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Test Report for EAC VVSG 1.0 Certification Testing
Election Systems & Software (ES&S)
Voting System (EVS) 6.5.0.0

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SIGNATURES

Approved by: Michael L. Walker 06/24/2024

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Wendy Owens, VSTL Program Director — Date

Approved by: Stacey Glover 06/24/2024

Stacey Glover, QA Manager — Date

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

REVISIONS

Revision	Description	Date
00	Initial Release	06/10/2024
01	Corrections made based on EAC comments	06/24/2024

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1.0 INTRODUCTION

The purpose of this Test Report is to document the procedures that Pro V&V, Inc. followed to perform certification testing during a system modification campaign for the Election Systems & Software (ES&S) Voting System (EVS) 6.5.0.0 (EVS 6.5.0.0) 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. Certification testing of EVS 6.5.0.0 was performed to ensure the applicable requirements of the EAC VVSG 1.0 and the EAC Testing and Certification Program Manual, Version 3.0 were met. Additionally, all EAC Requests for Interpretation (RFI) and Notices of Clarification (NOC) relevant to the system under test were incorporated into the test campaign.

Prior to submitting the voting system for testing, ES&S submitted an application package to the EAC for certification of the EVS 6.5.0.0. The application was accepted by the EAC and the project was assigned the unique Project Number of ESSEVS6500.

The EVS 6.5.0.0 EAC-approved test plan (TP-01-01-ESS-2023-05-01.01), as published on the EAC's website at www.eac.gov, was utilized as the guiding document during test performance. Since test plan approval, and as testing progressed, minor system modifications, such as revised system documentation, were incorporated. This test report reflects all testing completed and details the final versions of all technical documentation and system components and supersedes the approved test plan.

1.1 Description and Overview of EAC Certified System Being Modified

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

The EVS 6.5.0.0 configuration submitted for testing is a modification from the EAC certified EVS 6.4.0.0 system configuration.

EVS 6.5.0.0 is composed of software applications, central count location devices and polling place devices with accompanying firmware, and COTS hardware and software. EVS 6.5.0.0 is comprised of the following components: ExpressVote Universal Voting System Hardware 1.0 (ExpressVote HW1.0), ExpressVote Universal Voting System Hardware 2.1 (ExpressVote HW2.1); ExpressVote Universal Voting System Hardware 3.0 (ExpressVote HW3.0); DS200 poll place scanner and tabulator (DS200); DS300 poll place scanner and tabulator (DS300); DS450 high-throughput central scanner and tabulator (DS450); DS850 high-speed central scanner and tabulator (DS850); DS950 high-speed central scanner and tabulator (DS950): ExpressVote XL Full-Face Universal Voting System (ExpressVote XL); ExpressTouch Electronic Universal Voting System (ExpressTouch); Electionware Election Management Software (Electionware); ES&S Event Log Service (ELS); Removable Media Service (RMS); and Regional Results (RR).

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 EVS 6.4.0.0. Detailed descriptions of the EVS 6.4.0.0 test campaign, including a listing of all configurations and components, are contained in Pro V&V Report No. TR-01-01-ESS-2023-01.03, available for viewing on the EAC's website at www.eac.gov.

The following subsections describe the baselined EVS 6.4.0.0.

ExpressVote Hardware 1.0 (ExpressVote HW1.0)

ExpressVote HW1.0 is a hybrid paper-based polling place voting device that provides touch screen vote capture that incorporates the printing of the voter's selections as a cast vote record, to be scanned for tabulation in any one of the ES&S poll place or central tabulators.

ExpressVote Hardware 2.1 (ExpressVote HW2.1)

ExpressVote HW2.1 is a hybrid paper-based polling place voting device that provides touch screen vote capture that incorporates the printing of the voter's selections as a cast vote record, to be scanned for tabulation in any one of the ES&S poll place or central tabulators.

There are two separate versions of ExpressVote HW2.1: version 2.1.0.0 and version 2.1.2.0 (6.4 & 6.8).

DS200 Poll Place Scanner and Tabulator (DS200)

DS200 is a polling place paper-based voting system, specifically a digital scanner and tabulator that simultaneously scans the front and back of a paper ballot and/or vote summary card in any of four orientations for conversion of voter selection marks to electronic Cast Vote Records (CVR).

DS300 Poll Place Scanner and Tabulator (DS300)

DS300 is a polling place paper-based voting system, specifically a digital scanner and tabulator that simultaneously scans the front and back of a paper ballot and/or vote summary card in any of four orientations for conversion of voter selection marks to electronic Cast Vote Records (CVR).

DS450 High-Throughput Scanner and Tabulator (DS450)

DS450 is a central scanner and tabulator that simultaneously scans the front and back of a paper ballot and/or vote summary card in any of four orientations for conversion of voter selection marks to electronic Cast Vote Records (CVR).

DS850 High-Speed Scanner and Tabulator (DS850)

DS850 is a central scanner and tabulator that simultaneously scans the front and back of a paper ballot and/or vote summary card in any of four orientations for conversion of voter selection marks to electronic Cast Vote Records (CVR).

DS950 High-Speed Scanner and Tabulator (DS950)

DS950 is a central scanner and tabulator that simultaneously scans the front and back of a paper ballot and/or vote summary card in any of four orientations for conversion of voter selection marks to electronic Cast Vote Records (CVR).

ExpressVote XL Full-Face Universal Voting System (ExpressVote XL)

ExpressVote XL is a hybrid paper-based polling place voting device that provides a full-face touch screen vote capture that incorporates the printing of the voter's selections as a cast vote record, and tabulation scanning into a single unit.

ExpressTouch Electronic Universal Voting System (ExpressTouch)

ExpressTouch is a DRE voting system which supports electronic vote capture for all individuals at the polling place.

Electionware Election Management Software (Electionware)

Electionware is an end-to-end election management software application that provides election definition creation, ballot formation, equipment configuration, result consolidation, adjudication and report creation. Electionware is composed of five software groups: Define, Design, Deliver, Results, and Manage.

ES&S Event Log Service (ELS)

ELS monitors and logs users' interactions with the Election Management System. Events that happen when a connection to the database is not available are logged to the Windows Operating System log through the ELS.

Removable Media Service (RMS)

RMS is a utility that runs in the background of the Windows operating system. RMS reads specific information from any attached USB devices so that ES&S applications such as Electionware can use that information for media validation purposes.

Regional Results (RR)

RR is a standalone application that is deployed at Regional Sending Sites. This application establishes a secure connection to the central results transfer server at the jurisdiction headquarters and reads the election media with results from the different poll places. For more efficient results reporting, the Regional Results software then securely transmits the encrypted unofficial results collection files over a customer dedicated network.

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 Voting System Testing and Certification Program Manual, Version 3.0
- Election Assistance Commission Voting System Test Laboratory Program Manual, Version 3.0
- National Voluntary Laboratory Accreditation Program NIST Handbook 150, 2020 Edition, "NVLAP Procedures and General Requirements (NIST HB 150-2020)"
- National Voluntary Laboratory Accreditation Program NIST Handbook 150-22, 2021 Edition, "Voting System Testing (NIST Handbook 150-22-2021)"
- 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
- Election Assistance Commission "Approval of Election Systems & Software EVS 6.5.0.0 Testing Application Package" letter dated February 13, 2024
- EAC Requests for Interpretation (RFI) and Notices of Clarification (NOC) (listed on www.eac.gov)
- *Pro V&V EVS 6.4.0.0 Certification Test Report TR-01-01-ESS-2023-01.03*, dated August 15, 2023
- *EAC ES&S EVS 6.4.0.0 Certificate of Conformance and Scope of Certification*, dated August 18, 2023
- ES&S EVS 6.5.0.0 Technical Data Package
- FLEVS 6.5.0.0 Voting System Hardware Testing Report TR v. 01-02-ESS-2023-02.00
- NTS/Element Hardware Test Reports:
  - *TR-PR171950-00-REV2-Environmental-EV3*
  - *TR-PR171950-1-REV1-Emissions-EV3*
  - *TR-PR171950-2-REV2-Immunity-EV3*
  - *TR-PR171953-00-REV2-Environmental-EVXL*
  - *TR-PR171953-REV1-Emissions-EVXL*
  - *TR-PR171953-REV1-Immunity-EVXL*
- NTS/Element Safety Report - *PRVV0001-R1_UL 62368-1 2019*

1.3 Terms and Abbreviations

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

"ADA" – Americans with Disabilities Act 1990

"CM" – Configuration Management

"COTS" – Commercial Off-The-Shelf

"EAC" – United States Election Assistance Commission

"ELS" – Election Log Service

"EMS" – Election Management System

"ES&S" – Election Systems and Software

"EVS" – ES&S Voting System

"FCA" – Functional Configuration Audit

"HAVA" – Help America Vote Act

"NOC" – Notice of Clarification

"PCA" – Physical Configuration Audit

"QA" – Quality Assurance

"RMS" – Removable Media Service

"RFI" – Request for Interpretation

"TDP" – Technical Data Package

"UVC" – Universal Voting Console

"VSTL" – Voting System Test Laboratory

"VVSG" – Voluntary Voting System Guidelines

2.0 CERTIFICATION TEST BACKGROUND

EVS 6.5.0.0 is a modified voting system configuration that includes the addition of ExpressVote HW3.0, upgrades to the components of the EVS 6.4.0.0, new configuration options, and modifications to existing components. Pro V&V performed an evaluation of results from the previous test campaign to determine the scope of testing required for certification of the EVS 6.5.0.0. Based on this evaluation, Pro V&V determined that testing from the previous test campaign would establish the baseline and that the focus of this test campaign would be on the documented system updates.

2.1 Revision History

Table 2-1 details the version history of the EVS 6.5.0.0 System.

Table 2-1. EVS 6.5.0.0 System Revision History

System Version	Certification Type	Baseline System	Certification Number
EVS 6.0.0.0	New System	-- (Original System) --	ESSEVS6000
EVS 6.0.2.0	Modification	EVS 6.0.0.0	ESSEVS6020
EVS 6.0.4.0	Modification	EVS 6.0.2.0	ESSEVS6040
EVS 6.1.0.0	Modification	EVS 6.0.4.0	ESSEVS6100
EVS 6.2.0.0	Modification	EVS 6.1.0.0	ESSEVS6200
EVS 6.3.0.0	Modification	EVS 6.2.0.0	ESSEVS6300
EVS 6.4.0.0	Modification	EVS 6.3.0.0	ESSEVS6400
EVS 6.5.0.0	Modification	EVS 6.4.0.0	ESSEVS6500*

*Upon grant of certification by the EAC

2.2 Scope of Testing

The scope of testing focused on evaluating the modifications detailed in Section 2.2.2.1 of this Test Report. Primarily, these modifications focused on the addition of ExpressVote HW3.0, upgrades to the components of the previously certified EVS 6.4.0.0 system, new configuration options, and modifications to existing components. To determine the EVS 6.5.0.0 test requirements, the submitted modifications were evaluated against each section of the EAC VVSG 1.0 to determine the applicable tests to be performed. Based on this assessment, it was determined that multiple areas within the EAC VVSG 1.0 would be evaluated to encompass the required tests.

A breakdown of the areas and associated tests is listed below:

- EAC VVSG 1.0 Volume 1, Section 2: Functional Requirements
  - Functional Configuration Audit (FCA), including Regression Testing
  - Physical Configuration Audit (PCA), including System Loads & Hardening
  - Technical Documentation Package (TDP) Review
  - Accuracy Testing
  - Volume and Stress Testing
  - System Integration Testing
- EAC VVSG 1.0 Volume 1, Section 3: Usability & Accessibility
  - Usability & Accessibility Testing
  - Technical Documentation Package (TDP) Review
- EAC VVSG 1.0 Volume 1, Section 4: Hardware Requirements
  - Electrical Tests (ExpressVote HW3.0, ExpressVote XL)

- Environmental Tests (ExpressVote HW3.0, ExpressVote XL)
- Technical Documentation Package (TDP) Review

Note: Due to the introduction of the ExpressVote HW3.0 and the modifications to the ExpressVote XL, it was determined that hardware testing and a safety review would be required. The full suite of hardware electrical testing and all applicable environmental tests for the ExpressVote HW3.0 and ExpressVote XL, as well as a Safety Review of the ExpressVote HW3.0, were successfully conducted as part of a previous state level test campaign performed against the hardware test requirements of VVSG 2.0. The Pro V&V test report and associated hardware test reports of this testing were submitted to the EAC for evaluation and approved for reuse to satisfy the hardware test requirements in this test campaign.

- EAC VVSG 1.0 Volume 1, Section 5: Software Requirements
  - Source Code Review, Compliance Build, Trusted Build, and Build Document Review
  - Technical Documentation Package (TDP) Review
  - Functional Configuration Audit (FCA)
- EAC VVSG 1.0 Volume 1, Section 7: Security Requirements
  - Security Testing
  - Technical Documentation Package (TDP) Review

Note: Section 6 (Telecommunications Requirements) of the VVSG 1.0 is not applicable to EVS 6.5.0.0 and was therefore not included in testing. Additionally, Sections 8 (Quality Assurance Requirements) and 9 (Configuration Management Requirements) were reviewed in a previous test campaign and are not impacted by the submitted modifications.

2.2.1 Regression Testing

EVS 6.5.0.0 is a modified voting system configuration that includes functional upgrades and modifications 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 consisted of the execution of the System Integration Testing.

2.2.2 Modification Overview

EVS 6.5.0.0 is a modified voting system configuration that includes upgrades to the components of the EVS 6.4.0.0, new configuration options and modifications to existing components. This release introduces the ExpressVote Universal Voting System Hardware 3.0 (ExpressVote HW3.0). The ExpressVote HW3.0 is an ADA-compliant vote capture and marking device designed for all voters, including non-native English speakers and those who need special assistance. This release introduces hardware modifications to the ExpressVote XL Full-Face Universal Voting System (ExpressVote XL). The modifications included new parts, new replacement parts (determined to be the same fit and function as current parts), and parts introduced to replace end-of-life (EOL) components. In addition, EVS 6.5.0.0 presents a new Electionware module, Additional Reporting, which enhances the tracking and exporting of results with a suite of new, user-friendly software tools.

2.2.2.1 Detailed List of Changes

The following list includes specific changes between the current EVS 6.5.0.0 and the baseline of the EVS 6.4.0.0, as taken from the *ES&S Voting System 6.5.0.0 System Change Notes. No changes were submitted by ES&S for evaluation after the approval of the Test Plan TP-01-01-ESS-2023-05-01.*

HARDWARE CONFIGURATION CHANGES

- New hardware
  - **ExpressVote Hardware 3.0 (ExpressVote HW3.0):** The ExpressVote is a vote capture device designed for all voters, with independent voter-verifiable paper record that is digitally scanned for tabulation on a compatible ES&S tabulator.

New parts have been introduced to replace end-of-life (EOL) components. The replacement parts are the same fit and function as the original.

- Hardware Modifications
  - **ExpressVote XL**: added/updated the following components:
    - Introduced the motherboard revision 2.0 to replace end-of-life parts
    - Added a smart card reader for multi-factor authentication (reserved for future use)
    - Added an 8GB CFast 2 (data) card for customers with large volume elections (optional)
    - Added a re-engineered Paper Path Module (PPM) ground strap

SOFTWARE/FIRMWARE CHANGES

Cross-Product Changes

- Change ID EVS-4787: Expanded Language Support

  Added support for additional languages on printed ballots and for the ExpressVote.

  Impacted products:

- Electionware
- ExpressVote

- Change ID EVS-3987: ExpressPass

  Added support for scanning a 2D barcode containing voter selections generated by a third-party application.

  Impacted products:

  - Electionware
  - ExpressVote

- Change ID EVS-3780: Open-Source Fonts

  Replaced all purchased fonts with open-source equivalents.

  Impacted products:

  - Voting System

- Change ID EVS-4669: Security

  Implemented recommended security enhancements based on third-party security review.

  Impacted products:

  - Voting System

DS300

- Change ID EVS-4078, EVS-5348: DS300 Version 3.2.0.0

  Added the option to validate the application files on-demand from the administrative menu.

  Impacted products:

  - DS300

Electionware

- Change ID EVS-3999: Version 6.5.0.0

  Added a results export XML using the common data format.

  - Results Exports

- Change ID EVS-3767: Version 6.5.0.0

  Added the Additional Reporting module with a live results dashboard.

  - Reporting

- Change ID EW-21433: Version 6.5.0.0 Ballot Layout

  Added the ability to lay out the ExpressVote XL touch screen ballot in a column-by-column display similar to the Column Portrait layout available in Paper Ballot

  - ExpressVote XL

2.3 System Diagram

Figure 2-1 illustrates the end-to-end functionality of EVS 6.5.0.0, as derived from the EVS 6.5.0.0 technical documentation.

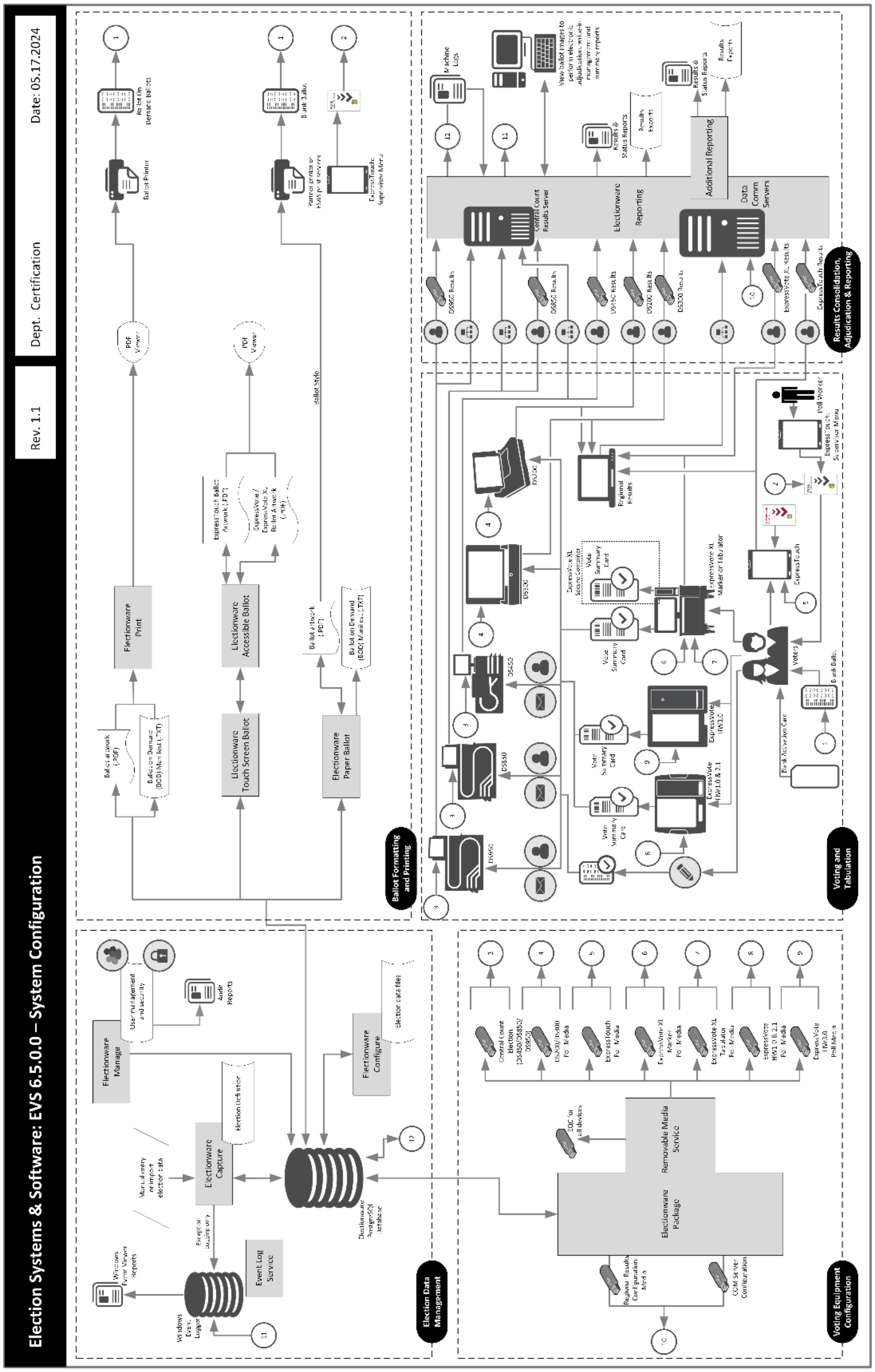

Figure 2-1. EVS 6.5.0.0 System Overview

2.4 Supported Functionality

EVS 6.5.0.0 is designed to support the following voting variations:

- General Election
- Closed Primary
- Open Primary
- Early Voting
- Partisan/Non-Partisan Offices
- Write-In Voting
- Split Precincts
- Vote for N of M
- Ballot Rotation
- Provisional or Challenged Ballots
- Straight Party Voting
- Cross-party Endorsement
- Ranked Order Voting

2.5 Supported Languages

The following languages are stated to be supported by EVS 6.5.0.0:

- English
- Spanish
- Chinese
- Korean
- Japanese
- Hindi
- Bengali
- Vietnamese
- Tagalog
- Creole
- Russian
- French
- Punjabi
- Gujarati*
- Arabic*
- Armenian*
- Burmese*
- Khmer*

- Hmong*
- Indonesian*
- Ilocano*
- Laotian*
- Mien*
- Mongolian*
- Nepali*
- Persian*
- Syriac*
- Tamil*
- Telegu*
- Thai*
- Urdu*

**** Not supported by DS200 and DS300 tabulators.***

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

For the character-based language, the ballot was created by Pro V&V and voted utilizing both paper ballots and ADA voting devices along with all applicable peripherals. The character-based languages for the ballot were created using a readily available online translation tool. The translated language text was entered into Electionware and a ballot preview was generated in the Electionware application. The characters displayed in the ballot preview were compared to the characters generated by the online translation tool, to ensure that the characters matched. The ballots were then generated and printed, and the election loaded onto the tabulators, the BMD units, and the DRE unit. The characters displayed on both the printed ballots and displayed on the BMD and DRE units were compared to the original characters generated by the online translation tool to verify that the characters matched.

2.6 System Limits

The system limits that were verified during testing to be supported by the EVS 6.5.0.0 are provided in Table 2-2.

Table 2-2. EVS 6.5.0.0 System Limits

System Characteristic	Boundary or Limitation	Limiting System Component
Max. precincts allowed in an election	9,999	Electionware
Max. candidates allowed per election	10,000	Electionware
Max. contests allowed in an election	10,000	Electionware

Table 2-2. EVS 6.5.0.0 System Limits *(continued)*

System Characteristic	Boundary or Limitation	Limiting System Component
Max. contests allowed per ballot style	500 or # of positions on ballot	N/A
Max. candidates (ballot choices) allowed per contest	230	Electionware
Max. number of parties allowed	General election: 75 Primary election: 30 (including nonpartisan party)	Electionware
Max. 'vote for' per contest	230	Electionware
Ballot formats	All paper ballots used in an election must be the same length. Votable paper ballots must contain the same number of rows	Ballot scanning equipment
Max. Ballot Styles	15,000	Electionware
Max. ballots per batch	1,500	DS450/DS850/DS950
Max. precinct types/groups	25 (arbitrary)	Electionware
Max. precincts of a given type	250 (arbitrary)	Electionware
Max. reporting groups	14	Electionware
Max. connections	18 client workstations	Electionware

Additionally, the following EVS 6.5.0.0 component limitations have been identified:

ExpressVote Limitations

1. ExpressVote capacities exceed all documented limitations for the ES&S election management, vote tabulation and reporting system. For this reason, Election Management System and ballot tabulator limitations define the boundaries and capabilities of the ExpressVote system as the maximum capacities of the ExpressVote are never approached during testing.
2. ExpressVote does not support Massachusetts Group Vote.
3. ExpressVote does not support Universal Primary Contest.
4. ExpressVote does not support Multiple Target Cross Endorsement.
5. ExpressVote does not support 19-inch cards with ballot stubs.
6. ExpressVote vote summary cards using the high-capacity barcode are limited to 630 or fewer oval positions.
7. ExpressVote does not support open primary elections in conjunction with high-capacity barcodes.

ExpressVote XL Limitations

1. ExpressVote XL capacities exceed all documented limitations for the ES&S election management, vote tabulation and reporting system. For this reason, Election Management System and ballot tabulator limitations define the boundaries and capabilities of the

ExpressVote XL system as the maximum capacities of the ExpressVote XL are never approached during testing.

2. ExpressVote XL does not offer open primary support based on the ES&S definition of Open Primary, which is the ability to select a party and vote based on that party.
3. In a General election, one ExpressVote XL screen can hold 32 party columns if set up as columns or 16 party rows if set up as rows.
4. ExpressVote XL does not support Massachusetts Group Vote.
5. ExpressVote XL does not support Universal Primary Contest.
6. ExpressVote XL does not support 17-inch cards with ballot stubs or 19-inch cards with ballot stubs.
7. ExpressVote XL vote summary cards using the high-capacity barcode are limited to 630 or fewer oval positions.

ExpressTouch Limitations

1. ExpressTouch capacities exceed all documented limitations for the ES&S election management, vote tabulation and reporting system. For this reason, Election Management System limitations define the boundaries and capabilities of the ExpressTouch system as the maximum capacities of the ES&S ExpressTouch are never approached during testing.
2. ExpressTouch does not offer open primary support based on the ES&S definition of Open Primary, which is the ability to select a party and vote based on that party.
3. ExpressTouch does not support Massachusetts Group Vote.
4. ExpressTouch does not support Universal Primary Contest.
5. ExpressTouch does not support Multiple Target Cross Endorsement.

Electionware Limitations

1. Electionware software field limits were calculated based on an average character width for ballot and report elements. Some uses and conditions, such as magnified ballot views or combining elements on printed media or ballot displays, may result in field limits (and associated warnings) lower than those listed. Check printed media and displays before finalizing the election.
2. Electionware Export Ballot Images function is limited to 250 districts per export.
3. Electionware supports the language special characters listed in the System Overview document. Languages with special characters other than those on that list may not appear properly when viewed on equipment displays or reports.

Electionware Paper Ballot Limitations

1. The paper ballot code channel, which is the series of black boxes that appear between the timing track and ballot contents, limits the number of available ballot variations depending on how a jurisdiction uses this code to differentiate ballots. The code can be used to differentiate

ballots using three different fields defined as: Sequence (available codes 1-16,300), Type (available codes 1-30) or Split (available codes 1-18).

2. For paper ballots, if Sequence is used as a ballot style ID, it must be unique election-wide and the Split code will always be 1. In this case the practical style limit would be 16,300.
3. The ExpressVote activation card has a ballot ID consisting of three different fields defined as: Sequence (available codes 1-16,300), Type (available codes 1-30) or Split (available codes 1-18).
4. Grid Portrait and Grid Landscape ballot types are New York specific and not for general use.

DS200 Limitations

1. The DS200 configured for an early vote station does not support precinct level results reporting. An election summary report of tabulated vote totals is supported.
2. The DS200 storage limitation for write-in ballot images is 3,600 images. Each ballot image includes a single ballot face, or one side of one page.
3. Write-in image review requires a minimum 1GB of onboard RAM.
4. To successfully use the write-in report, ballots must span three or more vertical columns. If the column is greater than 1/3 of the ballot width (two columns or less), the write-in image will be too wide to print on the tabulator report tape.

DS300 Limitations

1. The DS300 configured for an early vote station does not support precinct level results reporting. An election summary report of tabulated vote totals is supported.
2. The DS300 storage limitation for write-in ballot images is 3,600 images. Each ballot image includes a single ballot face, or one side of one page.
3. To successfully use the write-in report, ballots must span three or more vertical columns. If the column is greater than 1/3 of the ballot width (two columns or less), the write-in image will be too wide to print on the tabulator report tape.

2.7 VVSG

EVS 6.5.0.0 was evaluated against the relevant requirements contained in the EAC VVSG 1.0. To evaluate the EVS 6.5.0.0 test requirements, the submitted modifications were evaluated against each section of the EAC VVSG 1.0 to determine the applicable tests to be performed. Additionally, all requirements that were excluded from the previous test campaign (EVS 6.4.0.0) were also deemed not applicable to this test campaign. The submitted modifications did not require the evaluation of any requirements that were not included in the baseline system.

2.8 RFIs

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

2.9 NOCs

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

3.0 TEST FINDINGS AND RECOMMENDATIONS

EVS 6.5.0.0 was evaluated against the relevant requirements contained in the EAC VVSG 1.0, Volumes I and II. The focus of this test campaign was on the modifications to the voting system configuration that included upgrades to the components of the baselined system. The summary findings and recommendations for each area of testing are provided in the following sections.

3.1 Summary Findings and Recommendation

Summary findings for the System Level Testing (System Integration Testing, Accuracy, and Limited FCA), PCA, Source Code Review, Usability & Accessibility, Security, and Hardware Testing are detailed in the relevant sections of this report. In addition to these areas of testing, a TDP Review was performed, as described below.

Technical Documentation Package (TDP) Review

In order to determine compliance of the modified TDP documents with the EAC VVSG 1.0, a limited TDP review was conducted. This review focused on TDP documents that have been modified since the certification of the baseline system. The review consisted of a compliance review to verify that each regulatory, state, or manufacturer-stated requirement had been met based on the context of each requirement.

Results of the review of each document were entered on the TDP Review Checklist and reported to the manufacturer for disposition of any anomalies. This process was ongoing until all anomalies were resolved. Any revised documents during the TDP review process were compared with the previous document revision to determine changes made, and the document was re-reviewed to determine whether subject requirements had been met. A listing of all documents contained in the EVS 6.5.0.0 TDP is provided in Table 3-1.

Table 3-1. EVS 6.5.0.0 TDP Documents

Document ID	Description	Revision
00_Preface		
ESSVS_6'5'0'0_L_REQUIREMENTSMATRIX_QA	Requirements of the VVSG 1.0 Trace to Vendor Testing	1.1
ESSVS_6'5'0'0_L_Requirements Matrix_TDP	Requirements of the VVSG 1.0 Trace to TDP	1.1
01_System Overview		
ESSVS_6'5'0'0_D_SYSOVR	System Overview	1.5
02_System Functionality Description		
ESSVS_6'5'0'0_D_SFD	System Functionality Description	1.1

Table 3-1. EVS 6.5.0.0 TDP Documents *(continued)*

Document ID	Description	Revision
03_System Hardware Specification		
DS200_1'2_SPC_HWSPEC	DS200 Hardware Specification 1.2	3.8
DS200_1'3_SPC_HWSPEC	DS200 Hardware Specification 1.3	4.10
DS300_1'0_SPC_HWSPEC	DS300 Hardware Specification 1.0	1.2
DS450_1'0_SPC_HWSPEC	DS450 Hardware Specification 1.0	1.12
DS850_1'0_SPC_HWSPEC	DS850 Hardware Specification 1.0	1.11
DS950_1'1_SPC_HWSPEC	DS950 Hardware Specification 1.1	1.1
ETOUCH_1'0_SPC_HWSPEC	ExpressTouch Hardware Specification 1.0	1.1
EVOTE_1'0_SPC_HWSPEC	ExpressVote Hardware Specification 1.0	3.12
EVOTE_2'1_SPC_HWSPEC	ExpressVote Hardware Specification 2.1	1.5
EVOTE_3'0_SPC_HWSPEC	ExpressVote Hardware Specification 3.0	1.1
EVOTEXL_1'0_SPC_HWSPEC	ExpressVote XL Hardware Specification 1.0	1.5
03_System Hardware Specification – 01_Approved Parts List		
DS200_1'2_L_APL	Approved Parts List: DS200 HW1.2	1.1
DS200_1'3_L_APL	Approved Parts List: DS200 HW 1.3	1.7
DS300_1'0_L_APL	Approved Parts List: DS300 HW 1.0	1.4
DS450_1'0_L_APL	Approved Parts List: DS450 HW 1.0	1.6
DS850_1'0_L_APL	Approved Parts List: DS850 HW 1.0	1.7
DS950_1'1_L_APL	Approved Parts List: DS950 HW 1.1	1.2
ETOUCH_1'0_L_APL	Approved Parts List: ExpressTouch HW 1.0	1.1
EVOTE_1'0_L_APL	Approved Parts List: ExpressVote HW 1.0	2.3
EVOTE_2'1_L_APL	Approved Parts List: ExpressVote HW 2.1	2.7
EVOTE_3'0_L_APL	Approved Parts List: ExpressVote HW 3.0	1.1
EVOTEXL_1'0_L_APL	Approved Parts List: ExpressVote XL HW 1.0	1.6
04_Software Design and Specification		
DS200_3'2'0'0_SDS	DS200 - Software Design Specification	1.2
DS300_3'2'0'0_SDS	DS300 - Software Design Specification	1.3
DS450_4'4'0'0_SDS	DS450 - Software Design Specification	1.2
DS850_4'4'0'0_SDS	DS850 - Software Design Specification	1.2
DS950_4'4'0'0_SDS	DS950 - Software Design Specification	1.2
ELS_3'0'0'0_SDS	Event Log Service - Software Design Specifications	1.2
ESSVS_1'0_P_CODING STANDARDS	Coding Standards	1.10
ESSVS_1'0_P_SYSDEV PROGRAM	System Development Program	2.3
ESSVS_1'0_SPC_LICENSE AGREEMENTS	License Agreements for Procured Software	1.19
ETOUCH_4'4'0'0_SDS	ExpressTouch - Software Design Specification	1.1
EVOTE_4'4'0'0_SDS_HW1'0	ExpressVote1.0-Software Design Specification	1.1
EVOTE_4'4'0'0_SDS_HW2'1	ExpressVote2.1-Software Design Specification	1.1
EVOTE_4'4'0'0_SDS_HW3'0	ExpressVote 3 - Software Design Specification	1.1
EVOTEXL_4'4'0'0_SDS	ExpressVoteXL-Software Design Specification	1.1
EWARE_6'5'0'0_SDS	Electionware-Software Design Specification	1.1

Table 3-1. EVS 6.5.0.0 TDP Documents *(continued)*

Document ID	Description	Revision
EWARE_99'3_D_PostGreSQL Descriptions_EVS6500	PostGreSQL Descriptions EVS6500	---
EWARE_99'5_D_XMLDiagrams_ EVS6500	XML Diagrams EVS6500	---
EWARE_99'6_D_MediaContents_ 6500	Media Contents 6500	---
RGRSLT_1'7'0'0_SDS	Regional Results-Software Design Specification	1.1
05_System Test and Verification		
ESSVS_6'5'0'0_D_TestPlan	System Test Plan: ES&S Voting System 6.5.0.0	1.1
05_System Test and Verification - 01_Usability Reports		
DS200_1'3_D_CIFRpt	Usability Test Report: DS200 Precinct-Based Scanner and Tabulator Version 2.17.0.0 ES&S Voting System 6.0.0.0	---
DS300_1'0_D_CIFRpt	Usability Test Report: ES&S DS300 Precinct-Based Scanner and Tabulator ES&S Voting System 6.3.0.0	---
ETOUCH_1'0_D_CIFRpt	Usability Test Report: Expresstouch Electronic Universal Voting System Version 1.0.0.0 ES&S Voting System 6.0.0.0	---
EVOTE_1'0_D_CIFRpt	Usability Test Report: Expressvote Universal Voting System Version 1.5.0.0 ES&S Voting System 6.0.0.0	---
EVOTE_2'1_D_CIFRpt	Usability Test Report: Expressvote Universal Voting System Version 2.4.0.0 ES&S Voting System 6.0.0.0	---
EVOTE_3'0_D_CIFRpt	Usability Test Report: Expressvote Hardware version 3.0 Voting System ES&S Election Voting System 6.5.0.0	---
EVOTEXL_1'0_D_CIFRpt	Usability Test Report: Expressvote XL Full-Face Universal Voting System Version 1.0.0.0 ES&S Voting System 6.0.0.0	---
05_System Test and Verification - 02_Cert Test Cases		
ESSVS_6'5'0'0_CERT_TC_ACCURACY	Certification Test Cases Accuracy ES&S Voting System 6.5.0.0	1.0
ESSVS_6'5'0'0_CERT_TC_INTEGRATIONREGRESSION	Certification Test Cases Integration and Regression ES&S Voting System 6.5.0.0	1.0
05_System Test and Verification - 03_QA Test Cases		
ESSVS_6'5'0'0_QA_TC_REGRESSION_ADDENDUM	QA Test Cases Regression – Addendum ES&S Voting System 6.5.0.0	1.0
ESSSYS_6'5'0'0_QA_TC_REGRESSION	QA Test Cases Regression ES&S Voting System 6.5.0.0	1.0

Table 3-1. EVS 6.5.0.0 TDP Documents *(continued)*

Document ID	Description	Revision
06_System Security Specification		
ESSVS_6'5'0'0_SPC_SecBest Pract	Security Best Practices for Physically Securing ES&S Equipment	1.2
ESSVS_6'5'0'0_SPC_SECURITY SCRIPTDESC	Security Script Description ES&S Standards and Procedures	1.1
ESSVS_6'5'0'0_SPC_SETUP CONFIGGUIDE_CLIENT WORKSTATION	EMS Client Workstation Secure Setup & Configuration Guide	1.2
ESSVS_6'5'0'0_SPC_SETUP CONFIGGUIDE_DATACOMM SERVER	Data Communication Server Secure Setup & Configuration Guide	1.2
ESSVS_6'5'0'0_SPC_SETUP CONFIGGUIDE_EMSSERVER	EMS Server Secure Setup & Configuration Guide	1.3
ESSVS_6'5'0'0_SPC_SETUP CONFIGGUIDE_FIREWALL	Firewall Setup & Configuration Guide	1.1
ESSVS_6'5'0'0_SPC_SETUP CONFIGGUIDE_REGIONAL RESULTS	Regional Results Setup & Configuration Guide	1.2
ESSVS_6'5'0'0_SPC_SETUP CONFIGGUIDE_STANDALONE WORKSTATION	EMS Standalone Workstation Secure Setup & Configuration Guide	1.2
ESSVS_6'5'0'0_SPC_SETUP CONFIGGUIDE_VPNROUTER	VPN Router Setup and Configuration Guide for RV340	1.1
ESSVS_6'5'0'0_SPC_SYSTEM SECURITY	Voting System Security Specification	1.3
06_System Security Specification - 01_Verification Procedures & Scripts		
ESSVS_1'7'0'0_D_VERPROC_ REGIONALRESULTS	Verification Procedure: Regional Results	1.2
ESSVS_1'7'0'0_D_VERPROC_ REGIONALRESULTS_ADMIN	Verification Procedure: Regional Results - Administrator's Guide	1.2
ESSVS_3'2'0'0_D_VERPROC_ DS200_HW1'2	Verification Procedure: DS200 Hardware 1.2 Firmware Version: 3.2.0.0	1.2
ESSVS_3'2'0'0_D_VERPROC_ DS200_HW1'3	Verification Procedure: DS200 Hardware 1.3 Firmware version: 3.2.0.0	1.2
ESSVS_3'2'0'0_D_VERPROC_ DS300	Verification procedure: DS300 Firmware Version: 3.2.0.0	1.2
ESSVS_4'4'0'0_D_VERPROC_ DS450	Verification Procedure: DS450 Firmware Version: 4.4.0.0	1.2
ESSVS_4'4'0'0_D_VERPROC_ DS850	Verification Procedure: DS850 Firmware Version: 4.4.0.0	1.2
ESSVS_4'4'0'0_D_VERPROC_ DS950	Verification Procedure: DS950 Firmware Version: 4.4.0.0	1.2
ESSVS_4'4'0'0_D_VERPROC_ ETOUCH	Verification Procedure: ExpressTouch Firmware Version: 4.4.0.0	1.2

Table 3-1. EVS 6.5.0.0 TDP Documents *(continued)*

Document ID	Description	Revision
ESSVS_4'4'0'0_D_VERPROC_ EVOTE_HW1'0	Verification Procedure: ExpressVote Hardware 1.0 Firmware Version: 4.4.0.0	1.2
ESSVS_4'4'0'0_D_VERPROC_ EVOTE_HW2'1	Verification Procedure: ExpressVote Hardware 2.1 Firmware Version: 4.4.0.0	1.2
ESSVS_4'4'0'0_D_VERPROC_ EVOTE_HW3'0	Verification Procedure: ExpressVote Hardware 3.0 Firmware Version: 4.4.0.0	1.2
ESSVS_4'4'0'0_D_VERPROC_ EVOTEXL	Verification Procedure: ExpressVote XL Firmware Version: 4.4.0.0	1.2
ESSVS_6'5'0'0_D_VERPROC_ DATACOMM	Verification Procedure: Data Communication Server	1.2
ESSVS_6'5'0'0_D_VERPROC_D ATACOMM_ADMIN	Verification Procedure: Data Communication Server Administrator's Guide	1.1
ESSVS_6'5'0'0_D_VERPROC_ EMS	Verification Procedure: Election Management System	1.1
ESSVS_6'5'0'0_D_VerProc_ EMS_Admin	Verification Procedure: Election Management System – Administrator's Guide	1.1
ESSVS_6'5'0'0_D_VERPROC_ FIREWALL	Verification Procedure: Cisco ASA Firewall	1.1
ESSVS_6'5'0'0_D_VERPROC_ OVERVIEW	Verification Procedure: Overview	1.2
ESSVS_6'5'0'0_D_VERPROC_ VPN ROUTER	Verification Procedure: VPN Router	1.1
06_System Security Specification - 02_ValidationFileLists		
DataComm_6'5_L_ValFileList	Validation File List: Data Communications Server	1.2
DS200_3'2_L_ValFileList_HW1'2	Validation File List: DS200, Hardware 1.2	1.3
DS200_3'2_L_ValFileList_HW1'3	Validation File List: DS200	1.3
DS300_3'2_L_ValFileList	Validation File List: DS300	1.2
DS450_4'4_L_ValFileList	Validation File List: DS450	1.2
DS850_4'4_L_ValFileList	Validation File List: DS850	1.3
DS950_4'4_L_ValFileList	Validation File List: DS950	1.2
EMS_6'5_L_ValFileList_Client	Validation File List: Election Management System- Client	1.2
EMS_6'5_L_ValFileList_Server	Validation File List: Election Management System- Server	1.2
EMS_6'5_L_ValFileList_ Standalone	Validation File List: Election Management System- Standalone	1.2
ETOUCH_4'4_L_ValFileList	Validation File List: ExpressTouch	1.2
EVOTE_4'4_L_ValFileList_ HW1'0	Validation File List: ExpressVote HW1.0	1.2
EVOTE_4'4_L_ValFileList_ HW2'1	Validation File List: ExpressVote HW2.1	1.2

Table 3-1. EVS 6.5.0.0 TDP Documents *(continued)*

Document ID	Description	Revision
EVOTE_4'4_L_ValFileList_ HW3'0	Validation File List: ExpressVote HW3.0	1.2
EVOTEXL_4'4_L_ValFileList	Validation File List: ExpressVote XL	1.2
RGRSLT_1'7_L_ValFileList	Validation File List: Regional Results	1.2
06_System Security Specification - 03_Verification Packs		
DC-6.5.0.0-Generate-HashTrusted-Pack	Data Comm Server Hash Pack (zipped)	---
DC-6.5.0.0-Verification-Pack	Data Comm Verification Pack (zipped)	---
DS200-HW1.2-3.2.0.0-Verification-Pack	DS200 HW1.2 Verification Pack (zipped)	---
DS200-HW1.3-3.2.0.0-Verification-Pack	DS200 HW1.3 Verification Pack (zipped)	---
DS300-3.2.0.0-Verification-Pack	DS300 Verification Pack (zipped)	---
DS450-4.4.0.0-Verification-Pack	DS450 Verification Pack (zipped)	---
DS850-4.4.0.0-Verification-Pack	DS850 Verification Pack (zipped)	---
DS950-4.4.0.0-Verification-Pack	DS950 Verification Pack (zipped)	---
EMS-Client-6.5.0.0-Verification-Pack	EMS Client Verification Pack (zipped)	---
EMS-Server-6.5.0.0-Verification-Pack	EMS Server Verification Pack (zipped)	---
EMS-Standalone-6.5.0.0-Verification-Pack	EMS Standalone Verification Pack (zipped)	---
EMS-6.5.0.0-Generate-HashTrusted-Pack	EMS Hash Pack (zipped)	---
ET-4.4.0.0-Verification-Pack	ExpressTouch Verification Pack (zipped)	---
EV1-4.4.0.0-Verification-Pack	ExpressVote 1 Verification Pack (zipped)	---
EV2-4.4.0.0-Verification-Pack	ExpressVote 2 Verification Pack (zipped)	---
EV3-4.4.0.0-Verification-Pack	ExpressVote 3 Verification Pack (zipped)	---
RR-1.7.0.0-Generate-HashTrusted-Pack	Regional Results Hash Pack (zipped)	---
RR-1.7.0.0-Verification-Pack	Regional Results Verification Pack (zipped)	---
XL-4.4.0.0-Verification-Pack	ExpressVote XL Verification Pack (zipped)	---
06_System Security Specification - 10_Build Procedures		
ESSSYS_6'5'0'0_BP_CCVMTRUSTEDBUILD1	Build Procedure: Central Count Tabulators (CC) Trusted Build 1 ES&S Voting System 6.5.0.0	1.1
ESSSYS_6'5'0'0_BP_COREIMAGEGENERATORBUILD	Build Procedure, Core Image Generator ES&S Voting System 6.5.0.0	1.0
ESSSYS_6'5'0'0_BP_COREVMBUILDENVIRONMENT	Build Environment Construction: CoRE ES&S Voting System 6.5.0.0	1.1
ESSSYS_6'5'0'0_BP_COREVMTRUSTEDBUILD1	Build Procedure: CoRE Trusted Build 1 ES&S Voting System 6.5.0.0	1.1

Table 3-1. EVS 6.5.0.0 TDP Documents *(continued)*

Document ID	Description	Revision
ESSSYS_6'5'0'0_BP_EMSVMTRUSTEDBUILD1	Build Procedure, Election Management System Trusted Build 1 ES&S Voting System 6.5.0.0	1.1
ESSSYS_6'5'0'0_BP_EWARBUILDENVIRONMENT	Build Environment Construction: Electionware Additional Reporting ES&S Voting System 6.5.0.0	1.2
ESSSYS_6'5'0'0_BP_EWARVMTRUSTEDBUILD1	Build Procedure: Electionware Additional Reporting Trusted Build 1 ES&S Voting System 6.5.0.0	1.1
ESSSYS_6'5'0'0_BP_PPVMTRUSTEDBUILD1	Build Procedure: Poll Place Tabulators (PP) Trusted Build 1 ES&S Voting System 6.5.0.0	1.1
ESSSYS_6'5'0'0_BP_REGIONALRESULTSTRUSTEDBUILD1	Build Procedure, Regional Results Trusted Build 1 ES&S Voting System EVS 6.5.0.0	1.1
ESSSYS_6'5'0'0A1_BP_CIGBuildEnvironment	Build Environment Construction, EMS, Addendum 1	1.0
ESSSYS_6'5'0'0A1_BP_EMSBuildEnvironment	Build Environment Construction, EMS, Addendum 1	1.1
07_System Operations Procedures		
CENTRAL_4'4'0'0_SOP	DS450 & DS850 Central Count Operator's Guide Firmware Version 4.4.0.0	1.2
DS200_3'2'0'0_SOP	DS200 Operator's Guide Firmware Version 3.2.0.0 HW Versions 1.2 &1.3	1.1
DS300_3'2'0'0_SOP	DS300 Operator's Guide Firmware Version 3.2.0.0	1.1
DS950_4'4'0'0_SOP	DS950 Operator's Guide Firmware Version 4.4.0.0	1.1
ELS_3'0'0'0_SOP	EVS Event Log Service User Guide Software Version 3.0.0.0	2.0
ETOUCH_4'4'0'0_SOP	ExpressTouch Operator’s Guide Firmware Version 4.4.0.0	1.1
EVOTE_4'4'0'0_SOP	ExpressVote Operator’s Guide Firmware Version 4.4.0.0 HW Versions 1.0 & 2.1	1.2
EVOTE_4'4'0'0_SOP_HW3'0	ExpressVote 3 Operator's Guide Firmware Version 4.4.0.0 Hardware Version 3.0	1.2
EVOTEXL_4'4'0'0_SOP	ExpressVote XL Operator’s Guide Firmware Version 4.4.0.0	1.1
EWARE_6'5'0'0_SOP_01Admin	Electionware Vol. I: Administrator Guide Software Version 6.5.0.0	1.2

Table 3-1. EVS 6.5.0.0 TDP Documents *(continued)*

Document ID	Description	Revision
EWARE_6'5'0'0_SOP_02Define	Electionware Vol. II: Define User Guide Software Version 6.5.0.0	1.3
EWARE_6'5'0'0_SOP_03Design	Electionware Vol. III: Design User Guide Software Version 6.5.0.0	1.3
EWARE_6'5'0'0_SOP_04Deliver	Electionware Vol. IV: Deliver User Guide Software Version 6.5.0.0	1.2
EWARE_6'5'0'0_SOP_05Results	Electionware Vol. V: Results User Guide Software Version 6.5.0.0	1.3
EWARE_6'5'0'0_SOP_06 Appendices	Electionware Vol. VI: Appendices Software Version 6.5.0.0	1.2
RGRSLT_1'7'0'0_SOP	Regional Results Transfer User Guide Software Version 1.7.0.0	1.0
08_System Maintenance Manuals		
CENTRAL_4'4'0'0_SMM	DS450 & DS850 Central Count Maintenance Manual Firmware Version 4.4.0.0	1.1
DS200_3'2'0'0_SMM	DS200 Maintenance Manual Firmware Version 3.2.0.0	1.1
DS300_3'2'0'0_SMM	DS300 Maintenance Manual Firmware Version 3.2.0.0	1.1
DS950_4'4'0'0_SMM	DS950 Maintenance Manual Firmware Version 4.4.0.0	1.1
ETOUCH_4'4'0'0_SMM	ExpressTouch Maintenance Manual Firmware Version 4.4.0.0	1.2
EVOTE_4'4'0'0_SMM	ExpressVote Maintenance Manual Firmware Version 4.4.0.0 Hardware Version 1.0 and 2.1.x	1.2
EVOTE_4'4'0'0_SMM_HW3'0	ExpressVote Maintenance Manual Firmware Version 4.4.0.0 Hardware Version 3.0	1.2
EVOTEXL_4'4'0'0_SMM	ExpressVote XL Maintenance Manual Firmware Version 4.4.0.0	1.1
09_Personnel Deployment and Training		
ESSVS_1'0_P_Training Program	Personnel Deployment and Training Program	1.8
10_Configuration Management Plan		
ESSVS_1'0_P_CMProgram	Configuration Management Program	1.10
ESSSYS_1'0_P_TDProgram	Technical Documentation Program	2.1
11_QA Program		
ESSVS_1'0_P_MNFQA Program	Manufacturing Quality Assurance Program	1.15
ESSVS_1'0_P_SWQAProgram	Software Quality Assurance Program	1.10
12_System Change Notes		
ESSVS_6'5'0'0_D_ChangeNotes	System Change Notes	1.2

Table 3-1. EVS 6.5.0.0 TDP Documents *(continued)*

Document ID	Description	Revision
ESSVS_6'5'0'0_D_ CHANGENOTES_QA	System Change Notes w/ QA Test Notes	1.2
13_Attachments		
BPG_1'0_SOP	Ballot Production Guide Printing Guidelines ES&S Electionware Ballots	3.8

3.1.1 Source Code Review

Pro V&V reviewed the submitted source code to the EAC VVSG 1.0 and the manufacturer-submitted coding standards. Prior to initiating the software review, Pro V&V verified that the submitted documentation is sufficient to enable: (1) a review of the source code and (2) Pro V&V to design and conduct tests at every level of the software structure to verify that design specifications and performance guidelines are met.

A combination of Automated Source Code Review and Manual Source Code Review methods were used to review the changes in the source code from the previously certified EVS 6.4.0.0 voting system. In addition, 10% of the source code comments were manually reviewed.

Summary Findings

- Automated Source Code Review: The Automated Source Code Review was performed during the EVS 6.5.0.0 Compliance and Trusted Builds. No source code issues were found during the Automated Source Code review.

- Manual Source Code Review: The Manual Source Code review was performed on 10% of the comments for compliance to VVSG Volume Section 5.2.7. No source code issues were found during the Manual Source Code review.

- Compliance Build: The compliance build was performed following the compliance review. Once the compliance review was performed and the source was deemed stable enough to proceed with testing, the source code and all additional packages were compiled into a Compliance Build.

- Trusted Build: The trusted build consisted of inspecting customer submitted source code, COTS, third-party software products, and combining them to create the executable code. This followed the documented process from the "United States Election Assistance Commission Voting System Testing and Certification Program Manual, Version 3.0" Section 4.8. Performance of the trusted build includes the build documentation review. The Trusted Build was performed following the completion of the Functional Configuration Audit.

3.1.2 Physical Configuration Audit (PCA)

The Physical Configuration Audit (PCA) compares the voting system components submitted for qualification to the manufacturer's technical documentation, and included 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 reviewed drawings, specifications, technical data, and test data associated with system hardware to establish a system hardware baseline associated with the 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

Summary Findings

During execution of the PCA, the components of the EVS 6.5.0.0 system were documented by component name, model, serial number, major component, and any other relevant information needed to identify the component. For COTS equipment, every effort was made to verify that the COTS equipment had not been modified for use. Additionally, each technical document submitted in the TDP was recorded by document name, description, document number, revision number, and date of release. At the conclusion of the test campaign, test personnel verified that any changes made to the software, hardware, or documentation during the test process were fully and properly documented.

3.1.3 System Level Testing

System Level Testing was performed to evaluate the complete system. This testing included all proprietary components and COTS components (software, hardware, and peripherals), as well as the Ancillary Systems detailed in Attachment A. Although not part of the system under test, the Ancillary Devices were used during the test campaign to support testing. During test performance, the system was configured exactly as it would for normal field use per the procedures detailed in the EVS 6.5.0.0 technical documentation. This included connecting all

supporting equipment and peripherals including ballot boxes, voting booths (regular and accessible), and any physical security equipment such as locks and ties.

System Level Testing included the evaluations of the following test areas: Functional Configuration Audit (FCA), Accuracy Test, Volume and Stress, System Integration Tests, and Security Review. All functional modifications submitted in this release that have not been evaluated in a previously tested and approved EAC-certified system that are included in the listed Cross-Products Changes as well as for each of the following individual components were evaluated during System Level Testing: DS200, DS300, DS450, DS950, DS850, ExpressVote HW1.0, ExpressVote HW2.1, ExpressVote HW3.0, ExpressVote XL, and ExpressTouch. Additionally, Electionware Additional Reporting and modifications submitted for Electionware were evaluated during this area of testing.

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

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

In addition to functioning according to the manufacturer's documentation, tests were conducted to ensure all applicable EAC VVSG 1.0 requirements were met.

Summary Findings

All functional tests were successfully executed. Regression testing was performed as needed to verify all noted deficiencies were successfully addressed.

3.1.3.2 Accuracy

The Accuracy Test ensured that each component of the voting system could 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.

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 were used to test components of the voting system.

Summary Findings

The EVS 6.5.0.0 system was tested by utilizing a combination of hand marked (70%) and pre-marked (30%) paper ballots to achieve an accuracy rate greater than 1,549,703 correct ballot positions. The EVS 6.5.0.0 system was tested by using all of the available ballot sizes to cast a sufficient number of paper ballots to achieve an accuracy rate of 1,574,400 correct ballot positions for the DS200, DS300, DS450, DS850, and DS950.

In addition to the paper ballots, the accuracy test utilizing automated L&A, pre-marked, and hand-marked vote summary cards of each card length supported by the ExpressVote (HW1.0 & HW2.1), ExpressVote HW3.0, and the ExpressVote XL. These devices successfully passed the Accuracy Test without issue. A total of 1,600,000 voting positions were processed by the ExpressVote (HW1.0 & HW2.1). A total of 1,600,000 voting positions were processed by the ExpressVote HW3.0. A total of 2,166,528 voting positions were processed by the ExpressVote XL.

In addition to the paper ballots and the vote summary cards, the accuracy test utilizing automated L&A and manual voting sessions supported by the ExpressTouch successfully passed the Accuracy Test without issue. A total of 1,550,496 voting positions were processed by the ExpressTouch.

The Accuracy Test also included the transmission of the DS200, DS300, ExpressVote XL, and ExpressTouch results via Regional Results through a Virtual Private Network (VPN). The test securely transmitted 1,574,400 (DS200, DS300), 2,166,528 (ExpressVote XL), and 1,550,496 (ExpressTouch) correct ballot positions to the EMS.

The Accuracy Test also included the transmission of the DS950, DS850 and DS450 results via a closed local area network. The test securely transmitted 1,574,400 correct ballot positions to the EMS.

All of the results from the Accuracy Test were compiled into Electionware and all actual results obtained during test execution matched the expected results.

3.1.3.3 Volume and Stress Testing

A Volume and Stress Test was performed on the EVS 6.5.0.0 voting system. The Volume and Stress test investigated the system's response to conditions that tend to overload the system's capacity to process, store, and report data. The test parameters focused on the system's stated limits and the ballot logic for areas such as the maximum number of active voting positions, maximum number of ballot styles, maximum candidates, maximum contests, and stated limits within the EMS.

Summary Findings

The EVS 6.5.0.0 successfully met the requirements of the Volume and Stress Testing. It was verified that the system can achieve the manufacturer's TDP claims of what the system can support. Testing was performed on the ExpressVote HW3.0 by exercising four election definitions and test cases developed specifically to test for volume and stress conditions of the system.

3.1.3.4 System Integration

System Integration is a system level test that evaluates the integrated operation of both hardware and software. System Integration tests the compatibility of the voting system software components, or subsystems, with one another and with other components of the voting system environment. This functional test evaluates the integration of the voting system software with the remainder of the system. The System Integration Test was performed to verify the EVS 6.5.0.0 system functioned as a complete system.

The System Integration test was performed as part of the regression test requirements for this campaign. Regression testing establishes assurance that the modifications have no adverse impact on the compliance, integrity, or performance of the system.

Summary Findings

During test performance, the system was configured as it would be for normal field use. This involved connecting all supporting equipment and peripherals including ballot boxes, voting booths (regular and accessible), and any physical security equipment such as locks and ties.

Pro V&V personnel properly configured and tested the system by following the procedures detailed in the EVS 6.5.0.0 technical documentation.

During System Integration testing, two General Elections and three Primary Elections were successfully 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 three precincts (one precinct is a split). 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 contests spread across the four precincts. This election also has Review Box and Judges Initial Boxes.

- 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.

Three 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. This election also has Review Box and Judges Initial Boxes.

- Primary Election PRIM-02: This election is designed to functionally test an Open Primary Election held in two precincts. This election contains thirteen contests compiled into three ballot styles. One contest is in all three ballot styles and all other contests are independent. This election also has Review Box and Judges Initial Boxes.

- 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.

Summary Findings

The EVS 6.5.0.0 system successfully passed the System Integration Test. During execution of the test procedure, it was verified that the EVS 6.5.0.0 system successfully completed the system level integration tests with all actual results obtained during test execution matching the expected results.

3.1.3.5 Security Review

The objective of the Security Testing is to evaluate the effectiveness of the voting system in detecting, preventing, recording, reporting, and recovering from security threats. To evaluate the integrity of the system, Pro V&V developed specifically designed test cases in an attempt to defeat the access controls and security measures documented in the system TDP.

The test methods for performing the Security Testing were execution and review. Prior to performance of Security testing, the examiner verified that security hardening scripts had been properly applied to system components per the system documentation. The examiner also reviewed the submitted TDP to verify that documented access and physical controls were in place. Following the documented procedures, the examiner configured the voting system for use and functionality to verify that the documented controls were in place, adequate and met the stated requirements.

Summary Findings

The submitted threat matrix identifying the system's risks and vulnerabilities was evaluated for completeness and determined that mitigating controls are adequately implemented. An evaluation of the system was accomplished by utilizing a combination of functional testing and source code review. All findings will be reported to the EAC and ES&S.

Pro V&V determined there were no modifications made to the Physical and Administrative Security in the EVS 6.5.0.0 system. Pro V&V did not specifically test these areas, however Physical and Administrative Security testing was performed throughout the test campaign.

Logical security was tested as part of FCA testing by a recognized security expert who reviewed the physical and administrative testing outcomes and performed the following tests on system components: Vulnerability Scans and Physical Bypass Attempts. Logical security testing assessed the effectiveness of the security hardening scripts applied during the system setup and install process. Based on the review results, the system was deemed secure.

3.1.4 Usability and Accessibility Testing

Usability and Accessibility testing was performed to evaluate the EVS 6.5.0.0 system to the applicable requirements. During test performance, the voting system was configured as per the ES&S TDP. Testing specifically focused on the ExpressVote HW3.0.

Usability was defined generally as a measure of the effectiveness, efficiency, and satisfaction achieved by a specified set of users with a given product in the performance of specified tasks. The Accessibility portion of testing evaluated the requirements for accessibility. These requirements are intended to address HAVA 301 (a) (3) (B).

Summary Findings

The EVS 6.5.0.0 system successfully met the requirements of the Usability and Accessibility. ExpressVote HW3.0 was accessible to voters with disabilities.

3.1.5 Hardware Testing

Previous hardware examinations were performed on the EAC-certified baseline system (EVS 6.4.0.0) and/or previous certified versions of the EVS 6.5.0.0 components. Hardware changes introduced as part of this release include a new vote capture device and modifications to existing products. EVS 6.5.0.0 introduces the ExpressVote Hardware 3.0 and modifications to the ExpressVote XL. The modifications include new parts, new replacement parts (determined to be the same fit and function as current parts), and parts introduced to replace end-of-life (EOL) components.

The full suite of hardware electrical and environmental tests for the ExpressVote HW3.0 and ExpressVote XL, as well as a Safety Review of the ExpressVote HW3.0, were successfully performed as part of a previous state level test campaign performed to the hardware test requirements of VVSG 2.0. The Pro V&V test reports and associated hardware test reports of this

testing were submitted to the EAC for evaluation and were granted approval for reuse to satisfy the hardware test requirements in this test campaign.

The following components were submitted for hardware testing:

- ExpressVote HW3.0, Software/Firmware version 4.4.0.0, Hardware version 3.0
- ExpressVote XL, Software/Firmware version 4.4.0.0, Hardware version 1.0

The identified EVS 6.5.0.0 components were subjected to the hardware tests listed below:

Electrical Testing

- Voltage Dips and Interruptions (ExpressVote HW3.0, ExpressVote XL)
- Radiated Emissions (ExpressVote HW3.0, ExpressVote XL)
- Conducted Emissions (ExpressVote HW3.0, ExpressVote XL)
- Electrostatic Disruption (ExpressVote HW3.0, ExpressVote XL)
- Electrical Fast Transient (EFT) / Burst (ExpressVote HW3.0, ExpressVote XL)
- Surge Immunity (ExpressVote HW3.0, ExpressVote XL)
- Radiated RF Immunity (ExpressVote HW3.0, ExpressVote XL)
- Conducted RF Immunity (ExpressVote HW3.0, ExpressVote XL)
- Electrical Supply (ExpressVote HW3.0)
- Product Safety (ExpressVote HW3.0)

Environmental Testing

- High Temperature (ExpressVote HW3.0, ExpressVote XL)
- Low Temperature (ExpressVote HW3.0, ExpressVote XL)
- Bench Handling (ExpressVote HW3.0, ExpressVote XL)
- General Vibration, Transportation (ExpressVote HW3.0, ExpressVote XL)
- Continuous operation – Typical and Varied Environmental Conditions (ExpressVote HW3.0 and ExpressVote XL)

Pro V&V utilized third-party testing during the performance of hardware testing. All hardware testing was performed at the NTS/Element Longmont facility located in Longmont, Colorado. All testing was witnessed on-site by Pro V&V personnel, with the exception of Continuous Operation – Typical and Varied Environmental Conditions Test in which Pro V&V qualified staff executed all testing at the NTS/Element Longmont facility.

Summary Findings

Electrical Testing was performed on the ExpressVote HW3.0. The procedures and results for this testing are included in NTS Test Reports TR-PR171950-1-REV1-Emissions-EV3 and TR-PR171950-2-REV2-Immunity-EV3, provided independently of this document. The Product Safety results are provided in test report, PRVV0001-R1_UL 62368-1. Test results from this testing are summarized below.

Table 3-2 Electrical Hardware and Product Safety Test Results – ExpressVote HW3.0

Standard/Method	Description	Criteria	Class/Level	Result
ANSI C63.4-2014 TA1.2-I 1	Conducted Emissions	N/A	Class B	Compliant
ANSI C63.4-2014 TA1.2-I 1	Radiated Emissions	N/A	Class B	Compliant
IEC61000-4-11 TA2.7-I 3, TA2.7-I 4, TA2.7-I 5	Power Dips, Interruptions, and Variations Immunity	Normal Operation & No Data Loss	Various	Compliant
IEC 61000-4-4 TA2.7-I 1	Electrical Fast Transient	Normal Operation & No Data Loss	±2kV - Mains	Compliant
IEC 61000-4-5 TA2.7-I 2	Lightning Surge	Normal Operation & No Data Loss	±2kV Line - Line ±2kV Line - Ground	Compliant
IEC 61000-4-2, level 4 TA2.7-K 1	Electrostatic Discharge Immunity	Normal Operation & No Data Loss	+-2kV, +-4kV, +-8kV Contact ±15kV Air	Compliant
IEC 61000-4-3 TA2.7-G 1	Radiated Immunity	Normal Operation & No Data Loss	10 V/m, 80 MHz – 1 GHz	Compliant
IEC 61000-4-6 TA2.7-J 1	Conducted Immunity	Normal Operation & No Data Loss	10 Vrms, 150 kHz – 80 MHz	Compliant
IEC/UL 62368-1 VVSG 2.0 8.1-K	Product Safety	Product Safety	Product Safety	Compliant
Overall Result				Pass/ Compliant

The Electrical Supply portion of the Electrical Testing was performed at Pro V&V's test facility. The component completed the test requirements successfully with no deficiencies noted.
Test Result – PASS

Electrical Testing was performed on the ExpressVote XL. The procedures and results for this testing are included in NTS Test Reports TR-PR171953-REV1-Emissions-EVXL and TR-PR171953-REV1-Immunity-EVXL, provided independently of this document. Test results from this testing are summarized below:

Table 3-3 Electrical Hardware Test Results – ExpressVote XL

Standard/Method	Description	Criteria	Class/Level	Result
FCC 15.107 ICES-003 TA1.2-I 1	Conducted Emissions	N/A	Class B	Compliant

Table 3-3 Electrical Hardware Test Results – ExpressVote XL *(continued)*

Standard/Method	Description	Criteria	Class/Level	Result
FCC 15.109 ICES-003 TA1.2-I 1	Radiated Emissions	N/A	Class B	Compliant
IEC61000-4-11 TA2.7-I 3, TA2.7-I 4, TA2.7-I 5	Power Dips, Interruptions, and Variations Immunity	Normal Operation & No Data Loss	Various	Compliant
IEC 61000-4-4 TA2.7-I 1	Electrical Fast Transient	Normal Operation & No Data Loss	±2kV - Mains	Compliant
IEC 61000-4-5 TA2.7-I 2	Lightning Surge	Normal Operation & No Data Loss	±2kV Line - Line ±2kV Line - Ground	Compliant
EN61000-4-2 IEC 61000-4-2, level 4	Electrostatic Discharge Immunity	Normal Operation & No Data Loss	+-2kV, +-4kV, +-8kV Contact ±15kV Air	Compliant
IEC 61000-4-3 TA2.7-G 1	Radiated Immunity	Normal Operation & No Data Loss	10 V/m, 80 MHz – 1 GHz	Compliant*
IEC 61000-4-6 TA2.7-J 1	Conducted Immunity	Normal Operation & No Data Loss	10 Vrms, 150 kHz – 80 MHz	Compliant
Overall Result				Pass/ Compliant

* One issue was encountered during performance of the Radiated Immunity Test. The ExpressVote XL experienced a Paper Path Module (PPM) false paper jam when exposed to the frequency range of 573 to 587 Mhz. To remedy the issue, the Universal Voting Control (UVC) – Serial # UVC05170051 was replaced with UVC – Serial # UVC09211413. The UVC that was used is the same form/fit/function as the previous UVC in test. The failed UVC circuitry had been weakened by previous destructive testing (Electrostatic Discharge Immunity). The test was then repeated with no issues.

Environmental Testing was performed on the ExpressVote HW3.0 and ExpressVote XL. The procedures and results for this testing are included in NTS Test Reports TR-PR171950-00-REV2 Environmental- EV3 (ExpressVote HW3.0) and TR-PR171953-00-REV2 Environmental-EVXL (ExpressVote XL), provided independently of this document.

The test results from this testing are summarized in the following paragraphs:

High Temperature and Low Temperature - Storage (MIL-STD-810H, Methods 501.7 and 502.7, Procedure I-Storage, cyclic temperature and humidity exposure)

The ExpressVote HW3.0 and ExpressVote XL were subjected to High Temperature and Low Temperature – Storage Testing. The Equipment Under Test (EUT) was subjected to a temperature of -4 to 140ºF and relative humidity of 25% to 55%, after which operation was confirmed by Pro

V&V. The EUT was not powered, and left in their storage containers for the duration of the test. At the conclusion of testing, the EUT was removed from their storage containers, a visual inspection and an operational status check were performed. Test Result – PASS

Bench Handling (MIL-STD-810H, Method 516.8, Procedure VI)

The ExpressVote HW3.0 and ExpressVote XL were subjected to Bench Handling Testing. Testing was performed at ambient/room temperature (20ºC +/-3 ºC). Using one edge as a pivot, the opposite edge of the chassis of each unit was lifted until the face reached 45° with horizontal bench top, or 4 inches above bench top (whichever occurred first). This was repeated with each practical edge, of the same horizontal face. At the conclusion of testing, a visual inspection and an operational status check were performed. Test Result – PASS

General Vibration, Transportation (MIL-STD-810H, Method 514.8, Procedure I)

The ExpressVote HW3.0 and ExpressVote XL were subjected to General Vibration, Transportation Testing. Testing was performed at ambient/room temperature (20ºC +/-3 ºC) in the X, Y and Z axes utilizing a random vibration profile at 1.04 gRMS. At the conclusion of testing, a visual inspection and an operational status check were performed. Test Result – PASS

Continuous Operation–Typical and Varied Environmental Conditions Test (MIL-STD-810-H, Methods 501.7 and 502.7 Procedure II – Operation, cyclic temperature and humidity exposure)

The ExpressVote HW3.0 and ExpressVote XL were subjected to the Continuous Operation–Typical and Varied Environmental Conditions Test. The EUT was powered and being operated by Pro V&V for the duration of the environmental profile to confirm operation. At the conclusion of testing, a visual inspection and an operational status check were performed. Test Result – PASS

3.2 Anomalies and Resolutions

When a result is encountered during test performance that deviates from what is standard or expected, a root cause analysis is performed. Pro V&V considers it an anomaly if no root cause can be determined. In instances in which a root cause is established, the results are then considered deficiencies. No anomalies occurred during the testing of the EVS 6.5.0.0.

3.3 Deficiencies and Resolutions

Any violation of the specified requirement or a result is encountered during test performance that deviates from what is standard or expected in which a root cause is established is considered to be a deficiency. Upon occurrence, deficiencies are logged throughout the test campaign for disposition and resolution. Throughout the test campaign, any deficiencies encountered were logged in the Pro V&V tracking system (Mantis) for disposition and resolution. In each instance, if applicable, the resolution was verified to be resolved through all required means of testing (regression testing, source code review, and TDP update) as needed.

4.0 RECOMMENDATION FOR CERTIFICATION

The EVS 6.5.0.0, as presented for testing, successfully met the requirements set forth for voting systems in the U.S. Election Assistance Commission (EAC) 2005 Voluntary Voting System Guidelines (VVSG), Version 1.0. Additionally, Pro V&V, Inc. has determined that the EVS 6.5.0.0 functioned as a complete system during System Integration Testing. Based on the test findings, Pro V&V recommends the EAC grant the EVS 6.5.0.0 identified in Table 4-1, 4-2, 4-3 certification to the EAC VVSG 1.0.

Table 4-1. EVS 6.5.0.0 System Components – Proprietary

System Component	Software or Firmware Version	Hardware Version(s)	Description
Electionware	6.5.0.0	---	Election management software that provides end-to-end election management activities
Electionware Additional Reporting	1.1.0.0	---	Additional Reporting module with a live results dashboard.
ES&S Event Log Service (ELS)	3.0.0.0	---	Logs users' interactions with EMS
Removable Media Service (RMS)	3.0.0.0	---	Utility that runs in the background of the Windows operating system
Regional Results	1.7.0.0	---	Standalone application that is deployed at Regional Sending Sites.
DS200	3.2.0.0	1.2, 1.3	Poll Place Scanner and Tabulator that scans voter selections from both sides of the ballot simultaneously
DS300	3.2.0.0	1.0	Poll Place Scanner and Tabulator that scans voter selections from both sides of the ballot simultaneously
DS200/DS300 Ballot Box	---	1.0, 1.1	Collapsible Ballot Box (Model 98-00009)
DS200/DS300 Ballot Box	---	1.0	Collapsible Ballot Box (Model 98-00110)
DS200/DS300 Ballot Box	---	1.2, 1.3, 1.4, 1.5	Plastic Ballot Box (Model 57521)
DS200/DS300 Tote Bin	---	1.0	Tote Bin Ballot Box (Model 00074)
DS200/DS300 Ballot Trolley	---	N/A	Ballot Trolley Ballot Box (Model 212516)
DS200 Metal Ballot Box	---	1.0, 1.1, 1.2	Metal Ballot Box (Model 76245)
DS200/DS300 Ballot Tote Bag	---	N/A	Ballot Tote Bag (Model 60)
DS200/DS300 Carrying Case	---	N/A	Soft-sided carrying case (Model 90282)

Table 4-1. EVS 6.5.0.0 System Components – Proprietary *(continued)*

System Component	Software or Firmware Version	Hardware Version(s)	Description
DS200/DS300 Carrying Case	---	N/A	Hard-sided lid/carrying case with wheels and extendable handle (Model 98-00045)
DS200/DS300 Carrying Case	---	N/A	Hard-sided carrying case (suitcase) (Model 94052)
DS300 Ballot Box	---	1.0	Plastic Ballot Box (Model 57300)
DS450	4.4.0.0	1.0	Central Count Scanner and Tabulator
DS450 Cart	---	---	(Model 3002)
DS850	4.4.0.0	1.0	Central Count Scanner and Tabulator
DS850 Cart	---	---	Metal cart for DS850 only (Model 6823)
DS950	4.4.0.0	1.1	Central Count Scanner and Tabulator
Central Count Cart	---	---	Metal cart for DS450/DS850/DS950 (Model 7898)
ExpressVote XL	4.4.0.0	1.0	Hybrid full-face paper-based vote capture and selection device and precinct count tabulator
ExpressTouch	4.4.0.0	1.0	DRE
ExpressVote HW1.0	4.4.0.0	1.0	Hybrid paper-based vote capture and selection device
ExpressVote HW2.1	4.4.0.0	2.1.0.0 2.1.2.0	Hybrid paper-based vote capture and selection device
ExpressVote HW3.0	4.4.0.0	3.0	Hybrid paper-based vote capture and selection device
ExpressVote Carrying Case	---	N/A	Soft-sided carrying case (Model 98-00050)
ExpressVote 3 Carrying Case	---	N/A	Soft-sided carrying case (Model 98-00120)
ExpressVote Rolling Kiosk	---	1.0	Portable Voting Booth (Model 98-00049)
Voting Booth	---	---	Stationary Voting Booth (Model 98-00051)
ExpressVote Ben Franklin Booth	---	---	Sitting and Standing Voting Booth (Model 00380, adapter 00381)
Dual Express Cart	---	---	Portable Voting Booth (Model 41402)
Quad Express Cart	---	---	Portable Voting Booth (Model 41404)
Voting Booth Workstation	---	---	Stationary voting booth (Model 87035)
MXB ExpressVote Voting Booth	---	---	Sitting and Standing Voting Booth (Model 95000)
ExpressVote Single Table	---	---	Voting Table for One Unit (Model 87033)

Table 4-1. EVS 6.5.0.0 System Components – Proprietary *(continued)*

System Component	Software or Firmware Version	Hardware Version(s)	Description
ExpressVote Double Table	---	---	Voting Table for Two Units (Model 87032)
ADA Table	---	---	Voting Table for One Unit (Model 87031)
ExpressVote Audio-Tactile Keypad	1.0.0.0	---	Audio-Tactile Keypad (Model 97-00168)
ExpressVote 3 Audio-Tactile Keypad	---	---	Audio-Tactile Keypad (Model 97-00617)
Universal Voting Console (UVC)	---	2.0	Detachable ADA support peripheral (Model 98-00077)
ExpressTouch Tabletop Easel	---	---	Model 14040
ExpressTouch Carrying Case	---	---	Soft-sided carrying case (Model 14041)
ExpressTouch Voting Booth	---	---	Stationary Voting Booth (Model 98-00081)
Secure Setup	6.5.0.0	---	Proprietary Hardening Script

Table 4-2. EVS 6.5.0.0 System Components – COTS Software

Manufacturer	Application	Version
ES&S/Microsoft Corporation	Windows 10 Enterprise LTSC (ISO)*	WIN10_6500.iso
ES&S/Microsoft Corporation	Windows Server 2022 (ISO)*	WIN2022_6500.iso
Microsoft Corporation	Windows Updates (Software updates included in the OS image)	Package date: WIN10_6500.iso - 02/28/2023 WIN2022_6500.iso - 02/28/2023
Microsoft Corporation	Windows Defender Antivirus (Configured within the OS image)	N/A
Dell	TPM Utility	DellTpm2.0_Fw1.3.2.8_V1_64.exe
Cisco	Router firmware	1.0.03.29
Cisco	Rommon	ASA 5506-X (1.1.18) ASA 5508-X (1.1.18) ASA FPR-1010 (N/A)
Cisco	ASA Firmware	ASA 5506-X (9.16.4) ASA 5508-X (9.16.4) ASA FPR1010 (9.19.1)
Kiwi Syslog Server	Remote Event Log Monitoring	9.8.1
Amyuni	Amyuni PDF Generator	5.5
Cerberus	Cerberus FTP Server – Professional	12.1 (64-bit)

**These ISOs were constructed by Pro V&V per ES&S-provided procedures utilizing COTS software components.*

Table 4-2. EVS 6.5.0.0 System Components – COTS Software *(continued)*

Manufacturer	Application	Version
Sumatra	Sumatra PDF Viewer	3.1.2 (64-bit)
Legion of the Bouncy Castle Inc.	Bouncy Castle FIPS Java API	1.0.2.1
Yubico Login for Windows	Dual Factor Authentication YubiKey USB keys for dual factor authentication (optional)	Yubico-Login-for-Windows-2.0.3-win64.msi
WS FTP	Secure file transfer	12.8.0

Table 4-3. EVS 6.5.0.0 System Components – COTS Hardware

Manufacturer	Hardware	Model/Version
Dell	EMS Server	PowerEdge T430, T440, T630, T550, R540
Dell	Regional Results Data Comm Server	PowerEdge T430, T440, T630, T550, R540
Dell	EMS Client or Standalone Workstation	Latitude 5520, 5530, 5580 (32GB Ram) OptiPlex 5040, 5050, 7020, XE3, XE4
Dell	Trusted Platform Module (TPM) Chip 2.0	Security device
Dell	Regional Results Client	Latitude 5520, 5530, 5580
Toshiba	Regional Results Client	Tecra A50-C
Innodisk	USB EDC H2SE (16GB) for ExpressVote 2.1	DEEUH1-16GI72AC1SB
Delkin	2.0 USB Flash Drive (512MB, 1GB, 2GB, 4GB, 8GB)	N/A
Delkin	3.0 USB Flash Drive (4GB, 8GB, 16GB, 32GB)	6206, 6207, 6208, 6209
Delkin	3.0 USB Flash Drive (256GB) data transfer	6210
Delkin	USB Embedded 2.0 Module Flash Drive for ExpressVote HW1.0	MY08TQJ7A-RA000-D 8 GB MY16TNK7A-RA042-D/ 16 GB
Delkin	USB Embedded 2.0 Module Flash Drive for ExpressVote HW2.1	MY16TNK7A-RA042-D/ 16 GB
Delkin	Compact Flash Memory Card (1GB)	CE0GTFHHK-FD038-D
Delkin	Compact Flash Memory Card (4GB)	CE04TQSF3-XX000-D
Delkin	Secure CF Card (2GB)	CE02TLQCK-FD000-D
Delkin	Secure CF Card (4GB)	CE04TLQCK-FD042-D
Delkin	CFast Memory Card (4GB)	BE04TRSJG-3N042-D
Delkin	Compact Flash Memory Card Reader/Writer	6381
Delkin	CFAST Card (2GB, 4GB)	380-00006 – 2GB, 380-00007 – 4GB
Delkin	CFAST Card (8GB)	380-10014-00, 380-10024-00
Delkin	CFAST Card Reader/Writer	67417
Cisco Firewall	Regional Results Security Firewall	ASA-5506-X, ASA-5508-X, ASA FPR-1010

Table 4-3. EVS 6.5.0.0 System Components – COTS Hardware *(continued)*

Manufacturer	Hardware	Model/Version
Cisco Router	Regional Results VPN Router	RV340
D-link	network switch (1 GB Min)	DSG-1005G
YubiKey USB drive	Multi factor Authentication (optional)	5A series
Lexar	CFAST Card Reader/Writer	LRWCR1TBNA
CardLogix	Smart Card	CLXSU128kC7/ AED C7
SCM Microsystems	Smart Card Writer	SCR3310
Avid	Headphones	86002
iEi	Smart Card Reader	91-10041-00
Zebra Technologies	QR code scanner (Integrated)	DS457-SR20009, DS457-SR20004ZZWW, SE3307WA
Symbol	QR Code scanner (External)	DS9208
Brother	DS450, DS850, DS950 Report Printer	B6400, HL-EX415DWVS
Dell	DS450 Report Printer	S2810dn
OKI	DS450, DS850, DS950 Report Printer	B431dn, B431d, B432DN
OKI	DS450 and DS850 Audit Printer	Microline 420
APC	DS450 UPS	Back-UPS Pro 1500, Smart-UPS 1500
APC	DS850 UPS	Back-UPS RS 1500, Pro 1500
CyberPower	DS450 and DS950 UPS	OR1500PFCLCD
CyberPower	DS450, DS850, and DS950 UPS	CP1500PFCLCD
Tripp Lite	DS450 Surge Protector	SPIKECUBE
Seiko Instruments	Thermal Printer	LTPD-347B
NCR/Nashua	Paper Roll	2320
Fujitsu	Thermal Printer	FTP-62GDSL001, FTP-63GMCL153
HP	Ink cartridge for DS450/DS850 ballot number imprinting	87002
HP	Ink cartridge for DS950 ballot number imprinting	HP C6195A
TDS	Ink cartridge for DS200/DS300 ballot stamping	2278
HP	Ink cartridge for DS300 risk-limiting audit number imprinting	370-00538
Pivot	Vote Summary Card Only Suppression Tray	97-00359

ATTACHMENT A

ANCILLARY SYSTEMS

Ancillary systems represent products and utilities that are not part of the EAC certified configuration, however, they may be used to facilitate testing.

Ancillary systems include:

- Ballot Production
    - Balotar is a secure printing product that receives ballot artwork PDFs and ballot on demand (BOD) files from Electionware Capture. Balotar is specifically designed to automatically generate and print ad hoc ballots.
- Electronic Pollbook
    - ExpressPoll electronic pollbook stores registered voter information for precincts, districts, or entire jurisdictions. The voter registration data can be shared with the ExpressLink application to print a voter's activation card for use in an ExpressVote or ExpressVote XL.
- ExpressLink System
    - ExpressLink is a Windows PC application that can run in either a standalone mode, or in a monitor mode, where the application monitors requests from a voter registration (VR) system over a shared network folder. The application imports an election definition from Electionware, accepts requests to print a voter's activation card for use in an ExpressVote or ExpressVote XL, determines the voter's ballot style and then prints the activation card on the ExpressVote Activation Card Printer. Separately, this application is used to program vote session activator cards for use with ExpressTouch.
    - ExpressVote Activation Card Printer, a thermal, on demand printer, is used to print the ballot activation code on the activation card for use with ExpressVote or ExpressVote XL.
    - ExpressTouch Smart Card Writer is a device used to program the ballot activation code on the ExpressTouch vote session activator card.
- Electionware Toolbox is a set of utilities that can be integrated into the Electionware EMS to enhance the software usability experience and streamline various processes. These add-on utilities include Test Deck, Text to Speech and Media Restore.
    - Test Deck provides a means for the election official to test the election on each machine that will be used for voting. Vote patterns can be created with automatic ballot marking, and then the ballots can be printed and scanned through the ES&S ballot tabulators to test logic and accuracy of the counting. Additionally, a test pattern file can be created for the ExpressTouch, ExpressVote or ExpressVote XL that allows automated logic and accuracy testing on the universal voting machine.
    - Text to Speech provides a simplified method for creating the audio files that make up the audible ballot.

- Media Restore is used to prepare ES&S-certified USB media flash drives for use with Electionware by securely clearing all data and then restoring to the FAT32 format.

Table A-1
Ancillary Systems

System Component	Software or Firmware Version	Hardware Version(s)
BOD Software (Balotar)	1.0	---
BOD Printer	---	BOD6400, BOD9310, BODEX415
Balotar Compact	---	OKI C712
ExpressPoll	7.0.1.0 (or greater)	Microsoft Surface Go
ExpressLink	3.0.0.0	---
ExpressVote Activation Card Printer	---	1.0
ExpressTouch Smart Card Writer	---	SCR3310
Electionware Toolbox – Test Deck	4.5.0.0	---
Electionware Toolbox – Text to Speech	4.5.0.0	---
Electionware Toolbox – Media Restore	4.5.0.0	---

ATTACHMENT B

Hardware Test Reports

Part 1: NTS/Element - Hardware Test Report TR-PR171950-00-REV2-Environmental-EV3

Part 2: NTS/Element - Hardware Test Report TR-PR171950-1-REV1-Emissions-EV3

Part 3: NTS/Element - Hardware Test Report TR-PR171950-2-REV2-Immunity-EV3

Part 4: NTS/Element - Hardware Test Report TR-PR171953-00-REV2-Environmental-EVXL

Part 5: NTS/Element - Hardware Test Report TR-PR171953-REV1-Emissions-EVXL

Part 6: NTS/Element - Hardware Test Report TR-PR171953-REV1-Immunity-EVXL

Part 7: NTS/Element - Safety Report - PRVV0001-R1_UL 62368-1 2019

(Provided Separately)