reader -** Dual-sided scanner connected to the PC to scan data from marked ballot pages. The Ballot Reader ejects accepted ballot pages into an attached ballot box or rejects unaccepted ballot pages back out to the voter.

- **Printer -** 58 mm thermal receipt printer connected to the PC to print voter receipts and reports at the OVO.

- **UPS** - Uninterruptible power supply is provided as part of the system.

OpenElect Voting Interface – Vote Center (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 is equipped to assist voters, with varying abilities, to prepare their ballots independently and privately. It presents each contest on the correct ballot to the voter in visual and, if needed, audio formats. The OVI-VC gives voters the option to use an audio ballot, ADA keypad, sip and puff binary device, and touchscreen with varying font sizes to make their selections. Once the voter has made their selections, they are prompted to review their ballot selections. After the validation process is complete, the OVI-VC then prints the ballot and the voter inserts it into the OVO/FVS to cast their vote. When authorized, the OVI-VC provides for write-in candidates. Each OVI-VC can support multiple languages for both visual and audio ballots, allowing the voter to choose their preferred language. The OVI-VC consists of the following components:

- **Personal Computer (PC)** - Computer component (with a touch panel display) has the OVI-VC application installed that manages data and provides user interfaces for voting and maintenance. A new election loaded via a Transport Media (TM) sets passwords, parameters, audio, and ballot styles for that election.

- **Transport Media (TM)** - USB device with 1 GB or larger storage provides the means of transporting audit files to the OCS system.

- **Printer –** 82.5 mm thermal receipt printer is connected to the PC to print BMD Ballots and reports at the OVI-VC.

- **UPS** - Uninterruptible power supply is provided as part of the system.

OpenElect Voting Central Scan (OVCS)

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

- **PC Desktop** – A desktop PC configuration with the following minimum characteristics:

  - PC: 1.8 GHz Processor, 2 GB RAM, 250GB (or larger) Hard Drive, USB Ports, Network Interface Port (Ethernet), CDRW/DVD, Video Port

  - 16:9 LCD

  - Keyboard and Mouse

- **Bulk Scanner** – A dual-sided scanner (Canon model DR-M160II, model DR0G2140 or model DR-X10C) that is connected to the PC to scan data from marked ballots.

Freedom Vote Tablet (FVT)

The FVT is a tablet ballot marking device that enables voters to make their vote selections and to print their voted ballot. It can be used on Election Day or during an early voting period. Like the OVI-VC, the FVT is ADA compliant. It assists voters, with varying levels of ability, through the voting process, ballot review, and printing functions. The FVT presents each contest of 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/FVS 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 a Sip and Puff Interface, Headphones, Sip and Puff Device.

OpenElect Freedom Vote Scan (FVS)

The FVS 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 election is loaded from an Election TM. On Election Day, an FVS at each poll location scans and validates voters' ballots and provides precinct tabulation and reporting. The FVS runs Logic Tests and Training Elections in addition to General and Primary Elections. The FVS unit can also be paired with FVT units for early voting to scan and tabulate early voting ballots and election support at voting centers. Additionally, FVS units can be used at election headquarters to read absentee, provisional, or recount ballots in smaller jurisdictions.

The FVS consists of the following components:

- **Personal Computer (PC)** – The internal computer with Solid State storage has the FVS application installed that manages data and provides a user interface for voting and maintenance. A new election loaded 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).

- **Touchscreen Display** – The 10.1" TFT LCD has a resolution of 1280x800. The display is used to interact with the system application, and provides all functionality needed to deploy, conduct, and tally an election.

- **Transport Media (TM)** – 1 GB or larger USB thumb drive that provides the means of transporting audit, optional ballot page images and results files from the precinct on Election Night to Election Headquarters where the central count system resides.

- **Ballot Reader** - Dual-sided scanner connected to the PC to scan data from marked ballot pages. The Ballot Reader ejects accepted ballot pages into an attached ballot box or rejects unaccepted ballot pages back out to the voter.

- **Printer** - 80 mm thermal receipt printer connected to the PC to print voter receipts and reports at the FVS.

- **Internal Battery Backup** – An internal battery powers the system in the event of a power interruption. The battery allows for continued, and uninterrupted, use of the system if wall power is lost during a voting session.

The proprietary and COTS equipment provided by the manufacturer as part of the baseline OVS 2.2 test campaign is listed in the following tables.

Table 1-1. OVS 2.2 COTS Software Components

FVT, FVS, OVO and OVI-VC Device Software	Version
Cent OS Linux	
OVO1 and OVI-VC1	5.0
OVO2 and OVI-VC2	6.3
FVS	8.0
Java JRE + Unlimited Cryptographic Extension	
OVO and OVI-VC	1.6.0_02
FVS	1.6.0_45
Android OS	
FVT	4.4.4

Table 1-2. OCS and OVCS COTS Software Components

OCS and OVCS Device Software	Version
CentOS Linux	6.5, 6.8, 7.6, and 7.9
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, 5.7 (on CentOS 7.6 and 7.9)
JasperReports	2.0.5
OpenVPN	2.4.4
OpenSSL	1.0.1f-fips

Table 1-3. 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
DC/DC converter	Morex	MX-0608F
Chassis Fans	Young Lin Tech	DFB404012M
Motherboard	Jetway	JNF9D-2550
Memory	SuperTalent - Onboard RAM	W1333SA2GV
Hard Drive	Western Digital	WD5000AZLX
AC Adapter	EDAC	EA 10951C-120
1 Gb USB TM		
1 Gb USB	Innodisk	DEUA1-01GI72AC1SB-B88
1 Gb USB	Delkin	UY0GTFLSY-XN000-D
7" LCD Touchscreen Display		
7" LCD Touchscreen Display	Xenarc Technologies	700TSV

Table 1-3. Voting System COTS Hardware *(continued)*

Hardware	Make	Model
AC Power In Module		
AC Power In Module	Delta	Emi 10BEEG3G
FVS		
Computer		
CPU w/ Fan	Intel	G5400-LGA1151
Motherboard	Jetway	JNC8H-IH310
Memory	Crucial	CT4G48F8824A
SSD 250GB	Crucial	CT250MX500SSD1
80mm Thermal Printer		
80mm Thermal Printer	SNBC	BTS-S80
Duplex Ballot Scanner		
Duplex Ballot Scanner	PDI Scan	Pagescan V
Battery		
Battery	RRC Power Solutions Inc.	RRC2040-2
Power Management Module	RRC Power Solutions Inc.	RRC-PMM240
Power Supply 15VDC AC/DC	Meanwell	UHD-200-15
Power Supply 12/12VDC	Meanwell	RSD-60G-12
Power Supply 12/24VDC	Meanwell	RSD-60G-24
AC Inlet Module		
AC Inlet Module	Schurter	4303.5013
Fuse Drawer 1P		
Fuse Drawer 1P	Schurter	4303.2406
Switch On/Off DPDT		
Switch On/Off DPDT	Switchcraft	EHRRSLBPKG
1 Gb USB TM		
1 Gb USB	Innodisk	DEUA1-01GI72AC1SB-B88
1 Gb USB	Delkin	UY0GTFLSY-XN000-D
OVI-VC		
Sip and Puff (Optional)		
Sip and Puff (Optional)	Origin Instruments	AirVoter
Headphone (Optional)		
Headphone (Optional)	Koss On-Ear Headphones	KPH7
15 in LCD Touchscreen Display		
15 in LCD Touchscreen Display	GVision	P15BX-OB-4690
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
Hard Drive	Western Digital	WD5000AZLX
Adapter	EDAC	EA 10951c-120
1 Gb USB TM		

Table 1-3. Voting System COTS Hardware *(continued)*

Hardware	Make	Model
1 Gb USB	Innodisk	DEUA1-01GI72AC1SB-B88
1 Gb USB	Delkin	UY0GTFLSY-XN000-D
AC Power In Module		
AC Power In Module	Delta	Emi 10BEEG3G
OVCS		
Large Volume Scanner		
Large Volume Scanner	Canon	DR-X10C, DR-G2140
Desktop Scanner		
Desktop Scanner	Canon	DR-M160II
Laptop		
Laptop	Dell	Dell Precision
Desktop PC		
Desktop PC	Dell	Dell OptiPlex
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	Star	PS60A-24B 1
Barcode Reader 1D,2D series		
Barcode Reader 1D,2D series	Newland	FM420 & FM430
USB Hub		
USB Hub	D-Link	DUB-H4
Hub Adapter	Meanwell	PSD-15A-05
1 Gb USB TM		
1 Gb USB	Innodisk	DEUA1-01GI72AC1SB-B88
1 Gb USB	Delkin	UY0GTFLSY-XN000-D
Micro SD		
Micro SD	San Disk	4 GB Edge
AC Power In Module		
AC Power In Module	Delta	Emi 10BEEG3G
Sip and Puff (Optional)		
Sip and Puff	Origin Instruments	AirVoter
Headphone (Optional)		
Headphone	Koss On-Ear Headphones	KPH7
USB to Ethernet RJ45 Adapter (Optional)		
USB to Ethernet RJ45 Adapter	D-Link	DUB-E100
FVT-B **(Includes items listed for the FVT above)**		
Battery		
Battery	RRC Power Solutions Inc.	RRC2040-2
Power Management Module	RRC Power Solutions Inc.	RRC-PMM240
Power Supply 15VDC AC/DC	Meanwell	UHD-200-15
Power Supply 12/12VDC	Meanwell	RSD-60G-12

Table 1-3. Voting System COTS Hardware *(continued)*

Hardware	Make	Model
Power Supply 12/24VDC	Meanwell	RSD-60G-24
UPS		
UPS System – Minuteman Power Technologies	Para Systems, Inc.	Entrepid Series EP1500 LCD
Surgecube – Surge Protector	Belkin	F9H100-CW

Table 1-4. OVCS System COTS Software Components

OVS Hardware	Version
Desktop for non-redundant solutions	Dell OptiPlex 360, 755, 7010, D075/XE2
Desktop for redundant solutions	Dell PrecisionT3500, T3600, T5810, T5820, 3420
Canon Scanner (OVCS)	Canon DR-M160II, DR-G2140, or DR-X10C
Laptop	Dell Latitude E5500, E5540, E5570, E5590, E5500 v2, E5520, Dell XPS m1530,HP 2000

1.1.2 Description of Modification

The OVS 2.2.3 Voting System is a modified voting system configuration that contains updates to the FVT component of the OpenElect Voting System. The currently certified FVT tablet has reached its end of life and is being replaced.

1.1.3 Initial Assessment

Testing from the previous test campaign was used to establish the baseline. The focus of this test campaign is on the addition of the replacement FreedomVote Tablet (FVT). Based on the submitted modification, it was determined the following tasks would be required to verify compliance of the modifications:

- System Level Testing

  — System Integration

  — Accuracy

  — Functional Configuration Audit (FCA), including Regression Testing

- Technical Documentation Package (TDP) Review

- Physical Configuration Audit (PCA), including System Loads and Hardening

- Hardware Testing

  — Electrical

  — Non - Operational Environmental

— Operational Environmental

— Electrical Supply

1.1.4 Regression Test

OVS 2.2.3 is a modified voting system configuration that includes a modification to the baseline system. Modified system testing is an abbreviated testing campaign built upon a regression review of the modifications against the baseline-system and requirements. Modifications, alone and collectively, are reviewed (tested) to see if they fall under any requirement(s), or functionally impact the ability of the modified system to continue to meet requirements. Regression reviews consist of targeted investigations to determine if further testing is necessary based on the nature and scope of the communicated modifications (whether activated or deactivated), and any other submitted information. The objective of regression testing is to establish assurance that the modifications have no adverse impact on the compliance, integrity, or performance of the system.

Regression testing for this test campaign will consist of the execution of the System Integration Testing.

1.2 References

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

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

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

- National Voluntary Laboratory Accreditation Program NIST Handbook 150, 2020 Edition, "NVLAP Procedures and General Requirements (NIST Handbook 150)", dated July 2020

- National Voluntary Laboratory Accreditation Program NIST Handbook 150-22, 2017 Edition, "Voting System Testing (NIST Handbook 150-22)", dated July 2017

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

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

- EAC Requests for Interpretation (RFI) and Notices of Clarification (NOC) (listed on www.eac.gov)

- Pro V&V Test Report No. TR-01-01-UNI-06-01.03, "Test Report for EAC 2005 VVSG Certification Testing Unisyn Voting Solutions OpenElect 2.2 Voting System"

- OpenElect Voting System Release Notes, System 2.2 to 2.2.3, Version 1.1

- Unisyn Voting Solutions Technical Data Package *(A listing of the OpenElect 2.2.3 documents submitted for this test campaign is listed in Section 4.5 of this Test Plan)*

1.3 Terms and Abbreviations

This subsection lists terms and abbreviations relevant to the hardware, the software, or this Test Plan.

"ADA" – Americans with Disabilities Act 1990

"BLM" – Ballot Layout Manager

"BMD" – Ballot Marking Device

"CM" – Configuration Management

"COTS" – Commercial Off-The-Shelf

"EAC" – United States Election Assistance Commission

"EM" – Election Manager

"EMS" – Election Management System

"EOS" - Election Operating System

"FCA" – Functional Configuration Audit

"FVS" – FreedomVote Scan

"FVT" – FreedomVote Tablet

"LAT" – Logic and Accuracy Test

"NOC" – Notice of Clarification

"OCS" – OpenElect Central Suite

"OVCS" – OpenElect Voting Central Scan

"OVI-VC" – OpenElect Voting Interface – Vote Center

"OVO" – OpenElect Voting Optical

"OVS" – OpenElect Voting System

"PC" – Personal Computer

"PCA" – Physical Configuration Audit

"QA" – Quality Assurance

"RFI" – Request for Interpretation

"RCV" – Rank Choice Voting

"TAB" – Tabulator

"TC" – Tabulator Client

"TDP" – Technical Data Package

"TM" – Transport Media (USB Thumb Drive)

"TR" – Tabulator Reports

"UPS" – Uninterruptible Power Supply

"VSTL" – Voting System Test Laboratory

"VVSG" – Voluntary Voting System Guidelines

1.4 Project Schedule

The Project Schedule for the test campaign is located in Appendix A. The dates on the schedule are not firm dates but planned estimates based on the anticipated project workflow.

1.5 Scope of Testing

The scope of testing is limited to the modifications/enhancements implemented since the certification of the baseline system. To evaluate the OVS 2.2.3 test requirements, the submitted modifications were evaluated against each section of the EAC 2005 VVSG to determine the applicable tests to be performed. Based on this assessment, it was determined that multiple areas within the EAC 2005 VVSG would be evaluated to encompass the required tests. A breakdown of the areas and associated tests is listed below:

- EAC 2005 VVSG Volume 1, Section 2: Functional Requirements

  — System Integration Testing

  — Functional Configuration Audit (FCA)

  — Physical Configuration Audit (PCA), including System Loads & Hardening

  — Technical Documentation Package (TDP) Review

  — Accuracy Testing

- EAC 2005 VVSG Volume 1, Section 4: Hardware Requirements

  — Hardware Testing

  — Technical Documentation Package (TDP) Review

Note: Section 6 (Telecommunications Requirements) of the VVSG 1.0 is not applicable to OVS 2.2.3 and was therefore not included in testing. Additionally, Section 3 (Usability and Accessibility), Section 5 (Software Requirements), Section 7 (Security Requirements), Section 8 (Quality Assurance Requirements), and Section 9 (Configuration Management Requirements) were reviewed in previous test campaigns and were not impacted by the submitted modifications.
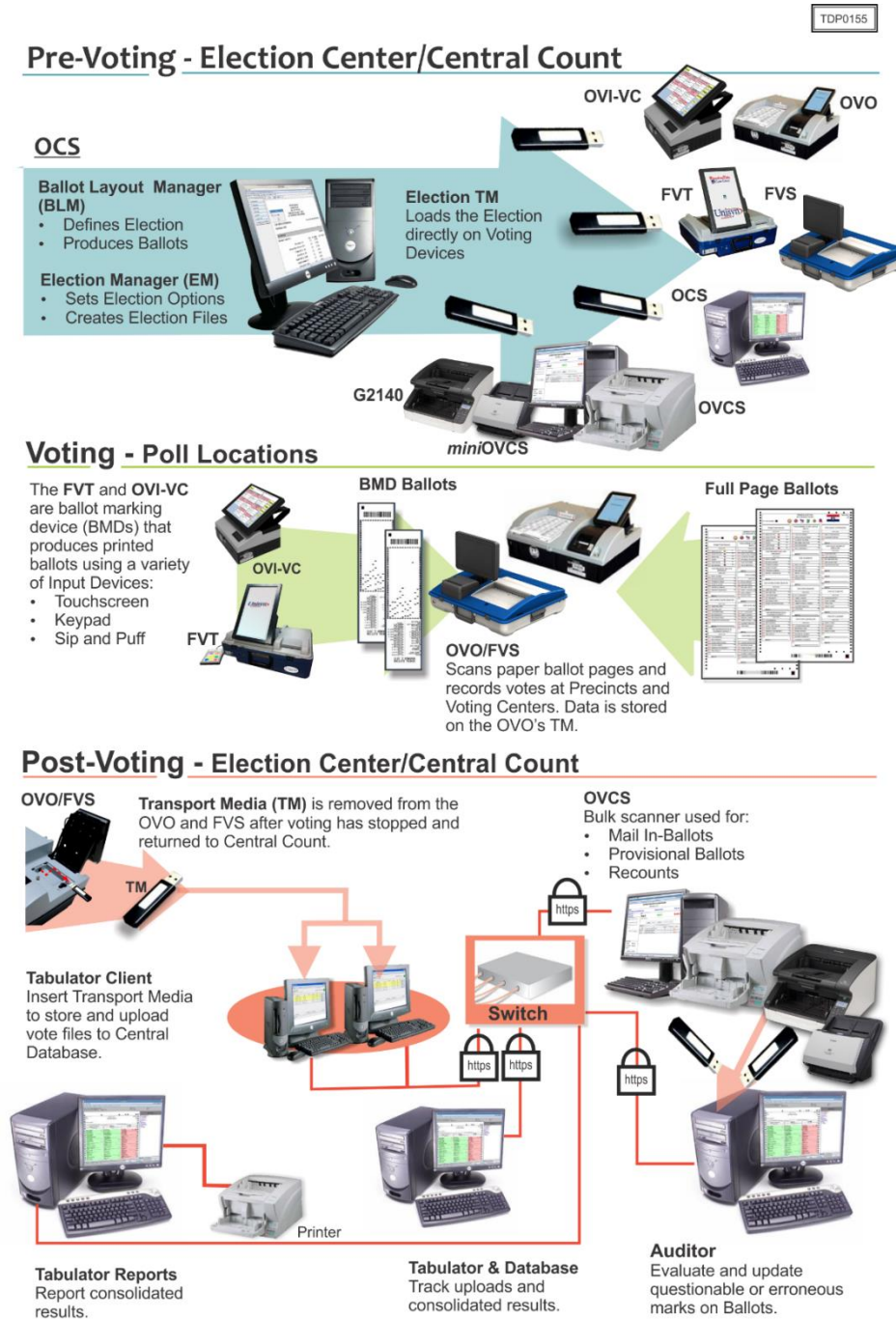
1.5.1   Block Diagram

Figure 1-5. OVS 2.2.3 System Components Overview

1.5.2 System Limits

Unisyn has defined the following system performance characteristic limits for the OVS 2.2.3:

- The OCS and OVCS Software are intended for use by a single jurisdiction with one set of districts, voting centers, and precincts at any given time.

- The OCS and OVCS are designed for handling up to 20 consecutive elections.

- Ten elections may be stored in the OCS database simultaneously.

- The system allows 400 ballot styles for an election.

- One OVO and FVS can be initialized for use with ballots from 1-50 precincts, or all precincts.

- An OVI-VC and FVT can present all precincts to the voter.

- The system allows voting by precinct and split precinct.

- The OVO and FVS provides several voting sessions to accommodate different ballot counting purposes. Only one session can be used at a time:

    - **Election Day** voting at the polls and voting centers

    - **Training Election** voting for training or sales purposes

    - **Logic Test** voting to test data and tabulation

    - **Absentee** session

    - **Recount** session

    - **Provisional** session

    - **Regional Early Voting** session

- The OVO/FVS provides the following System Performance:

    - Expected speed (per ballot page)   4 seconds to ballot page confirm

    - Throughput capacity (per ballot page)   6 ballot pages per minute

    - Maximum Volume   5,000 ballot pages

    - Ballot Pages

        - 11" ballot page:

            - Maximum number of voting positions per ballot page (11 inch ballot pages, without Rank Choice Voting): 228

            - Maximum number of voting positions per ballot page (11 inch ballot pages, with Rank Choice Voting): 456

        - 14" ballot page:

- Maximum number of voting positions per ballot page (14 inch ballot pages, without Rank Choice Voting): 300

- Maximum number of voting positions per ballot page (14 inch ballot pages, with Rank Choice Voting): 600

  ▪ 17" ballot page:

- Maximum number of voting positions per ballot page (17 inch ballot pages, without Rank Choice Voting): 372

- Maximum number of voting positions per ballot page (17 inch ballot pages, with Rank Choice Voting): 744

  ▪ 19" ballot page:

- Maximum number of voting positions per ballot page (19 inch ballot pages, without Rank Choice Voting): 420

- Maximum number of voting positions per ballot page (19 inch ballot pages, with Rank Choice Voting): 840

- Maximum number of ballot styles: 50 ballot styles per OVO session if individually entered with a maximum of 400 ballot style choices. For All Precinct sessions, all ballot styles are accepted by the OVO/FVS.

- The OVCS provides several voting sessions to accommodate different ballot counting purposes. Only one session can be used at a time:

  – Normal - Election Day Tabulation

    ▪ Election Day Tabulation

    ▪ Recount

    ▪ Training

  – LAT - Logic and Accuracy Test (LAT) voting to test data and tabulation

  – Absentee session

  – Provisional session

  – Write-In only session

- The OVCS Large scanners provide the following System Performance:

  – Max Ballot pages per batch   500

  – Max Ballot pages per session   5,000

  – Expected speed (ballot pages per hour)   2,100 ballot pages per hour

  – Maximum number of ballot styles: 400 ballot style choices

- The mini OVCS scanner provides the following System Performance:

  – Max Ballot pages per batch   50

  – Max Ballot pages per session   5,000

  – Expected speed (ballot pages per hour)   350 ballot pages per hour

       –   Maximum number of ballot styles: 400 ballot style choices

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

- Up to 10 political parties (including non-partisan) voting their own ballot in a Primary Election. Up to 10 political parties (including non-partisan) voting in a General Straight Ticket Election. 50 parties may appear on the ballot for candidates.

- Up to 2,000 precincts.

- Up to 160 candidates per contest, with a limit of 3,000 combined count of candidates and contests.

- Up to 10 language translations (applies to ballot pages).

- Up to 3 ballot pages per ballot.

- Up to 5,000 ballot pages processed (cast votes) at an OVO/FVS during a single voting session.

1.5.3   Supported Languages

The submitted voting system supports:

- Hindi

- Chinese

- English

- Japanese

- Korean

- Navajo

- Spanish

- Thai

Support for all stated languages will be verified; however, only English and Spanish language ballots will be cast during the performance of functional testing. Additionally, one character based language (Chinese) will be tested during System Integration Testing.

1.5.4   Supported Functionality

The OVS 2.2.3 is designed to support the following voting variations:

- General Election

- Closed Primary

- Open Primary

- Modified Open Primary

- Early Voting

- Partisan/Non-Partisan Offices

- Write-In Voting

- Primary Presidential Delegation Nominations

- Straight Ticket Voting (*including Pennsylvania and Indiana Rules*)

- Presidential-only Voting

- Split Precincts

- Multiple Selection Contests: Vote for N of M

- Ballot Rotation

- Cross Party Endorsement

- Multi-Page Ballots

- Multi-Party Candidate Endorsements

- Provisional or Challenged Ballots

- Absentee Ballots

- Recount Tabulation

- Ranked Choice Voting (RCV)

1.5.5 VVSG

The OVS 2.2.3 shall be evaluated against the relevant requirements contained in the EAC 2005 VVSG, Volumes I and II.

1.5.6 RFIs

There are no RFIs released by the EAC as of the date of this Test Plan that pertain to this test campaign that were not in effect at the time of the baseline system certification.

1.5.7 NOCs

There are no NOCs released by the EAC as of the date of this Test Plan that pertain to this test campaign that were not in effect at the time of the baseline system certification.

2.0   PRE-CERTIFICATION TESTING AND ISSUES

This section describes previous testing performed prior to submitting the voting system to the EAC.

2.1   Evaluation of Prior VSTL Testing

Pro V&V evaluated to the published Final Test Report for the OVS 2.2 System in order to baseline the current system under test.

2.2   Evaluation of Prior Non-VSTL Testing

No prior non-VSTL testing of the OVS 2.2.3 modifications were considered for this test campaign.

2.3   Known Field Issues

OVS 2.2.3 is a modification to a previously certified system (OVS 2.2). There are no known field issues related to the baseline OVS 2.2 system. Any known field issues on previously certified versions derived from the original OVS 2.0 system are addressed in the associated published test plans.

3.0   MATERIALS REQUIRED FOR TESTING

The following sections list all materials needed to enable the test engagement to occur.

The materials required for testing of the OVS 2.2.3 System include all materials to enable the test campaign to occur. This includes the applicable hardware and software as well as the TDP, test support materials, and deliverable materials, as described in the following subsections.

3.1   Software

This subsection lists the proprietary and COTS software to be provided by the manufacturer as part of the test campaign.

All software required for testing is identified in Section 1.1.1 of this test plan. No changes to system software were implemented; therefore, no software was submitted for testing. All software required for testing will be utilized from the baseline test campaign.

3.2   Equipment

This subsection lists the proprietary and COTS equipment to be provided by the manufacturer as part of the test campaign.

For COTS equipment, every effort will be made to verify that the COTS equipment has not been modified for use. This will be accomplished by performing research using the COTS equipment manufacturer's websites based on the serial numbers and service tag numbers for each piece of equipment.

Assigned test personnel will evaluate COTS hardware, system software and communications components for proven performance in commercial applications other than voting.

For PCs, laptops, and servers, the service tag information will be compared to the system information found on each machine. Physical external and internal examination will also be performed when the equipment is easily accessible without the possibility of damage. Hard drives, RAM memory, and other components will be examined to verify that the components match the information found on the COTS equipment manufacturer's websites.

All hardware required for testing is identified in Section 1.1.1 of this test plan.

3.3 Test Materials

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

The materials required for certification testing of the OVS 2.2.3 include all previously identified software, hardware and test materials, as well as the deliverable materials listed below.

3.4 Deliverable Materials

This subsection lists the materials identified by the manufacturer as materials deliverable to the end user for the system being tested.

Table 3-1. Voting System Deliverables

Material	Software Version	Hardware Version	Description
OpenElect Voting Optical (OVO)	2.2	Rev. E	Precinct Ballot Scanner
OpenElect Voting Interface (OVI-VC)	2.2	---	Ballot Marking Device
OVCS	2.2	Canon DR-X10C, DR-G-2140 and Canon M160-II	Central Count Scanner
Freedom Vote Tablet (FVT) Ballot Marking Device	2.2	Rev. F	Ballot Marking Device
Freedom Vote Scanner (FVS)	2.2	Rev. A	Precinct Ballot Scanner
Ballot Box – Plastic (OVO)	1.0	1.1	OVO Ballot Box
Ballot Box – Plastic (OVO)	2.0	1.2	OVO Ballot Box
Ballot Box – Plastic (FVS)	2.2	1.0	FVS Ballot Box
Open Elect Central Suite (OCS)	2.2	---	
Transport Media	1 GB	--	USB Flash Drive
Minuteman UPS	---	EP1500 LCD	UPS
Surgecube	---	Belkin F9H100-CW	Surge Protector
Headphones (optional)	---	Koss KPH7	Stereo headphones
Sip and Puff (optional)		Origin AirVoter	Binary Input Device
OVS 2.2.3 TDP*	---	---	Technical Data Package

* Listed in Section 4.5

3.5   Proprietary Data

All data and documentation considered by the manufacturer to be proprietary will be identified and documented in an independent submission along with a Notice of Protected Information.

4.0   TEST SPECIFICATIONS

Certification testing of the OVS 2.2.3 System submitted for evaluation will be performed to ensure the applicable requirements of the EAC 2005 VVSG and the EAC Testing and Certification Program Manual, Version 2.0, are met. Additionally, all EAC Request for Interpretations (RFI) and Notices of Clarification (NOC) relevant to the system under test will be incorporated in the test campaign. A complete listing of the EAC RFIs and NOCs is available on the EAC website.

4.1   Requirements (Strategy of Evaluation)

To evaluate the OVS 2.2.3 test requirements, the submitted modifications were evaluated against each section of the EAC 2005 VVSG to determine the applicable tests to be performed. Based on this assessment, it was determined the following evaluations would be required to verify compliance of the modifications:

Technical Documentation Package (TDP) Review

A TDP Review will be performed to ensure that all submitted modifications are accurately documented and that the documents meet the requirements of the EAC VVSG 1.0. The preliminary TDP review is performed to gather information concerning the system under test and its capabilities or design intentions. Additionally, a TDP review will be performed throughout the test campaign. The TDP Review includes the Initial Review, the Regulatory/Compliance Review, and the Final Review. This review is conducted to determine if the submitted technical documentation meets the regulatory, customer-stated, or end-user requirements and includes reviewing the documents for stated functionality and verification.

Section 2: Functional Requirements

The requirements in this section shall be tested during the FCA, Accuracy Test, and System Integration Test. This evaluation will utilize baseline test cases as well as specifically designed test cases and will include predefined election definitions for the input data.

The FCA targets the specific functionality claimed by the manufacturer to ensure the product functions as documented. This testing uses both positive and negative test data to test the robustness of the system. The FCA encompasses an examination of manufacturer tests, and the conduct of additional tests, to verify that the system hardware and software perform all the functions described in the manufacturer's documentation submitted in the TDP (such as system operations, voter manual, maintenance, and diagnostic testing manuals). It includes a test of system operations in the sequence in which they would normally be performed. These system operations and functional capabilities are categorized as follows by the phase of election activity in which they are required:

- Overall System Capabilities: These functional capabilities apply throughout the election process. They include security, accuracy, integrity, system audit ability, election management system, vote tabulation, ballot counters, telecommunications, and data retention.

- Pre-voting Capabilities: These functional capabilities are used to prepare the voting system for voting. They include ballot preparation, the preparation of election-specific software (including firmware), the production of ballots, the installation of ballots and ballot counting software (including firmware), and system and equipment tests.

- Voting System Capabilities: These functional capabilities include all operations conducted at the polling place by voters and officials including the generation of status messages.

- Post-voting Capabilities: These functional capabilities apply after all votes have been cast. They include closing the polling place; obtaining reports by voting machine, polling place, and precinct; obtaining consolidated reports; and obtaining reports of audit trails.

- Maintenance, Transportation and Storage Capabilities: These capabilities are necessary to maintain, transport, and store voting system equipment.

The system integration testing addresses the integration of the hardware and software. This testing focuses on the compatibility of the voting system software components and subsystems with one another and with other components of the voting system. During test performance, the system is configured as would be for normal field use.

The accuracy test ensures that each component of the voting system can each process 1,549,703 consecutive ballot positions correctly within the allowable target error rate. The Accuracy test is designed to test the ability of the system to "capture, record, store, consolidate and report" specific selections and absences of a selection. The required accuracy is defined as an error rate. This rate is the maximum number of errors allowed while processing a specified volume of data.

The FCA for this test campaign will include an assessment of the submitted modifications and will include inputs of both normal and abnormal data during test performance. This evaluation will utilize baseline test cases as well as specifically designed test cases and will include predefined election definitions for the input data. As part of the FCA, one primary and one general election will be executed to verify that each of the submitted modifications have been successfully implemented

Section 4: Hardware Requirements

The hardware tests specified in the VVSG are divided into two categories: non-operating and operating. The non-operating tests apply to the elements of the system that are intended for use at poll site locations and are intended to simulate the storage and transport of equipment between the storage facility and the polling location. The Operating tests apply to the entire system, including hardware components that are used as part of the voting system telecommunications capability, and are intended to simulate conditions that the voting system may encounter during operation. Prior to and immediately following each required non-operating and operating test, the system shall be subjected to an operational status check.

The requirements in this section shall be tested and/or evaluated by personnel verified by Pro V&V to be qualified to perform the testing.

4.1.1 Rationale for 'Not Applicable' Requirements

The OVS 2.2.3 is a paper-based system that supports a closed network. Therefore, all EAC 2005 VVSG requirements, with the exceptions listed below, will be evaluated as part of this test campaign.

- Volume I, Section 7.7 (Wireless Communications)

- Volume I, Section 7.9 (Voter Verifiable Paper Audit Trail Requirements)

The rationale for not evaluating the OVS 2.2.3 to the indicated sections is described in following table.

Table 4-1. Not Applicable Requirements

EAC 2005 VVSG Version 1 Volume I, Section	Rationale for 'Not Applicable'
7.7	No wireless technology is present in the Unisyn OVS 2.2.3
7.9	The Unisyn OVS 2.2.3 is a paper-based system

4.2 Hardware Configuration and Design

The Unisyn OVS 2.2.3 is a paper-based optical scan voting system. The OVS 2.2.3 consists of the following major components: the OCS software suite, OVO precinct scanner, FVS precinct scanner, OVI-VC precinct voting interface, OVCS central count scanner, and FVT precinct voting tablet. All components of the OVO, excluding the case, are COTS. All components of the OVI-VC, excluding the case and keypad, are COTS. All components of the FVT, excluding the case, tablet enclosure, and keypad, are COTS. All OVCS components are COTS. All components of the FVS, excluding the case, are COTS. All OCS functions are handled by proprietary software running on COTS PS/laptop/servers.

4.3 Software System Functions

The OCS/OVO/FVS/OVI-VC/OVCS software is a set of Java applications that utilize open source libraries and run on a customized Linux operating system to take advantage of that platform's security and performance. The OVO, FVS, and OVCS use the Java Native Interface (JNI) classes, which are C++ classes, to communicate with the native drivers (also C++) provided by the hardware manufacturer. This is required by the Optical Scanner in the OVO, FVS and the OVCS. The OpenElect system is designed for use in two distinct locales: Central Processing and In-Precinct Systems.

The FreedomVote Tablet (FVT) product is also written in Java, but compiled for use on the Google Android operating system, using different core libraries.

4.4   Test Case Design

Test cases are designed based on the manufacturer's design specifications and the relevant technical requirements set forth by the VVSG. Test cases shall be based on the following aspects of the voting system: Hardware qualitative examination design, Hardware environmental test case design, Software module test case design and data, Software functional test case design, and System level test case design. Test cases shall provide information regarding the sequence of actions to be performed for the execution of a test, the requirements being met, the test objective, test configuration, equipment needed, special requirements, assumptions, and pass/fail criteria. Once the test cases are finalized, they will be validated and published for use in the test campaign. The validation of the test case will be accomplished by technical review and approval. This validation will include the following: confirmation of adequate test coverage of all requirements; confirmation that test case results are not ambiguous and gave objective pass/fail criteria; and confirmation that any automated test suites will produce valid results.

4.4.1   Hardware Qualitative Design

Previous hardware examinations were performed on the certified baseline system (OVS 2.2). The addition of the new FVT tablet to the modified system will require the full suite of electrical testing and environmental testing as detailed in the 2005 VVSG. These tests are listed below:

Electrical Tests

- Electrical Power Disturbance

- Electromagnetic Emissions (Radiated & Conducted)

- Electrostatic Disruption

- Electromagnetic Susceptibility

- Electrical Fast Transient

- Lightning Surge

- Conducted RF Immunity

- Magnetic Fields Immunity

- Electrical Supply

Environmental Tests

- Bench Handling

- Vibration

- Low Temperature

- High Temperature

- Humidity

- Temperature Power Variation

4.4.2   Hardware Environmental Test Case Design

The voting system hardware shall be subjected to the tests specified in Section 4.4.1. Testing will be performed by personnel verified by Pro V&V to be qualified to perform the test. Pro V&V will utilize third-party test facilities for performance of the electrical and environmental tests. Environmental testing will be performed at the NTS Longmont facility located in Longmont, Colorado. Electrical testing will be performed at the Nemko facility located in Carlsbad, California. All pre and post operational status checks shall be conducted by Pro V&V personnel.

4.4.3   Software Module Test Case Design

Software module test case design performed as part of the baseline system test campaign will be utilized during testing of the OVS 2.2.3 test campaign. No modified software was submitted for this test campaign.

4.4.4   Software Functional Test Case Design

Software functional test case design performed as part of the baseline system test campaign will be utilized during testing of the OVS 2.2.3 test campaign. No modified software was submitted for this test campaign.

4.4.5   System-Level Test Case Design

System Level testing will be implemented to evaluate the complete system. This testing will include all proprietary components and COTS components (software, hardware, and peripherals) in a configuration of the system's intended use. For software system tests, the tests shall be designed according to the stated design objective without consideration of its functional specification. The system level hardware and software test cases shall be prepared independently to assess the response of the hardware and software to a range of conditions.

4.5   TDP Evaluation

In order to determine compliance of the modified TDP documents with the EAC 2005 VVSG, a limited TDP review shall be conducted. This review will focus on TDP documents that have been modified since the certification of the baseline system. The review will consist of a compliance review to determine if each regulatory, state, or manufacturer-stated requirement has been met based on the context of each requirement. Results of the review of each document will be entered on the TDP Review Checklist and reported to the manufacturer for disposition of any anomalies. This process will be ongoing until all anomalies are resolved.

Any revised documents during the TDP review process will be compared with the previous document revision to determine changes made, and the document will be re-reviewed to determine whether subject requirements have been met.

A listing of all documents contained in OVS 2.2.3 TDP is provided in Table 4-2.

Table 4-2. TDP Documents

Document Number	Description	Version	Release
04-00512	Technical Data Package-Document List and Version Control	1.0	2.2
04-00446	OVS System Overview	1.2	2.2.3
04-00444	System Functionality Description	1.0	2.2.3
04-00458	System Hardware Specification	1.2	2.2.3
04-00464	Software Design and Specification	1.0	2.2
04-00447	System Security Specification	1.0	2.2
04-00453	System Test and Verification Plan	1.0	2.2
04-00460	Systems Operations Procedure: Warehouse Technician's Guide	1.0	2.2
04-00459	System Maintenance Procedures	1.0	2.2
04-00445	Personnel Training and Deployment Requirements	1.0	2.2
04-00448	Configuration Management Plan	1.0	2.2
04-00454	Quality Assurance Plan	1.0	2.2
04-00469	Final QA Report	1.0	2.2
04-00427	Election Manager User Guide	1.0	2.2
04-00428	Ballot Layout Manager User Guide	1.0	2.2
04-00431	Tabulator Client User Guide	1.0	2.2
04-00432	Tabulator User Guide	1.0	2.2
04-00433	Tabulator Reports User Guide	1.0	2.2
04-00495	OVCS User Guide	1.0	2.2
04-00530	Auditor Users Guide	1.0	2.2
04-00549	EOS Linux and OCS Installation Guide	1.0	2.2
04-00449	System Coding Standards	1.0	2.2
04-00462	Election Day Troubleshooter's Guide	1.0	2.2
04-00463	Election Day Poll Worker's Guide	1.0	2.2
04-00494	OVS Acronyms	1.0	2.2
04-00503	OVS Paper Specification	1.0	2.2
04-00513	Hardware Verification	1.0	2.2.3
04-00542	Requirements of the 2005 VVSG Trace To Vendor Testing and Technical Data Package	1.0	2.2
04-00594	OpenElect Voting System Release Notes, 2.2 to 2.2.3	1.1	2.2.3

4.6 Physical Configuration Audit (PCA)

The physical configuration audit compares the voting system components submitted for qualification to the manufacturer's technical documentation, and shall include the following activities:

- Establish a configuration baseline of software and hardware to be tested; confirm whether manufacturer's documentation is sufficient for the user to install, validate, operate, and maintain the voting system

- Verify software conforms to the manufacturer's specifications; inspect all records of manufacturer's release control system; if changes have been made to the baseline version, verify manufacturer's engineering and test data are for the software version submitted for certification
- If the hardware is non-COTS, Pro V&V shall review drawings, specifications, technical data, and test data associated with system hardware to establish system hardware baseline associated with software baseline
- Review manufacturer's documents of user acceptance test procedures and data against system's functional specifications; resolve any discrepancy or inadequacy in manufacturer's plan or data prior to beginning system integration functional and performance tests
- Subsequent changes to baseline software configuration made during testing, as well as system hardware changes that may produce a change in software operation are subject to re-examination

4.7 System Level Testing

System Level Testing will be implemented to evaluate the complete system. This testing will include all proprietary components and COTS components (software, hardware, and peripherals) in a configuration of the system's intended use. System Level Testing for this campaign includes the evaluations of the following test areas: FCA, Accuracy Testing, and System Integration Testing.

For software system tests, the tests will be designed according to the stated design objective without consideration of its functional specification. The system level hardware and software test cases will be prepared independently to assess the response of the hardware and software to a range of conditions. Pro V&V will review the manufacturer's program analysis, documentation, and module test case design and evaluate the test cases for each module with respect to flow control parameters and entry/exit data.

Pro V&V defines the expected result for each test and the ACCEPT/REJECT criteria for certification. If the system performs as expected, the results will be accepted. If the system does not perform as expected, an analysis will be performed to determine the cause. If needed, the test will be repeated in an attempt to reproduce the results. If the failure can't be reproduced and the expected results are not met, the system will be determined to have failed the test. If the results can't be reproduced, the test will continue. All errors encountered will be documented and tracked through resolution.

4.7.1 Functional Configuration Audit (FCA)

The Functional Configuration Audit (FCA) encompasses an examination of manufacturer's tests, and the conduct of additional tests, to verify that the system hardware and software perform all the functions described in the manufacturer's documentation submitted in the TDP. In addition to functioning according to the manufacturer's documentation tests will be conducted to ensure all applicable EAC 2005 VVSG requirements are met.

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

4.7.2 Accuracy

The accuracy test ensures that each component of the voting system can each process at least 1,549,703 consecutive ballot positions correctly within the allowable target error rate. The Accuracy test is designed to test the ability of the system to "capture, record, store, consolidate and report" specific selections and absences of a selection. The required accuracy is defined as an error rate. This rate is the maximum number of errors allowed while processing a specified volume of data. In an effort to achieve this and to verify the proper functionality of the units under test, the following methods will be used to test components of the voting system:

For paper-based voting systems the ballot positions on a paper ballot must be scanned to detect selections for individual candidates and contests and the conversion of those selections detected on the paper ballot converted into digital data.

In an effort to achieve this and to verify the proper functionality of the units under test, the following methods will be used to test components of the voting system:

The OVO, FVS, and OVCS shall be tested by utilizing a combination of hand marked (70%) and pre-marked (30%) ballots to achieve accuracy rate greater than 1,549,703 correct ballot positions. The OVI-VC and FVT shall be utilized to create ballots that will be implemented as part of the pre-marked test deck.

4.7.3 System Integration

System Integration is a system level test for the integrated operation of both hardware and software. It evaluates the compatibility of the voting system software components or subsystems with one another, and with other components of the voting system environment. This is determined through functional tests integrating the voting system software with the remainder of the system. During this area of testing, the system shall be configured exactly as it would for normal field use. Pro V&V personnel shall properly configure and test the system by following the procedures detailed in the OVS 2.2.3 voting system technical documentation. This includes connecting all supporting equipment and peripherals including ballot boxes, voting booths (regular and accessible), and any physical security equipment such as locks and ties.

To accomplish the test objective, two General Elections and two Primary Elections will be exercised on the voting system, as described below:

Two general elections with the following breakdowns:

- ― General Election GEN-01: A General Election with Straight Party held in four precincts, one of which is a split precinct. This election contains nineteen contests compiled into four ballot styles. Five of the contests are in all four ballot styles.

The other fourteen contests are split between at least two of the precincts with a maximum of four different contest spread across the four precincts.

— General Election GEN-03: A General Election held in two precincts. This election contains eight contests and compiled into two ballot styles. Four of the contests are in both ballot styles. The other four contests are split between the two precincts. This election is designed to functionally test the handling of multiple ballot styles, support for at least three languages including a character-based language, support for common voting variations, and audio support for at least three languages and an ADA binary input device.

Two primary elections with the following breakdowns:

— Primary Election PRIM-01: This election is designed to functionally test a Closed Primary Election with multiple ballots and support for common voting variations. This election contains thirty-one contests and six parties compiled into eighteen ballot styles, each ballot containing six contests.

— Primary Election PRIM-03: A Closed Primary Election held in two precincts. This election contains ten contests and is compiled into two ballot styles. Two of the contests are in both ballot styles. The other eight contests are split between the two parties' ballots. This election is designed to functionally test the handling of multiple ballot styles, support for at least three languages including a character-based language, support for common voting variations, and audio support for at least three languages and an ADA binary input device.

4.7.4 Regression Testing

Regression testing for this test campaign will consist of performance of the System Integration Testing.

5.0 TEST DATA

The following subsections provide information concerning test data recording, criteria, and reduction.

5.1 Test Data Recording

All equipment utilized for test data recording shall be identified in the test data package. The output test data shall be recorded in an appropriate manner as to allow for data analysis. For source code and TDP reviews, results shall be compiled in reports and submitted to Unisyn for resolution.

5.2 Test Data Criteria

The OVS 2.2.3 shall be evaluated against all applicable requirements contained in the EAC 2005 VVSG.

The acceptable range for system performance and the expected results for each test case shall be derived from the manufacturer-submitted technical documentation and the EAC 2005 VVSG.

5.3 Test Data Reduction

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

6.0 TEST PROCEDURE AND CONDITIONS

The following subsections detail the facility requirements, test setup conditions, and sequence of testing.

6.1 Facility Requirements

Unless otherwise annotated, all testing shall be conducted at the Pro V&V test facility located in Huntsville, AL, by personnel verified by Pro V&V to be qualified to perform the test. Unless otherwise specified herein, testing shall be performed at the following standard ambient conditions and tolerances:

- Temperature: 68-75° F (±3.6°F)

- Relative Humidity: Local Site Humidity

- Atmospheric Pressure: Local Site Pressure

- Time Allowable Tolerance: ±5%

Testing performed at third-party laboratories will be subject to the test parameters and tolerances defined by VVSG. If not specified in VVSG, the test facilities' standard parameters and tolerances will be used. These shall be reported in the final Test Report.

6.2 Test Set-up

All voting system equipment shall be received and documented using Pro V&V proper QA procedures. Upon receipt of all hardware, an inspection will be performed to verify that the equipment received is free from obvious signs of damage and/or degradation that may have occurred during transit. If present, this damage shall be recorded, photographed, and reported to the Unisyn Representative. Additionally, a comparison shall be made between the recorded serial numbers/part numbers and those listed on shipper's manifest and any discrepancies shall be reported to the Unisyn Representative. TDP items and all source code received shall be inventoried and maintained by Pro V&V during the test campaign.

During test performance, the system shall be configured as it would be for normal field use. This includes connecting all supporting equipment and peripherals.

6.3 Test Sequence

The OVS 2.2.3 will be evaluated against all applicable requirements in the EAC 2005 VVSG. There is no required sequence for test performance.

6.4 Test Operations Procedure

Pro V&V will identify PASS/FAIL criteria for each executed test case. The PASS/FAIL criteria will be based on the specific expected results of the system. In the case of an unexpected result that deviates from what is considered standard, normal, or expected, a root cause analysis will be performed. Pro V&V will evaluate every EAC 2005 VVSG requirement applicable to the OVS 2.2.3 voting system. Any deficiencies noted will be reported to the EAC and the manufacturer. If it is determined that there is insufficient data to determine compliance, this test plan will be altered, and additional testing will be performed.

APPENDIX A

PROJECT SCHEDULE

Task Name	Start Date	End Date	Assigned To	Duration
EAC Application & TRR	**10/24/22**	**11/11/22**		**15d**
Application Submitted to EAC	10/24/22	10/24/22	Ryan	1d
TRR	11/10/22	11/10/22	Ryan	1d
Application Approval from EAC	11/11/22	11/11/22	Ryan	1d
TDP	**11/08/22**	**02/24/23**		**71d**
Initial Review	11/08/22	11/09/22	Stacey	2d
Compliance Review	11/10/22	02/20/23	Stacey	65d
Final review	02/21/23	02/24/23	Stacey	4d
Test Plan	**12/06/22**	**02/10/23**		**43d**
Test Plan Creation	12/06/22	12/12/22	Wendy	5d
Vendor Review & Comments	12/13/22	12/14/22	Wendy	2d
EAC Submission and Review	12/15/22	01/19/23	Wendy	20d
VSTL Comment Review & Update	01/20/23	01/25/23	Wendy	4d
EAC Submission & Review of Revision	01/26/23	02/08/23	Wendy	10d
EAC Approved Test Plan	02/09/23	02/10/23	Wendy	2d
System Delivery & Setup	**11/08/22**	**11/17/22**		**8d**
PCA	11/08/22	11/10/22	Ryan	3d
System Setup	11/11/22	11/14/22	Ryan	2d
System Loads & Hardening	11/15/22	11/17/22	Ryan	3d
Hardware Testing	**01/10/23**	**02/08/23**		**22d**
Electrical Testing (1 configuration)	01/10/23	01/13/23	Ryan	4d
Environmental Testing (1 configuration)	01/10/23	01/26/23	Walker	13d
Temp Power (85 hours based on 2 each of the configurations total of 2 units under test)	01/30/23	02/03/23	Walker	5d
Electrical Supply (1 config)	02/06/23	02/06/23	Ryan	1d
Maintainability	02/07/23	02/08/23	Ryan	2d
System Level Testing	**12/05/22**	**02/17/23**		**49d**
FCA	12/05/22	12/16/22	Ryan	10d
Usability	12/19/22	12/19/22	Ryan	1d
Accessibility	12/20/22	12/20/22	Ryan	1d
Accuracy	02/06/23	02/09/23	Ryan	4d
Regression Testing	02/10/23	02/10/23	Ryan	1d
System Integration	02/13/23	02/17/23	Ryan	5d
Test Report	**02/20/23**	**04/25/23**		**47d**
Test Report Creation	02/20/23	03/06/23	Wendy	11d
Vendor Review & Comments	03/07/23	03/08/23	Wendy	2d
EAC Submission & Review	03/09/23	04/05/23	Wendy	20d
VSTL Comment Review & Update	04/06/23	04/10/23	Wendy	3d
EAC Submission & Review of Revision	04/11/23	04/24/23	Wendy	10d
EAC Approved Test Report	04/25/23	04/25/23	Wendy	1d