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# Test Report Addendum of Election Systems & Software's Unity 3.4.1.0 Voting System

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## REVISIONS

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## **1.0 INTRODUCTION**

This Test Report is an addendum to the previously approved ES&S Unity 3.4.1.0 Test Report, Rev. B.

### **1.1 Scope**

The scope of this Addendum included an updated post-install hardening script for the Election Management System (EMS) to grant the correct permissions for each system user role, and an updated hardening procedures document (Hardening Procedures for the Election System v1.6).

### **1.2 Objective**

The objectives of this Addendum were to verify the updated hardening procedures document and the post-install hardening script provided by ES&S is compliant with the EAC 2005 VVSG, perform an installation of the EMS, and verify each user role was granted the permissions as documented in the updated hardening procedures document.

### **1.3 Customer**

Election Systems & Software, LLC.  
11208 John Galt Boulevard  
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### **1.4 References**

The documents listed were utilized to perform testing.

- Election Assistance Commission 2005 Voluntary Voting System Guidelines, Volume I, Version 1.0, "Voting System Performance Guidelines," and Volume II, Version 1.0, "National Certification Testing Guidelines," dated December 2005
- Election Assistance Commission Testing and Certification Program Manual, Version 1.0, effective date June 1, 2011
- Election Assistance Commission Voting System Test laboratory Program Manual, Version 1.0, expires November 2014
- National Voluntary Laboratory Accreditation Program NIST Handbook 150, 2006 Edition, "NVLAP Procedures and General Requirements (NIST Handbook 150)," dated February 2006
- National Voluntary Laboratory Accreditation Program NIST Handbook 150-22, 2008 Edition, "Voting System Testing (NIST Handbook 150-22)," dated May 2008
- United States 107<sup>th</sup> Congress Help America Vote Act (HAVA) of 2002 (Public Law 107-252), dated October 2002
- Test Guidelines Documents: EMI-001A, Test Guidelines for Performing Electromagnetic Interference (EMI) Testing," and EMI-002A, "Test Procedure for Testing and Documentation of Radiated and Conducted Emissions Performed on Commercial Products"

#### 1.4 References (Continued)

- Quality Assurance Program Manual, Revision 5
- ANSI/NCCL Z540-1, “Calibration Laboratories and Measuring and Test Equipment, General Requirements”
- ISO 10012-1, “Quality Assurance Requirements for Measuring Equipment”
- EAC Requests for Interpretation (listed on [www.eac.gov](http://www.eac.gov))
- EAC Notices of Clarification (listed on [www.eac.gov](http://www.eac.gov))
- EAC Quality Monitoring Program residing on:  
[http://www.eac.gov/testing\\_and\\_certification/quality\\_monitoring\\_program.aspx](http://www.eac.gov/testing_and_certification/quality_monitoring_program.aspx)
- Wyle Laboratories’ “National Certification Test Report for the Certification Testing of the Election Systems & Software Unity 3.2.1.0 Voting System Revision A”, Report Number T58200.01-01, dated March 29, 2011
- Wyle Laboratories’ “National Certification Test Report for the Certification Testing of the Election Systems & Software Unity 3.4.0.0 Voting System Revision B”, Report Number T58722.01-01, dated October 31, 2012
- Wyle Laboratories’ “Hardware Compliance of the Election Systems & Software FL EVS 4.5.0.0 Voting System DS200 Hardware Version 1.3”, Report Number T71013.01-01, dated September 18, 2013

#### 1.5 Summary

The Unity 3.4.1.0 Voting System was successfully subjected to all tests as required for the scope of this test campaign.

The results of the required tests are summarized in Section 3.0 of this report. All hard copy data generated by the performance of these tests is retained by NTS Huntsville as raw data.

#### 2.0 TEST EQUIPMENT DESCRIPTION

The Unity 3.4.1.0 Voting System components identified below were submitted to NTS Huntsville for testing.

Election Management System (EMS) software:

- a. Audit Manager
- b. Election Data Manager
- c. ES&S Ballot Image Manager
- d. Hardware Programming Manager
- e. Election Reporting Manager
- f. Log Monitor Service
- g. AutoMARK Information Management System
- h. Voter Assist Terminal (VAT) Previewer

## **2.1 Software**

The Unity 3.4.1.0 Election Management System is an application suite comprised of eight components: AutoMark Information Management System, Audit Manager, Election Data Manager, ES&S Ballot Image Manager, Hardware Programming Manager, Election Reporting Manager, Log Monitor Service, and VAT Previewer.

### **2.1.1 Audit Manager (AM) 7.5.2.0**

The Audit Manager (AM) utility provides security and user tracking for Election Data Manager and ES&S Ballot Image Manager. Audit Manager runs in the background of the other Unity programs and provides password security and a Texas real-time audit log of all user inputs and system outputs. Election coders use Audit Manager to set Unity system passwords and track user activity.

### **2.1.2 Election Data Manager (EDM) 7.8.2.0**

The Election Data Manager (EDM) is the entry point for the Unity Election Management System. Election Data Manager is a single-entry database that stores precinct, office, and candidate information. Data entered for an initial election is stored to a re-useable database to be recalled and edited for all elections that follow. Election Data Manager is used in conjunction with other Unity software to format and print ballots, program ballot scanning equipment, and produce Election Day reports.

### **2.1.3 ES&S Ballot Image Manager (ESSIM) 7.7.2.0**

The ES&S Ballot Image Manager (ESSIM) uses ballot style information created by Unity Election Data Manager to display the ballots in a WYSIWYG design interface. Users can apply typographic formatting (font, size, attributes, etc.) to individual components of the ballot. Text and graphic frames can also be added to the ballot.

### **2.1.4 Hardware Programming Manager (HPM) 5.9.0.0**

The Hardware Programming Manager (HPM) uses the election specific database created with Election Data Manager and ES&S Ballot Image Manager to program the appropriate media for ES&S tabulation devices. Hardware Programming Manager converts the ballot layout data into the format required for each ES&S tabulator. HPM then writes this data to the appropriate media required; a USB flash drive for the DS200 and DS850, a PCMCIA card for the Model 100, or a Zip disk for Model 650 tabulators.

### **2.1.5 Election Reporting Manager (ERM) 7.9.0.0**

Election Reporting Manager (ERM) generates paper and electronic reports for election workers, candidates, and the media. Jurisdictions can use a separate ERM installation to display updated election totals on a monitor as ballot data is tabulated, and send results reports directly to media outlets. ERM supports accumulation and combination of ballot results data from all ES&S tabulators. Precinct and accumulated totals reports provide a means to accommodate candidate and media requests for totals and are available upon demand. High-speed printers are configured as part of the system accumulation/reporting stations PC and related software.

### **2.1.6 Log Monitor Service 1.1.0.0**

The Log Monitor Service is a Windows Service that runs in the background of any active ES&S Election Management software application to monitor the proper functioning of the Windows Event Viewer. The Log Monitor Service closes any active ES&S software application if the system detects the improper deactivation of the Windows Event Viewer.

### **2.1.7 AutoMARK Information Management System (AIMS) 1.3.257**

AIMS is a windows-based election management system software application used to define election parameters for the VAT including functionality to import election definition files produced by the Unity EMS and create VAT flash memory cards.

### **2.1.8 VAT Previewer 1.3.2907**

The VAT Previewer is an application within the AIMS program that allows the user to preview audio text and screen layout prior to downloading election-day media for the AutoMARK.

## **2.2 Hardware**

The equipment the manufacturer submitted for testing is listed in Table 2-1.

Every effort was made to verify that the COTS equipment had not been modified for use. NTS Huntsville performed research using the manufacturer's website based on the serial numbers and service tag numbers for each piece of equipment.

For PCs, laptops, and servers, the service tag information was compared to the system information found on each machine. Hard drives, RAM memory, and other components were examined to verify that the components match the information found on the manufacturers' websites.

## 2.2 Hardware (Continued)

**Table 2-1 Hardware Submitted for Testing**

<b>Equipment</b>	<b>Manufacturer</b>	<b>Version/Model</b>	<b>Specifications</b>	<b>Serial Number</b>
EMS Server	Dell	T110	Intel Xeon E3-1200 @3.10GHz, 8.0 GB RAM, HD Capacity 500 GB	BY6XHX1
EMS Client Desktop	Dell	OptiPlex 3010	Intel Pentium G2030 @ 3.00GHz, 2.0 GB RAM, HD Capacity 250 GB	8L98FX1

## 2.3 Test Tools/Materials

This subsection enumerates any and all test materials needed to perform functional testing. The equipment was used to read/write election data, load election ballot definitions, hold cast ballot records, hold simulation scripts, and print reports. The scope of testing determines the quantity of a specific material required.

**Table 2-2 Test Materials**

<b>Test Material</b>	<b>Manufacturer/Description</b>	<b>Quantity</b>
Ethernet Switch	1	D-Link

## 3.0 TEST BACKGROUND

NTS Huntsville is an independent testing laboratory for systems and components under harsh environments, including dynamic and climatic extremes as well as the testing of electronic voting systems. NTS Huntsville holds the following accreditations:

- ISO-9001:2000
- NVLAP Accredited ISO 17025:2005
- EAC Accredited VSTL, NIST 150,150-22
- A2LA Accredited (Certification No.'s 845.01, 845.02, and 845.03)
- FCC Approved Contractor Test Site (Part 15, 18, 68)

### **3.1 General Information**

All testing performed as part of the test effort was performed at the NTS Huntsville facility. Testing was limited to the Unity 3.4.1.0 EMS component previously identified in this report.

All hardware used during testing for this test campaign was configured “As Used” for voting. The EMS was located in a back office environment and loaded with the proper firmware. The Unity 3.4.1.0 Voting System EMS suite was loaded on COTS PCs.

### **3.2 Quality Assurance**

All work performed on this test program was completed in accordance with NTS’ Quality Program.

The NTS, Huntsville Facility, Quality Management System is registered in compliance with the ISO-9001:2008 International Quality Standard. Registration has been completed by SAI Global, a Division of Canadian Standards Association (CSA).

### **3.3 Test Equipment and Instrumentation**

All instrumentation, measuring, and test equipment used in the performance of this test program was calibrated in accordance with NTS Huntsville’s Quality Assurance Program, which complies with the requirements of ANSI/NCSL 2540-1, ISO 10012-1, and ISO/IEC 17025. Standards used in performing all calibrations are traceable to the National Institute of Standards and Technology (NIST) by report number and date. When no national standards exist, the standards are traceable to international standards, or the basis for calibration is otherwise documented.

### 3.4 Terms and Abbreviations

This subsection defines all terms and abbreviations applicable to the development of this Test Plan.

**Table 3-1 Terms and Abbreviations**

<b>Term</b>	<b>Abbreviation</b>	<b>Definition</b>
AutoMARK Information Management System	AIMS	A windows-based election management system software application to define election parameters for the VAT, including functionality to import election definition files produced by the Unity EMS and creates VAT flash memory cards.
Audit Manager	AM	System software that provides security and user tracking for Election Data Manager (EDM) and ES&S Ballot Image Manager (ESSIM).
Commercial Off the Shelf	COTS	Commercial, readily available hardware or software.
United States Election Assistance Commission	EAC	Commission created per the Help America Vote Act of 2002, assigned the responsibility for setting voting system standards and providing for the voluntary testing and certification of voting systems.
Election Data Manager	EDM	Unity EMS data entry component.
Election Management System	EMS	Within the Unity 3.4.1.0 System, the EMS is comprised of eight components: AIMS, AM, EDM, HPM, ESSIM, ERM, LogMonitor Service, and VAT Previewer.
Election Reporting Manager	ERM	A component of the EMS that is used for results gathering and reporting.
ESS Image Manager	ESSIM	A desktop publishing tool that allows users to design and print ES&S paper ballots.
Hardware Programming Manager	HPM	An election package primarily used for converting election files and creating and loading election parameters.
National Institute of Standards and Technology	NIST	Government organization created to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhances economic security and improves our quality of life.
Quality Assurance	QA	---

### 3.4 Terms and Abbreviations (Continued)

**Table 3-1 Terms and Abbreviations (Continued)**

<b>Term</b>	<b>Abbreviation</b>	<b>Definition</b>
Personal Computer	PC	Computer component of the Unity 3.4.1.0 Voting System.
Voluntary Voting System Guidelines	EAC 2005 VVSG	Published by the EAC, the third iteration of national level voting system standards.
Technical Data Package	TDP	Manufacturer documentation related to the voting system required to be submitted as a precondition of certification testing.

## 4.0 TEST PROCEDURES AND RESULTS

The Unity 3.4.1.0 Voting System, as identified in Section 2 of this report, was subjected to the tests as summarized in the following paragraphs.

### 4.1 Functional Testing

The EMS component of the Unity 3.4.1.0 Voting System was subjected to Functional Testing. The purpose was to verify the submitted updated hardening procedures document and Post-Install hardening script for the EMS system were compliant with the requirements of Section 7.2.1 of Volume II of the VVSG.

Per the EAC 2005 VVSG, the vendor shall specify the general features and capabilities of the access control policy recommended to provide effective voting system security. Although the jurisdiction in which the voting system is operated is responsible for determining the access policies for each election, the vendor shall provide a description of recommended policies for: software access controls, hardware access controls, communications, effective password management, protection abilities of a particular operating system, general characteristics of supervisory access privileges, segregation of duties, and any additional relevant characteristics.

#### 4.1.1 Summary Findings

The Unity 3.4.1.0 Voting System's EMS server and client PC's were cleared of existing data, all COTS and proprietary software were installed according the updated hardening procedures document. The updated Post-Install hardening script was tested, and revealed that each system user account created during the installation process had the correct access level as documented in the updated hardening procedures document.

### 4.2 Test Summary and Conclusion

NTS Huntsville performed functional testing of the Unity 3.4.1.0 Voting System to the EAC 2005 VVSG. During the test campaign, all data from the test was reviewed to ensure all applicable EAC 2005 VVSG requirements that are supported by the system had been tested.