

Voting System Qualification Test Report
Election Systems & Software, LLC
ES&S Voting System (EVS) Release 4.0.3.0, Version 2

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Executive Summary

Election Systems & Software, LLC (ES&S) requested a modification to Florida's certification of their ES&S Voting System (EVS) Release 5.0.0.0, Version 1. The modification includes upgrades to the precinct count (DS200 digital scanner) and central count (DS850 high-speed scanner) tabulators, with no other changes to the voting system. The modified voting system is known as **ES&S Voting System (EVS) Release 4.0.3.0, Version 2**. The objective of this certification is to verify that this modification meets the applicable requirements of the Florida Voting Systems Standards (FVSS), Florida Statutes, and the Help America Voting Act (HAVA) for usability and accessibility.

The certification campaign included a functional test, a regression test, and a mass ballot count test of the two scanner types, the precinct tabulator (DS200) and the central count tabulator (DS850). The voting system performed to the requirements of the FVSS, statutory, and HAVA requirements. The Bureau of Voting Systems Certification (BVSC), therefore, recommends that the referenced voting system be certified for use in the state of Florida.

Introduction

On September 5, 2012, Election System & Software, LLC (ES&S) submitted an application to the Florida Department of State, Division of Elections (FLDoE) requesting a modification to Florida's certification of ES&S Voting System (EVS) Release 5.0.0.0, Version 1. The modification includes upgrades to the precinct count and central count tabulators, with no other changes to the voting system. The upgrades are based on Duval County, Florida's needs and their desire to acquire the modifications, if testing is satisfactory, before the 2012 General Election.

The modified voting system is known as *ES&S Voting System (EVS) Release 4.0.3.0, Version 2*. The objective of this certification is to verify that this modification meets the applicable requirements of the Florida Voting Systems Standards (FVSS), Florida Statutes, and the Help America Voting Act (HAVA) for usability and accessibility.

The publicly noticed certification testing campaign was conducted September 13-21, 2012, in the test laboratory of Florida Division of Elections, Bureau of Voting Systems Certification (BVSC), in Tallahassee, Florida.

Background

This section gives a brief overview of the election management system (EMS), describes the components of the EMS that are under review, and explains the change in the release number from the previous release numbering schema.

Election Management System Overview

The ES&S election management system (EMS) is a component voting system, the hardware platform of which is configured as a server/client configuration.

The EMS consists of:

- ElectionWare – this software integrates the jurisdiction, districts, contests, and candidate database as the main pre-voting phase and post-voting phase that allows ballot images to be viewed. It provides the method to configure elections, create ballot design, add languages (including audio), export ballot/election definitions and view ballot images.
- Election Reporting Module (ERM) – this software is a client application used for integrating election results acquisition, consolidation, and reporting.

The following scanning and tabulating devices and ADA voting device are used with the EMS.

- Digital Scan 200 (DS200) digital scanner – a voter interface device used to scan paper ballots. It is a precinct tabulator that can also be used for absentee voting. This tabulator captures the voter's selections and digitally scans the ballot. The DS200 uses a USB drive for downloading the election definition, provides an option to capture cast ballot images on the USB, and provides the election results on the USB. The results data can be uploaded into ERM, or the DS200 can transmit via secure wireless telecom network into ERM.
- Digital Scan 850 (DS850) digital tabulator – a high-speed scanner for use with absentee voting or contest/race recounts. The DS850 uses digital cameras and image recognition algorithms to scan paper ballots, capture voter selections, and evaluate the results. It uses a USB drive for downloading the election definition, capturing the cast ballot images, and exporting the results, with or without the captured ballot images, to a USB memory device. The results data are uploaded into ERM. The DS850 also uses two COTS printers, one for printing reports and the other for recording and printing an audit log.

- AutoMARK Voter Assist Terminal (VAT) – a voter interface device that allows a voter to mark a blank, preprinted ballot or assists a voter with contest selections via visual display, audio, or both. The voter uses the AutoMARK to navigate the ballot through touchscreen, physical keypad, assistive support peripherals such as sip and puff device, or other assistive equipment with a two position switch. Also, the voter can use the AutoMARK to review a marked ballot and either to cast the ballot into a digital scan tabulator (like the DS200) or, if available, to cast the ballot into an attached ballot box, known as the AutoCAST.

Components under Review

The two voting system components under review are the DS200 and the DS850. The modification is due to an upgrade of the tabulators' firmware. The firmware modification of the DS200 is Version 2.5.2.1, which implements improvements to the 'file save' functionality. This upgrade reduces the time needed to cast a ballot. There were no changes to the vote counting segment of the DS200. The firmware modification of the DS850 is Version 2.3.2.1. This upgrade improves the collection of 'ballots cast vote records' and reduces the time for both generating reports and processing the results export. There were no changes to the vote counting segment of the DS850. Thus, the changes require the limited qualification of a mass ballot count (MBC) test for each tabulation system.

Change in Release Version Number

The application of *EVS Release 4.0.3.0, Version 2* is a modification of Florida certified voting system, *EVS Release 5.0.0.0, Version 1*, including a change in the release version number. This change in the release number is based on the election management system's identification of the software, which is software version 4.0.3.0. Florida typically identifies the voting system based on the EMS software version and the version number identifying the original tabulation system (Version 1) or modification of the tabulation system (a Version number greater than 1). Thus, the original voting system (Release 5.0.0.0, Version 1) should have been identified as *EVS Release 4.0.3.0, Version 1*. Therefore, a modification of the correct identification for that system is *EVS Release 4.0.3.0, Version 2*.

Conduct of Tests

The test objective was to verify that this modification meets the applicable requirements of the Florida Voting Systems Standards (FVSS), Florida Statutes, and the Help America Voting Act (HAVA) for usability and accessibility.

The FVSS qualification examination for this modification encompassed regression testing and functional testing, including a mass ballot count for the DS200 and DS850. In addition to these certification activities, staff reviewed the ElectionWare Toolbox v. 1.0.0.0zj and EXP Utility versions 3.1.0.1 and 4.0.0.1 as separate tests.

The regression test is to verify that functioning of the existing EMS was not affected by the upgraded DS200 and DS850 firmware. BVSC used Duval County's 2012 General Election to conduct regression testing. The examination for the DS200 and DS850 included a physical audit, functional system audit, and a mock general election. The mock election included simulating all election cycle events for early voting, Election Day voting, provisional voting, absentee voting, and post-election activities.

A mass ballot count test is required whenever new or modified software application (a.k.a. firmware) for a precinct or central count tabulator is introduced. Thus, the precinct tabulator mass ballot count test requires a minimum of 9,900 ballots on a single DS200 and a central count mass ballot count test is required using a minimum combined count of 192,000 ballots (at the discretion of the vendor, one or

more DS850 tabulators may be used). Staff used the 2011 Escambia County Primary Election for the mass ballot count on the DS850, and the Duval County 2012 General Election for the DS200 mass ballot count.

This qualification test plan does not include the software source code review. Source code review was conducted as a separate activity.

Systems Setup & Configuration

The EMS set up for the previous certification campaign (EVS 5.0.0.0, v.1, December 2011) was used for this certification campaign, since there were no changes to the EMS portion of the voting system. An ElectionWare server, an ElectionWare client, and an ERM client are each set up on separate machines, which are networked in a closed client/server network configuration via an Ethernet switch. The DS850 was provided by the vendor. The two DS200s used in this campaign were provided by BVSC (on loan from the vendor to BVSC). The firmware updates for the DS200 and the DS850 were installed, validated and verified.

Physical Audit

The physical audit activities included verifying the firmware on both the DS200 and the DS850. This was done by 1) maintaining chain of custody of the firmware versions that were installed on the machines, and 2) verifying the firmware versions reported in the machines' firmware verification logs.

A Hardware Identification Record was maintained, logging serial number(s), description and property tag information.

Functional System Audit

The functional system audit activities included calibration, review of administrative menus, and review of other menu and machine functions associated with the mock elections.

Regression Test (Mock General Election)

The regression test verifies that functioning of the existing EMS was not affected by the upgraded DS200 and DS850 firmware. Regression testing was accomplished through the conduct of a mock General election. The election definition used was the Duval County 2012 General Election.

The mock General election activities included restoring a General election definition, pre-election activities, early voting and Election Day activities, post-election and reporting. Logic and Accuracy testing (L&A) were considered pre-election activities.

Testing activities for L&A and elections included simulating precinct opening, casting ballots, obtaining zero reports, closing polls, and obtaining results reports.

Creation/Import of Election Definitions

The elections used in testing were defined (or modified) to meet the criteria described below in the following election sections.

General Election

- Used Duval County's 2012 General election definition.
- Language: English
- Ballots
 - Two (2) two-sided, three column cards
 - Coded by precinct ID
 - Two-fold ballot to simulate a ballot that was mailed

- Printed ballots
 - Hand marked ballots using 1-2-3 pattern
 - One or more unmarked ballot
 - One or more ballots with an overvoted contest
- 20 precincts
 - One or more split precincts
- Precinct scanners set to:
 - Reject ballot for one or more overvoted contests
 - Reject a blank ballot
 - Accept a ballot that contains one or more undervoted contests
- Central count scanners set to:
 - Outstack a ballot for one or more overvoted contests
 - Outstack a blank ballot
 - Accept a ballot that contains one or more undervoted contests
- Groups to be reported by precinct
 - Early voting
 - Absentee
 - Provisional
 - Election day
- Capture all ballot images including ballots with write-ins
- Media:
 - DS200
 - Delkin 8 GB USB (MBC Election Definition)
 - Delkin 512MB, 1GB, 4GB, 8GB (regression/functional testing and qualification (EQC) media)
 - SanDisk 2GB (regression/functional testing and qualification (EQC) media)

Primary Election

- Used the 2011 Escambia County Primary Election definition, which was used in the previous certification of this voting system.
- Closed Primary Election
 - Parties
 - Republican
 - Democrat
 - Green
 - Nonpartisan
 - Three languages
 - English
 - Spanish
 - Haitian Creole
- 20 precincts
 - One or more split precincts
- Ballots
 - Coded by precinct ID
 - One (1) two-sided, three column ballot, 17" (81x24, 5 targets/inch) with no stubs
- Contests
 - One or more 'Vote for up to 5' county-wide nonpartisan contest(s)

- One or more precinct only contest(s)
- One or more county-wide universal primary contest(s)
- One or more district-wide universal primary contests(s)
- One or more split precincts(s)
- Precinct count scanners set to:
 - Reject ballot for one or more over voted contests
 - Reject a blank ballot
 - Accept a ballot that contains one or more under voted contests
- Central count scanners set to:
 - Outstack a ballot for one or more over voted contests
 - Outstack a blank ballot
 - Accept a ballot that contains one or more under voted contests
- Media:
 - DS850
 - Delkin 8 GB USB (MBC Results)
 - Delkin 1GB USB (MBC Election Definition)
 - Delkin 1GB USB (MBC Qualification Media)
 - Delkin 512MB, 1GB, 4GB, 8GB (regression/functional testing)
 - SanDisk 2GB (regression/functional testing)
- Printed Ballots:
 - Minimum 17 ballots for DEM, REP, GREEN, & NP per precinct
 - Machine marked ballots using 1-2-3-4-5 marking (15 ballots)
 - One unmarked ballot
 - One ballot with an overvoted contest

Pre-Election Activities

Pre-election activities included restoring the election definition in the EMS and ensuring that it meets the requirements of the certification test plan election definition parameters, burning the media in EMS, verifying the software and firmware versions in the scanners, preparing and pre-auditing test decks, and conducting the L&A test.

The L&A test included five (5) ballots, supplied by the vendor and hand-marked by staff. Ballots were from five (5) precincts and were marked in a 1-2-3-4 pattern. The media were burned, polls opened, a zero tape printed, ballots cast, polls closed, tabulator reports printed, and results verified against expected results. Results were uploaded into ERM, and summary reports generated and audited. There were no unexpected results.

Election Activities

The mock election activities consisted of early voting, Election Day, absentee, and provisional ballot casting. Each of the voting groups (early voting, Election Day, absentee, and provisional) had its own media prepared. For each group, the DS200 precinct scanner was prepared for voting mode. The early voting activity was conducted on one DS200 (concurrent with the mass ballot count), while the Election Day, absentee, and provisional voting activities were conducted on a separate DS200. In each case, the polls were opened, a zero tape printed, ballots cast, polls closed, tabulator reports printed, and results verified against expected results. Results were uploaded into ERM. Summary and group reports were generated and audited. There were no unexpected results.

Reporting

Results were transferred from the tabulators to the ERM via the direct method (“direct upload”).

Precinct totals were consolidated for early voting, Election Day, provisional, and absentee results. Election night reports, as well as precinct-level reports, were generated from the ERM.

Post-Election Activities

Post-election activities included auditing results. All precinct results tapes and election results in ERM were verified against the expected results. As reported in the section titled *Mass Ballot Counts: Precinct Scanner (DS200)*, there was one anomaly when the mass ballot count/early voting results were tabulated in the ERM. This anomaly was attributed to human error. The results were reloaded, and the new results indicated that the system met the FVSS, statutory, and HAVA requirements. (See the section titled *Mass Ballot Counts: Precinct Scanner (DS200)* for further details.)

Mass Ballot Counts

A mass ballot count (MBC) was conducted on both the precinct scanner (DS200) and the central count scanner (DS850). The audited test decks were supplied by the vendor. The test decks included over votes and blank ballots. A set of predetermined results was supplied and compared to the scanner results and the results reports from ERM.

The DS200 and the DS850 met the acceptance criteria for the MBC.

Precinct Scanner (DS200)

One test deck comprised of 320 2-card ballots was run through the scanner 16 times to reach the minimum 9,900-ballot requirement. In this case, because the ballot had multiple cards, the total number of cards met the 9,900-ballot requirement. A log of ballot issues was maintained. All ballot issues recorded on the log were successfully resolved immediately (at the time of the ballot cast). The medium used was a Delkin 8-Gigabyte, ES&S-branded USB memory stick.

Election definition used: Duval County 2012 General election

Ballot size: 17” long, 24x62

Number of scanner units used: 1

Number of test decks: 1

Number of runs per test deck: 16

Number of ballots per deck: 320

Number of cards per ballot: 2

Total number of ballots cast: 5,120 ballots x 2 cards per ballot = 10,240 cards

Total number of vote targets: 362,240

Mass Ballot Count – Acceptance Criteria	
Did the memory registers overflow?	No
Did the public counters increment appropriately?	Yes
Did the tabulated results agree with predetermined vote totals?	Yes
Number of errors (must not exceed 1 in 1,000,000 vote targets). An error is defined as a target scan that produces a result other than the expected result.	0

Initially, the results tapes from the DS200 matched the expected results, but the results report from the ERM did not match the expected results. An analysis of the discrepancy suggested that a ballot style failed to load into the ERM. To test that theory, staff performed a results re-load. The unexpected results were documented in reports, and then the ERM database was cleared of all election results. An ERM “zero tape” report was generated, and the original USB memory stick was used to upload results. Care was taken during this second upload to click more slowly through the dozens of messages (i.e., “time stamp mismatch”, “No ballots cast in precinct”) generated in the Precinct Results Accumulation window. In the case of the “time stamp mismatch” message, the “Update” button was clicked. For the “No ballots cast in precinct” message, the “Use results” button was clicked. After a successful upload, the ERM results matched the expected results and the results tape. The previous discrepancy was attributed to human error during the upload process, most likely during repetitive clicking through the numerous messages in the Precinct Accumulation window.

Central Count Scanner (DS850)

Forty (40) test decks comprised of 320 single-card ballots were run through the scanner fifteen times each to reach the 192,000-ballot requirement. The accumulated totals were saved after every fifth run (1,600 ballots), and a report generated after every deck was finished (15th run, or 4,800 ballots). The DS850 auto-generated an audit log. The media used were a 1 GB ES&S-branded USB memory stick for the election definition, 1 GB ES&S-branded USB memory stick for the EQC key, 4 GB ES&S-branded USB memory stick for the ERM, and an 8 GB ES&S-branded USB memory stick for the results.

- Election definition used: Escambia County 2011 Primary election
- Ballot size: 17” long, 24x81
- Number of scanner units used: 1
- Number of test decks: 40
- Number of runs per test deck: 15
- Number of ballots per deck: 320
- Number of cards per ballot: 1
- Total number of ballots cast: 192,000
- Total number of vote targets: 9,388,800

Mass Ballot Count – Acceptance Criteria	
Did the memory registers overflow?	No
Did the public counters increment appropriately?	Yes
Did the tabulated results agree with predetermined vote totals?	Yes
Number of errors (must not exceed 1 in 1,000,000 vote targets). An error is defined as a target scan that produces a result other than the expected result.	0
Number of multiple feeds (must not exceed 1 in 5,000 ballots). A multiple feed occurs when the machine pulls multiple ballots and does not “catch” the error.	0
Number of incorrect rejections of ballots (must not exceed 3 per 100 ballots)	0

Folded Ballots

A “folded ballot” test was conducted on the DS850 to simulate absentee ballot processing. Using the Escambia 2011 Primary election ballots, a test deck of 320 tri-folded ballots was scanned. The 17” ballots were machine-folded into a “Z” pattern as recommended by the vendor. Some ballots were folded with the top of Side 1 facing the outside, and some ballots with the top of Side 2 facing the outside. The scanner scanned the ballots and tabulated them correctly. However, even with flattening, jogging, and fanning (to remove static) of the ballots beforehand, the scanner had numerous outstacks that required re-processing.

Two types of exceptions caused the DS850 to outstack numerous ballots, some multiple times. The first exception triggered a “Double Pick” exception message, in which the scanner pulled two cards at once. The cards were automatically outstacked and the exception was logged on the “Not Processed” report at the end of the run. The “Double Pick” exception message occurred several times during the test deck run. When the outstacked ballots were re-run, often they had to be re-run multiple times before the DS850 successfully read the ballots and sent them to the processed bin.

The second type of exception triggered a “Ballot Long” exception message. This message occurred when a ballot was pulled through too close to the previous ballot, causing the scanner to read the two ballots as one long ballot. These ballots were automatically outstacked, logged on the “Not Processed” report, and re-processed.

Although there were exceptions that required ballots to be re-run, the DS850 did not have any errors or issues that would preclude a satisfactory test result.

A folded ballot test was not conducted on the DS200.

Scanner Sensitivity

Both the DS200 precinct scanner and the DS850 central count scanner were subjected to scanner sensitivity testing. The purpose of the scanner sensitivity test is to test the scanner’s ability to read marks made by various types of marking devices (pens, pencils, highlighters, etc.). The sensitivity test also demonstrates the scanner’s ability to detect a marking when the vote target is not fully or properly marked (such as “✓”, “O”, etc.).

The test decks were created by marking blank ballots (17”) from the Duval County 2012 General Election. (The ballots were printed on BVSC’s ballot-on-demand (BOD) printer.) The table below illustrates the specific instruments used to mark the 24 ballots scanned for this activity. The ballots were 2-card ballots, and both cards for each ballot were marked consistently for that ballot. Thus, each marking device had two test cards.

The test included a baseline scan of the ballots with selected ovals fully marked (●). A test deck was then run, with the same targets marked, but with a 1 millimeter line through the center of the target, rather than fully marked (⊖). If a scanner rejected a ballot card, or produced an “unclear mark” error, staff attempted to cast the ballot card two more times.

For testing the scanners’ ability to detect improperly marked targets, the target was marked using the vendor’s approved pen (ES&S VL Ballot Pen, “Bic Grip Roller”). These results were compared to a baseline of the same targets, fully marked, using the same pen. If a scanner rejected a ballot card, or produced an “unclear mark” error, staff attempted to cast the ballot card two more times.

The results of the sensitivity test for both scanners are summarized in the two tables below. The test was conducted on one DS200 and one DS850, using the same test deck for both machines.

Ballot Sensitivity – DS200						
1	Marking Device	Device Type	Color	Ballot Card	Findings	
					A=ballot accepted; UN=unclear mark	
					Fully Marked Target [Baseline] ●	1 mm Horizontal Line thru Center of Target ⊖
1	Office Depot Pencil	#2	Gray	1	A	A
				2	A	A
2	Steadler Pencil	#2B	Gray	1	A	A
				2	A	A
3	Steadler Pencil	#B	Gray	1	A	A
				2	A	A
4	Steadler Pencil	#HB	Gray	1	A	A
				2	A	A
5	Steadler Pencil	#F	Gray	1	A	A
				2	A	A
6	Steadler Pencil	#H	Gray	1	A	A
				2	A	A
7	Steadler Pencil	#2H	Gray	1	A	A
				2	A	UN
8	Steadler Pencil	#3B	Gray	1	A	A
				2	A	A
9	Steadler Pencil	#4H	Gray	1	UN	UN
				2	UN	A
10	K-Dent	Ball Point (med. pt.)	Blue	1	A	A
				2	A	A
11	“Hotel” Ink Pen [Renaissance Hotel]	Ball Point (med. pt.)	Light Blue	1	UN	UN
				2	UN	A
12	Pilot G2 Ink Pen	Ball Point (med. pt.)	Red	1	A	A
				2	A	A
13	Papermate	Ball Point (med. pt.)	Green	1	A	A
				2	A	A
14	EF Felt Pen	Felt Tip (med. pt.)	Black	1	A	A
				2	A	A
15	Sharpie	Highlighter	Orange	1	A	A
				2	A	A
16	Vendor (Micron 08 Pen)	Felt Pen (fine pt.)	Black	1	A	A
				2	A	A
17		Felt Tip	Black	1	A	N/A

Ballot Sensitivity - DS200						
Marking Device	Device Type	Color	Ballot Card	Findings		
				A=ballot accepted; UN=unclear mark		
				Fully Marked Target [Baseline] ●	1 mm Horizontal Line thru Center of Target ⊖	
Vendor Pen- "X" mark	(fine pt.)		2	A	N/A	
18 Vendor Pen- "✓" mark	Felt Tip (fine pt.)	Black	1	UN	N/A	
			2	A	N/A	
19 Vendor Pen- "✓" mark	Felt Tip (fine pt.)	Black	1	UN	N/A	
			2	UN	N/A	
20 Vendor Pen- "O" mark on oval line	Felt Tip (fine pt.)	Black	1	UN	N/A	
			2	UN	N/A	
21 Steadler Pencil	#4B	Gray	1	A	A	
			2	A	A	
22 Steadler Pencil	#5B	Gray	1	A	A	
			2	A	A	
23 Steadler Pencil	#6B	Gray	1	A	A	
			2	A	A	
24 Steadler Pencil	#3H	Gray	1	UN	UN	
			2	UN	A	

NOTE: For items with "N/A" results, instead of a 1-mm mark, the test mark was a special mark (such as "✓" or "X") using the vendor's pen. These were compared against the baseline mark of a fully marked target using the vendor's pen (Marking Device #16).

For the DS200, the full oval marking was done on the second position target for all contests. Unclear results were re-scanned twice, for a total of three scans.

Ballot Sensitivity - DS850						
Marking Device	Device Type	Color	Ballot Card	Findings		
				A=ballot accepted; UN=unclear mark		
				Fully Marked Target [Baseline] ●	1 mm Horizontal Line thru Center of Target ⊖	
1 Office Depot Pencil	#2	Gray	1	A	A	
			2	A	A	
2 Steadler Pencil	#2B	Gray	1	A	A	
			2	A	A	
3 Steadler Pencil	#B	Gray	1	A	A	
			2	A	A	
4 Steadler Pencil	#HB	Gray	1	A	A	
			2	A	A	
5 Steadler Pencil	#F	Gray	1	A	A	
			2	UN	A	
6 Steadler Pencil	#H	Gray	1	UN	UN	
			2	UN	A	
7 Steadler Pencil	#2H	Gray	1	UN	A	
			2	UN	A	
8 Steadler Pencil	#3B	Gray	1	A	A	
			2	A	A	
9 Steadler Pencil	#4H	Gray	1	A	UN	
			2	A	A	

Ballot Sensitivity – DS850						
Marking Device	Device Type	Color	Ballot Card	Findings		
				A=ballot accepted; UN=unclear mark		
				Fully Marked Target [Baseline] ●	1 mm Horizontal Line thru Center of Target ⊖	
10	K-Dent	Ball Point (med. pt.)	Blue	1	A	A
				2	A	A
11	“Hotel” Ink Pen [Renaissance Hotel]	Ball Point (med. pt.)	Light Blue	1	UN	A
				2	UN	A
12	Pilot G2 Ink Pen	Ball Point (med. pt.)	Red	1	A	A
				2	A	A
13	Papermate	Ball Point (med. pt.)	Green	1	A	A
				2	A	A
14	EF Felt Pen	Felt Tip (med. pt.)	Black	1	A	A
				2	A	A
15	Sharpie	Highlighter	Orange	1	A	UN
				2	A	A
16	Vendor (Micron 08 Pen)	Felt Pen (fine pt.)	Black	1	A	A
				2	A	A
17	Vendor Pen- “X” mark	Felt Tip (fine pt.)	Black	1	A	N/A
				2	A	N/A
18	Vendor Pen- “✓” mark	Felt Tip (fine pt.)	Black	1	UN	N/A
				2	A	N/A
19	Vendor Pen- “\” mark	Felt Tip (fine pt.)	Black	1	UN	N/A
				2	UN	N/A
20	Vendor Pen- “O” mark on oval line	Felt Tip (fine pt.)	Black	1	UN	N/A
				2	UN	N/A
21	Steadler Pencil	#4B	Gray	1	A	A
				2	A	A
22	Steadler Pencil	#5B	Gray	1	A	A
				2	A	A
23	Steadler Pencil	#6B	Gray	1	A	A
				2	A	A
24	Steadler Pencil	#3H	Gray	1	UN	UN
				2	UN	UN

NOTE: For items with “N/A” results, instead of a 1-mm mark, the test mark was a special mark (such as “✓” or “X”) using the vendor’s pen. These were compared against the baseline mark of a fully marked target using the vendor’s pen (Marking Device #16).

The results of the scanner sensitivity test indicate that several marking devices produce marginal marks. Marginal marks are, by definition, near the threshold of detection. In addition to the light blue pen and the orange highlighter, the harder pencil grades and fine pencil grade produce marginal marks. The inconsistency of readability for several marking devices means that those devices produce marginal marks. The table below summarizes which marking devices produce marginal marks. The BVSC discourages the use of these marking devices.

Marking Devices that Produce Marginal Marks			
Marking Device...		Produces marginal mark in...	
		DS200	DS850
Steadler Pencil	#2H	Yes	Yes
	#3H	Yes	
	#4H	Yes	Yes
	#F		Yes
	#H		Yes
Light blue "hotel" ink pen		Yes	Yes
Orange Sharpie highlighter		Yes	Yes

When special marks are used instead of the recommended fully marked oval, even when using the vendor’s pen, inconsistencies develop when compared to the baseline (●). Across both scanner types, three of the four special marks (“✓”, “\”, “O”) produced marginal marks. Voters should be educated and encouraged to mark a fully marked oval target, as other markings could produce marginal results.

Special Marks that are Marginal		
Special Mark...	Produces marginal mark in...	
	DS200?	DS850?
✓	Yes	Yes
\	Yes	Yes
○	Yes	Yes

The media used for the DS200 test results was a 2 GB Sandisk Cruzer USB memory stick. For the DS850 sensitivity test, the EQC key and the test results were saved on separate 2 GB Sandisk Cruzer USB memory sticks.

Ballot Image Restoration

Ballot images were successfully restored from ElectionWare. The image files were then saved in both TIF and PDF file formats. The saved images were from the 2012 Duval County General Election.

Source Code Review

The source code was reviewed for changes from the previous, certified version. Changes pertained only to the change items documented in the vendor’s application. No source code issues were found.

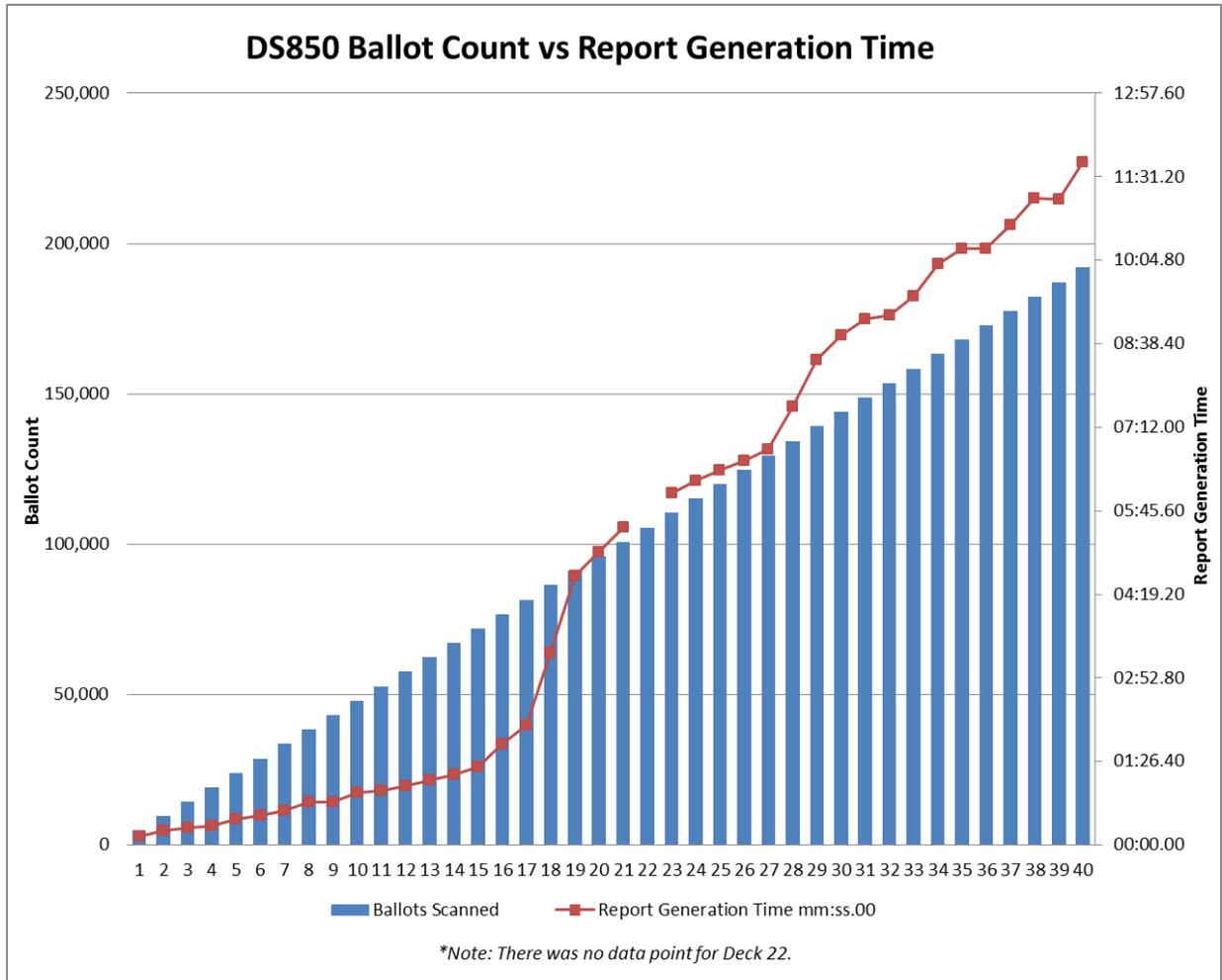
Firmware Upgrade Impact - Observations

As stated earlier, the purpose of the firmware upgrades to the DS200 and the DS850 was to reduce the time the machines require to perform certain activities. For the DS200, improvements were made to reduce the time required to cast a ballot. For the DS850, improvements were made to reduce the time required to generate reports, as well as the time to export results.

Data for these activities were collected as a point of information, and as a starting point for comparison in future certifications. Thus, the information reported here has no impact on this certification.

The DS200 average time to cast a ballot varied between 6 and 7 seconds. This average remained steady throughout the duration of the mass ballot count. This behavior was in contrast to the ballot casting time of the previous certification, which increased with the increasing ballot count.

The DS850 demonstrated, in general, a positive correlation between the time required to generate a report and the number of ballots cast (see graph below). The report generation time showed a marked increase between 81,600 and 91,200 ballots cast (the steep climb that begins around Deck 17). The next steepest increase in report generation time occurred between 129,600 and 148,800 ballots (beginning at Deck 27). There were a few small plateaus, as well.



The times required to save the results were: 29.61 seconds at the 177,600-ballot count, and 29.67 seconds at the 192,000-ballot count.

The time required to export the final results (192,000 ballot count) was 12m:02.75s.

ElectionWare Toolbox

The Toolbox is an optional add-on to the already-approved version of ElectionWare. The Toolbox v. 1.0.0.0zj was examined for functionality and found to be acceptable.

EXP File Utility

The EXP File Utility, which is designed to assist the counties in complying with the requirement to submit a precinct-level election report, is not considered part of this certification. Therefore, the EXP File utility (versions 3.1.0.1 and 4.0.0.1) was reviewed separately. The results of that review will be reported separately.

Engineering Change Orders

ES&S recently issued two Engineering Change Orders (ECOs) affecting EVS 4.0.3.0 v.2. Neither of these ECOs presents changes that would affect the performance of the voting system or its ability to meet FVSS, statutory and HAVA requirements.

ECO 881 – Thumb Drives in Custom Colors

This ECO affects the DS200 and DS50. This ECO allows custom colors of the plastic housing of the thumb drives. The thumb drive itself will be the same form, fit and function. This is a *de minimus* change and is acceptable in Florida.

ECO 884 – Rubber Gasket for DS200 with Metal Ballot Box

This ECO describes the inclusion of a rubber gasket for use with the steel ballot box, to seal a gap between the ballot box and the back of the DS200. The sealing of this gap is to provide additional security for the ballots casting process, and does not affect the handling of the ballots by the DS200. This change is acceptable in Florida.

Test Results and Findings of Compliance

Test results indicated that the voting system functioned as expected and met the FVSS, statutory, and HAVA requirements. Evidence suggests that the firmware upgrades to the scanners did indeed improve aspects of their performance. The results of the certification examination activities indicated that the voting system components under review satisfied the FVSS, statutory, and HAVA requirements.

One exception identified during testing, however, should be addressed in a future release. Though the voting system performed as designed during the DS200 mass ballot count, an anomaly occurred during the results upload process. The anomaly was attributed to human error. However, as an item the vendor should consider, the interface of the program is such that the repetitive messages produced by the Precinct Results Accumulation window present a usability issue. The risk of human error increases with the number of repetitive messages that are presented. Although BVSC recognizes that these multiple messages are unlikely to be generated outside of test conditions, BVSC recommends that the vendor consider improving the interface to reduce the risk of human error during the upload process. This exception did not preclude the components under review from being certified.

The BVSC, therefore, recommends certification of the referenced voting system.

ES&S Voting System (EVS) Release 4.0.3.0, Version 2

[Redacted pursuant to section 282.318, Florida Statutes, and to the U.S. Department of Homeland Security's designation of elections as a critical infrastructure.]

[Redacted, continued]