

ES&S Unity 3.2.0.0 Revision 1 Voting System Certification Test Plan for DS200 Modifications to the EAC Certified ESSUNITY3200

Prepared for
Election System and Software
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Version 4.0
EAC application # ESS1002

Trace to Standards	
NIST Handbook 150-22	
4.2.3, 5.3.5, 5.3.6, 5.4.2, 5.4.6, 5.5.1, 5.7 thru 5.7.3	
HAVA	
301	
VVSG	
Vol. #	Section(s) #
1	2, 3, 4, 5, 6, & 7
2	1.8.2.1
2	2, 3, 4, 5, & 6
2	Appendix A

iBeta Quality Assurance is accredited for Voting System Testing under:



EAC Lab Code: 0702 - Effective thru 7/16/11



NVLAP LAB CODE 200749-0

Version History

Ver #	Description of Change	Author	Approved by	Date
v.1.0	Initial submission to the EAC	C. Coggins, J. Garcia, &S. Brown	C Coggins iBeta & Sue McKay ES&S	6/24/10
v.2.0	Correction of errors from EAC review: <ul style="list-style-type: none"> Title page & section 1: added EAC Application #ESS1002 Section 4.4.1 Clarify assessment and correct ECO List Section 7.1 typo corrected "not supported" 	C. Coggins, J. Garcia, K. Austin, &S. Brown	C Coggins iBeta	6/25/10
v.3.0	Changed Revision 1 to Revision 1 As run test plan: <ul style="list-style-type: none"> Table 1 RFI 2010-03 & 2010-04 Section 1.4.1, 1.4.6, 7.1 exclusion of Illinois and Hawaii Section 3 additional hardware used for environmental testing Table 12 Correct 000339 Section 7.1 change to Idaho Updated Section 1.2.3, Table 4, changes to TDP. 	C. Coggins, J. Garcia, & K Austin	C Coggins iBeta	6/30/10
v.4.0	Scope of Certification changes required by EAC – Counterfeit Sensor must be disabled and tested. Table 6 &13, section 4.4.2 & 7.1 <ul style="list-style-type: none"> ENH19328 disables the counterfeit sensor functionality 	C. Coggins	C. Coggins, J. Garcia iBeta	9/23/10

This Test Plan follows the format identified NOC 09-001 & 09-005

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1 Introduction

This Test Plan identifies iBeta Quality Assurance's (iBeta) approach to VSTL Certification Testing of the changes to the certified DS200 Precinct Count Scanner in the ESSUNITY3200 voting system [supporting EAC application number ESS1002](#). The changes submitted in Unity 3.2.0.0 Revision 1 are tested to the *EAC Voluntary Voting System Guidelines (VVSG 2005)*. The changes to the DS200 submitted in Unity 3.2.0.0 Revision 1 have also been submitted to the Unity 3.2.1.0 certification test effort. In the instances where tests or reviews for these certification efforts are identical iBeta used these common results.

Note: In preparing the Scope of Certification the EAC has issued instructions to ES&S to disable DS200 code associated with the withdrawn counterfeit sensor. This has resulted in a modification to the "as run" test plan.

1.1 Modifications to EAC Certified Systems

EAC Notice of Clarification NOC 09-005: *Development and Submission of Test Plans for Modifications to EAC Certified Systems* identifies that "Test Plans submitted for modifications to previously EAC certified voting systems should be brief and structured to minimize test plan development and review". The NOC 09-005 identifies specific content of the test plan. The sections listed below address this content or lists it's location in the test plan.

1.1.1 Description of the ESSUNITY3200 Baseline

The ESSUNITY3200 certified voting system is a paper-based voting system that includes the:

- Election management system election (EMS) preparation software: Election Data Manager, ES&S Ballot Image Manager, Hardware Programming Manager, AutoMARK Information Management System
- EMS audit software: Audit Manager and LogMonitor
- Pre-vote hardware: Ballot-on-Demand COTs printer
- Polling place optical scanner hardware and firmware: Model DS200
- Polling place ballot marker hardware and firmware: AutoMARK Voter Assist Terminal A100, AutoMARK Voter Assist Terminal Model A200
- Central count hardware and firmware: Model 650
- Central count EMS software: Election Reporting Manager

The [EAC Certificate of Conformance ES&S Unity 3.2.0.0](#), found on the EAC website, provides the official description of the ESSUNITY3200 baseline.

1.1.2 Location of the Modification Test Plan Required Content

The DS200 change identification, description of the firmware changes, the category, functional area, reason for the change and applicable documentation changes are listed in [Section 1.4.5 System Functionality](#). Changes to the DS200 hardware are listed in [Section 4.4.1 Hardware Environmental Test Case Design](#)

Detail regarding the review and initial assessment process for documentation, hardware and firmware is found in [Section 2 Pre-certification Testing and Analysis](#). This section also includes a description of what will be tested (regression) to establish assurance that the change(s) create no inconsistencies with the TDP and further are correctly documented and reflected in the TDP. . Issues identified in the field are identified in [Changes Related to Field Issues](#).

The description of what will be tested (regression) to establish assurance that the change(s) have no adverse impact on the compliance, integrity or the performance of the equipment is identified in [Section 4 Software Functional and System Level Test Case Design](#) and the [DS200 Functional Test Method](#), a summary of the test methods that will be used to validate compliance.

Titles of test lab personnel responsible for each aspect of the test campaign and the project schedule are found in [Section 1.3 Testing Responsibilities](#).

1.1.3 RFI & NOC- Validity for the Test Campaign

Handling of the EAC Requests for Interpretation and Notices of Clarification in Unity 3.2.0.0 Revision 1 are listed below.

Table 1 EAC Requests for Interpretation and Notices of Clarification

EAC RFI and NOC Title	Addressed in Unity 3.2.0.0 Revision 1
EAC Decision on Request for Interpretation 2007-01, Rev. 2 2005 VVSG Vol. 1 Section 3.2.2.1 (e)(AutoMARK Keypad)	Complied in ESSUNITY3200, no changes to the AutoMARK keypad
EAC Decision on Request for Interpretation 2007-02, 2002 Voting Systems Standards, Vol. 1, Section 4.2.5* (Single character names)	Names with a single character difference are identified and assessed in the review of source code changes
EAC Decision on Request for Interpretation 2007-03, 2005 VVSG Vol. 1 Section 3.1.1*(usability test review)	Complied in ESSUNITY3200, no changes to the VAT
EAC Decision on Request for Interpretation 2007-04, 2005 VVSG Vol. 1 Section 3.1.3*(Alternate language)	Complied in ESSUNITY3200, no changes to the VAT which is the voting equipment that addresses v.1: 3.1.3 Alternative Language
EAC Decision on Request for Interpretation 2007-05, 2005 VVSG Vol. 1 Section 4.2.1 (Testing Focus & Applicability)*	Complied in ESSUNITY3200, no COTS hardware changes to ESSUNITY3200
EAC Decision on Request for Interpretation 2007-06, 2005 VVSG Vol. 1 Section 4.1.1, 2.1.2c & f, 2.3.3.3o & 2.4.3c&d. (Recording and reporting undervotes) *	Complied in ESSUNITY3200, no changes to counting of undervotes
EAC Decision on Request for Interpretation 2008-01, 2002 VSS Vol. II, 2005 VVSG Vol. II, Section 4.7.1 & Appendix C* (Temperature & power variation testing)	Complied in ESSUNITY3200, no changes to hardware requiring temperature and power variation testing
EAC Decision on Request for Interpretation 2008-02, Battery Backup for Optical Scan Voting machines*	Complied in ESSUNITY3200, no changes to battery backup
EAC Decision on Request for Interpretation 2008-03 (Operating System Configuration) 2002 VSS Vol. 1: 2.2.5.3, 4.1.1, 6.2.1.1, Vol. 2: 3.5; 2005 VVSG Vol. 1: 2.1.5.2, 5.1.1, 7.2.1, Vol. 2: 3.5*	OS configuration documentation is tested for completeness, clarity and consistency as part of the test environment configuration.
EAC Decision on Request for Interpretation 2008-04, 2002 VSS Vol. I, Section 2.3.1.3.1a 2005 VVSG Vol. II, Section 2.2.1.3a Ballot Production*	Complied in ESSUNITY3200, no changes to ballot production
EAC Decision on Request for Interpretation 2008-05 2002 VSS Vol. I, Section 3.4.2 2005 VVSG Vol. I, Section 4.3.2, Durability*	Complied in ESSUNITY3200, no changes to hardware that impact durability
EAC Decision on Request for Interpretation 2008-06, 2002 VSS Vol. I, Sections 3.2.2.4c, 3.2.2.5 2005 VVSG Vol. I, V. 1.0, Sections 4.1.2.4c (Electrical Supply), 4.1.2.5 (Electrical Power Disturbance) *	Complied in ESSUNITY3200, no changes to battery backup
EAC Decision on Request for Interpretation 2008-07; 2002 VSS Vol. I, Sections, 2.3.4, 2.3.5, 2.3.6, 2.4.1, 4.4.3, 9.4; 2002 VSS Vol. II, Sections, 3.3.1, 3.3.2; 2005 VVSG Vol. I, Sections, 2.2.4, 2.2.5, 2.2.6, 2.3.1, 5.4.3; 2005 VVSG Vol. II, Sections, 1.3, 3.3.1, 3.3.2*	Complied in ESSUNITY3200, no changes to zero count r
EAC Decision on Request for Interpretation 2008-08 2002 VSS Vol. I, 2005 VVSG Vol. I, Glossary (Bar code readers)	No bar code reader
EAC Decision on Request for Interpretation 2008-09 (Safety Testing) 2002 VSS Vol. I, Section, 3.4.8 2005 VVSG Vol. I, Section 4.3.8*	Complied in ESSUNITY3200, no changes to hardware that impact safety
EAC Decision on Request for Interpretation 2008-10 (EFT) 2005 VVSG Vol. I, Sect. 4.1.2.6 2005 VVSG Vol. II, Sect,4.8*	Tested to IEC-61000-4-4 (2004-02)
EAC Decision on Request for Interpretation 2008-12 (Ballot marking Device/ Scope of Testing) 2005 VVSG Vol. 1: 2.1.5. System Audit 2005 VVSG Vol. 1: 2.1.5.2 Shared Computing Platform*	Complied in ESSUNITY3200, no changes to the VAT ballot marking device
EAC Decision on Request for Interpretation 2009-001 (VVPAT Accessibility) 2005 VVSG Volume1: 7.8.2, 7.9.7*	No VVPAT
EAC Decision on Request for Interpretation 2009-02 (Alternate Languages) 2002 VSS Vol. I: 2.2.1.3a Ballot Production; 2005 VVSG Vol. I: 3.1.3 Alternate Languages*	Complied in ESSUNITY3200, no changes to the VAT which is the voting equipment that addresses v.1: 3.1.3 Alternative Language
EAC Decision on Request for Interpretation 2009-03 (Battery Back Up for Central Count): RFI 2008-06 (Battery Back Up for Central Count); 2002 VVSS Volume I, Sections 3.2.2.4c, 3.2.2.5; 2005 VVSG Volume	Complied in ESSUNITY3200, no changes to M650 central count scanner

EAC RFI and NOC Title	Addressed in Unity 3.2.0.0 Revision 1
I, Version 1.0, Sections 4.1.2.4c (Electrical Supply), 4.1.2.5 (Electrical Power Disturbance) *	
EAC Decision on Request for Interpretation 2009-04 (Audit Log Events); 2002 VSS Vol: 2.2.4.1, Common Standards, 2.2.5.1 System Audit; 2005 VVSG Vol: 2.1.4 Integrity, 2.1.5 System Audit, 2.1.5.1 Operational Requirements, 5.4.3 In-Process Audit Records*	All test cases include verification that events are recorded in the audit log.
EAC Decision on Request for Interpretation 2009-05; 2002 VSS Vol. I, Sections, 2.2.7.2 c & d; 2005 VVSG Vol. I, Sections, 3.2.2.2 c ii & iii*	Complied in ESSUNITY3200, no changes to the VAT which is the voting equipment that supports audio capabilities
EAC Decision on Request for Interpretation 2009-06 (Temperature & Power Variation Tests); 2002 VSS Vol. I, Sect. 3.4.3 2002 VSS Vol. II, Sect. 4.7.1, 4.7.2, Appx Sec. C.4 2005 VVSG Vol. I, Sect. 4.3.3 2005 VVSG Vol. II, Sect. 4.7.1, 4.7.3, Appx Sec. C.4 EAC Decision on RFI 2008-1*	Complied in ESSUNITY3200, no changes to hardware requiring temperature and power variation testing
EAC Decision on Request for Interpretation 2010-01; 2002 VSS Vol. I, Sections, 3.2.2.8; 2005 VVSG Vol. I, Sections, 4.1.2.8* (ESD Voltage Levels)	Tested at 2, 4, 6 & 8 kV
EAC Decision on Request for Interpretation 2010-02 2005 VVSG Vol. I, Section, 5.2.3 d, 5.2.5, 5.2.6, 5.2.7 b, c, d & e 2005 VVSG Vol. II, Section, 5.4.2 (Coding conventions)	ES&S is using the VVSG coding conventions
EAC Decision on Request for Interpretation 2010-03; 2005 VVSG, Volume II, Section 5.4, Section 5.4.2.a - 5.4.2.v * (Database Coding Conventions)	Complied in ESSUNITY3200, no relevant code changes
EAC Decision on Request for Interpretation 2010-04; 2002 VSS Volume I: 2.2.1 Security , 2005 VVSG Volume I: 2.1.1 Security * (Functional Requirements with Respect to Security)	No changes to the relevant system capabilities
Notice of Clarification NOC 07-001: Timely Submission of Certification Application*	ES&S is coordinating with the EAC project manager, VSTL selection has been declared
Notice of Clarification NOC 07-002: VSTL Work with Manufacturers Outside of Voting System Certification Engagements*	Unity 3.2.0.0 Revision 1 project is not outside of a certification engagement
Notice of Clarification: NOC 07-003: State Testing Done in Conjunction with Federal Testing within the EAC Program*	There is no state testing in conjunction with this project
Notice of Clarification: NOC 07-004: Voting System Manufacturing Facilities*	NOC addresses manufacture issues outside the VSTL's scope
Notice of Clarification 07-05: Voting System Test Laboratory (VSTL) responsibilities in the management and oversight of third party testing*	Changes do not require third party testing
Notice of Clarification NOC 08-001: Validity of Prior Non-Core Hardware Environmental and EMC Testing*	There is no reused of non-EAC certification hardware testing.
Notice of Clarification: NOC 08-002: Clarification of EAC Mark of Certification Requirement*	NOC addresses manufacture issues outside the VSTL's scope
Notice of Clarification NOC 08-003: Clarification of EAC Conformance Testing Requirements for VSTLs*	Tests and reviews are developed by iBeta to confirm the changes conform to the VVSG
Notice of Clarification: NOC 09-001 Clarification of the Requirements for Voting System Test Laboratories (VSTLs) Development and Submission of Test Plans*	This test plan for modification to a certified system follows the sequence outlined in NOC 09-001 edited with the NOC 09-005 content and traces
Notice of Clarification: NOC 09-002: Clarification of EAC Laboratory Independence Requirement*	Tests and reviews shall not be conducted in the presence of ES&S.
Notice of Clarification NOC 09-003: Clarification of De Minimis Change Determination Requirements*	Changes are to documentation are subjected to testing and/or review.
Notice of Clarification NOC 09-004: Development & Submission of Test Reports*	NOC required content will be incorporated into the test report
Notice of Clarification NOC 09-005: Development and Submission of Test Plans for Modifications to EAC Certified Systems*	NOC required content is identified in Section 1.1

* Public document found on the [EAC website](#)

1.2 References

The documents listed below are used in the Unity 3.2.0.0 Revision 1 voting system certification test effort.

1.2.1 Internal Documentation

The documents identified below are iBeta internal documents used in certification testing of the changes to the ESSUNITY3200.

Table 2 Internal Documents

Version #	Title	Abbreviation	Date	Author (Org.)
	Voting Certification Master Services Agreement-Prepared for Election Software & Services (ES&S)	MSA contract	11/15/08	iBeta Quality Assurance
	Statement of Work 11	SOW 11		iBeta Quality Assurance
	DS200 Functional TC Unity 3.2.0.0 Revision 1		6/29/10	iBeta Quality Assurance
	FCA Environmental Test Case Unity 3.2.1.0		3/25/10	iBeta Quality Assurance
	Unity 3.2.0.0 Revision 1 DS200 Trusted Build Read Me		6/14/10	iBeta Quality Assurance
1.0	Trusted Build of the DS200 firmware 1.4.3.0		2/12/10	iBeta Quality Assurance
4.0	Election Systems & Software Unity 3.2.0.0 Voting System VSTL Certification Test Report (V)2009-30Jun-001(D) *		7/22/09	iBeta Quality Assurance

* Public document found on the [EAC website](#)

1.2.2 External Documentation

The documents identified below are external resources used to in certification testing of the changes to the ESSUNITY3200.

Table 3 External Documents

Version #	Title	Abbreviation	Date	Author (Org.)
	Help America Vote Act*	HAVA	October 29, 2002	107 th Congress
NIST Handbk 150 2006 Ed	NVLAP Voting System Testing	NIST 150	February 2006	National Voluntary Lab Accreditation Program
NIST Handbk 150-22	NVLAP Voting System Testing	NIST 150-22	December 2005	National Voluntary Lab Accreditation Program
	Voluntary Voting System Guidelines*	VVSG	December 2005	Election Assistance Commission
	EAC Certification of Conformance ES&S Unity 3.2.0.0 Election Systems and Software*	ESSUNITY3200 voting system	July 29, 2009	Election Assistance Commission
v.1.0	Testing and Certification Program Manual*		January 1, 2007	Election Assistance Commission
v.1.0	Voting System Test Laboratory Program Manual*		July 2008	Election Assistance Commission
	Unity 3.2 Revision 1 Testing (Field Issue 2 EAC email)		6/21/10	Election Assistance Commission
	DS200 (Field Issue 2 ES&S email)		6/21/10	ES&S
	See section 1.1.3 for a list of RFIs & NOCs *		Various dates	Election Assistance Commission

Version #	Title	Abbreviation	Date	Author (Org.)
	Environmental Test Reports			
	EMC Qualification Test Report Election Systems and Software IntelElect Precinct Ballot Counter DS200 HW Rev. 1.2.1 Report Number: 090924-1464		12/3/09	Criterion Technology
	EMC Qualification Test Report Election Systems and Software IntelElect Precinct Ballot Counter DS200 HW Rev. 1.2.1 Report Number: 091130-1503R		3/31/2010	Criterion Technology

* Public document found on the [EAC website](#)

1.2.3 Changes to the ESSUNITY3200 Technical Data Package Documents

The changes to the ESSUNITY3200 submitted for this certification test effort are listed below.
Unchanged documents are found in the ESSUNITY3200 Test Report.

Table 4 Unity 3.2.0.0 Revision 1 voting system Technical Data Package Documents

Title	Version	Date	Author
Unity 3.2.0.0 Revision 1			
Election Systems & Software System Overview Unity v. 3.2.0.0 Revision 1	5.0	06/29/10	ES&S
Election Systems & Software System Limitations Unity v. 3.2.0.0 Revision 1	2.0	06/25/10	ES&S
Unity 3.2.0.0 Revision 1 System Change Notes	3.0	no date	ES&S
Requirements of the 2005 VVSG Trace to Vendor Testing and Technical Data Package	None	06/25/10	ES&S
Election Systems & Software ES&S Software Design Specifications DS200 Unity v. 3.2.0.0 Revision 1	3.0	06/25/10	ES&S
Election Systems & Software ES&S Software Design Specifications ERM Unity v. 3.2.0.0 Revision 1	1.0	06/24/10	ES&S
Election Systems & Software ES&S System Functionality Description DS200 Unity v. 3.2.0.0 Revision 1	1.0	06/07/10	ES&S
Election Systems & Software ES&S System Functionality Description ERM Unity v. 3.2.0.0 Revision 1	1.0	06/24/10	ES&S
Election Systems & Software ES&S System Hardware Specification DS200 Unity v. 3.2.0.0 Revision 1	1.0	06/07/10	ES&S
DS 200 Part list	None	05/12/08	ES&S
DS200 System Maintenance Manual Hardware Version 1.2.1.0 Firmware Version 1.4.3.0	None	05/07/10	ES&S
ES&S DS200 System Operations Procedures Hardware Version 1.2.1 Firmware Version 1.4.3.0	None	06/21/10	ES&S
ES&S Election Reporting Manager System Operations Procedures Version Release 7.5.4.0	None	06/28/10	ES&S
DS200 Precinct Ballot Scanner Election Day Training Manual Version Number 1.4.x	None	06/07/10	ES&S
DS200 Precinct Ballot Scanner Pre-Election Day Training Manual Version Number 1.4.x	None	06/07/10	ES&S

1.3 Testing Responsibilities

1.3.1 Project Schedule

The VVSG 2005 identifies a general sequence of pre-test, test and post test activities. Any anomalies or errors are communicated to the manufacturer during all these activities. The schedule defined by

iBeta details the tasks, dependencies, personnel and test phase. Predecessor tasks must be completed prior to task initiation. Tasks that do not have predecessors or dependencies may be performed in parallel.

1.3.1.1 Owner Assignments

Staff assigned to the Unity 3.2.0.0 Revision 1 voting system certification test effort includes:

Project Manager: Carolyn Coggins

Lead Tester/Reviewer: Jennifer Garcia

Tester/Reviewers: Gail Audette, Kirby Austin, Steven Brown, Sridevi Jakileti, Alastair Meyer, Kevin Wilson

Owner Assignments are identified in Table 5.

1.3.1.2 Test Case Development

Test methods identified in [section 7 Test Methods](#) provide an outline of the content of the test cases. Detail regarding test method and test case development are incorporated into [section 4 Test Case Design](#).

1.3.1.3 Test Procedure Development and Validation

Test procedures and validations are documented in the test cases.

1.3.1.4 Third Party Tests

Changes have no impact on the ESSUNITY3200 third party tests.

1.3.1.5 EAC and Manufacturer Dependencies

EAC and Manufacturer dependencies are incorporated into Table 5.

Table 5 –Sequence of Certification Test Tasks Schedule

Certification Test Task	Predecessor Tasks or Dependencies	Owner	Phase
Pre-Test Activities			
Identify scope of project for contract negotiation	<ol style="list-style-type: none"> 1. Preliminary discussion and overview examination of the system and documents for identification of the scope of testing, test standards, components and documents needed to conduct testing. 2. Delivery of the EAC certification application, implementation statement, System Overview, System Limits and Functional Design 3. Identification of the EAC application and status of approval 	Coggins, Garcia	June
Set up Project Repositories	<ol style="list-style-type: none"> 1. Contract Authority 	Coggins	June
Reporting of Discrepancies	<ol style="list-style-type: none"> 1. Commencement of the project 	All staff	On going
Identify any TDP changes relevant to the PCA TDP Document Review	<ol style="list-style-type: none"> 1. Project repository set up 2. TDP document delivery, check in & CM version check 	Austin	June
Restore & rebuild ESSUNITY3200 System Configuration	<ol style="list-style-type: none"> 1. Delivery of the Unity 3.2.0.0 Revision 1 Overview, Functional Description, changed SW & HW TDP documentation 2. Restore Unity EMS on ESSUNITY3200 test hardware to matching images 	Garcia, Austin, Brown	June
PCA Source Code Review of changed code	<ol style="list-style-type: none"> 1. Project source code repository set up (shared code will reside in Unity 3.2.1.0 project. Read me document will identify location until copied into Unity 3.2.0.0 Revision 1 final project archive) 2. Confirm no changes to ESS coding practices from ESSUNITY3200 3. Source code received, checked in, & CM version check 4. Identify changed code and prepare review sheets 	Jakileti, Meyer	June
FCA Testing Review and	<ol style="list-style-type: none"> 1. Identification of changes to SW, HW and 	Coggins, Garcia,	June

Certification Test Task	Predecessor Tasks or Dependencies	Owner	Phase
Test Scope/ Requirements Identified; identification of Test Methods to test changes	processes from ESSUNITY3200 2. Import the HW environmental test results from the Unity 3.2.1.0 project for the DS200 ECOs	Austin	
Certification Test Plan	1. PCA pre-test examination changes to TDP, SW, HW, system configuration and source code. 2. Identification of scope in the PCA TDP Document Review, FCA Testing Review, ECO Assessments for changes to hardware 3. Preparation of Test Method for changes from ESSUNITY3200	Coggins, Garcia, Austin, Brown	June
Certification Test Plan Approval	1. Delivery of the Test Plan to the EAC 2. EAC Program Director review and approval	EAC staff	June
FCA Test Case Preparation: Functional and System Level Regression	1. Preparation and peer review of the Test Method 2. Gather and review document changes to develop the Test Cases 3. Test Plan completion and approval may occur prior to Test Case development. Only the Test Method is a required pre-requisite	Garcia, Austin	June
Test Activities			
Trusted Build	1. PCA Source Code Review completed with no open source code or functional discrepancies 2. Validate COTS 3. Review and validation build procedure including user selections and configuration changes 4. Obtain and document build hardware	Jakileti, Meyer	June
FCA Functional Test Execution	1. FCA Test Method & Test Case development is completed 2. DS200 build and installed; ESSUNITY3200 escrow retrieved and installed with the PCA System Configuration verified	Garcia, Austin, Brown	June
FCA System Level Regression Test Execution	1. Functional testing completed	Garcia, Austin, Brown	June
FCA Environmental Test Execution	1. Use DS200 environmental test results and report from the Unity 3.2.1.0 certification	Coggins, Garcia, Austin	June
Post Test Activities			
VSTL Certification Test Report	1. Completion of FCA and PCA tasks 2. EAC Program Director approves the Test Plan 3. Delivery of "Warrant of Accepting Change Control Responsibilities" 4. Update of as-run Test Plan 5. Implementation Statement	Coggins, Garcia, Austin, Brown	June
Deliver the Certification Report for EAC Review	1. Completion of VSTL Certification Test Report and matrix	Coggins	June
Delivery of the Manufacturer letter signed by iBeta; trusted build, hash & images	1. EAC Technical Review of the Test Report 2. VSTL and/or manufacturer delivery to the EAC of any materials stipulated by the EAC review 3. EAC Technical Reviewer report to the EAC Program Director 4. Initial Decision issued by the EAC Executive Director	ES&S	July
Re-issue the Certification Report with the EAC Certification Number	1. Certification number issued by the EAC	Coggins	July

1.4 Target of Evaluation Description of Changes from ESSUNITY3200

The Unity 3.2.0.0 Revision 1 voting system changes to ESSUNITY3200 are identified below.

1.4.1 System Overview

The System Overview reflects the DS200 firmware version change to 1.4.3.0 and **Unity 3.2.0.0 Revision 1 non-support of elections in Illinois and Hawaii**. All other aspects of the System Overview are unchanged from ESSUNITY3200.

1.4.2 Block Diagram

Changes have no impact on the ESSUNITY3200 block diagram.

1.4.3 System Limits

ES&S has submitted no change to the ESSUNITY3200 declared system limits.

1.4.4 Supported Languages

Enhancements 16120, 16291, and 16336 update the Spanish translations for errors. All other supported language functionality is unchanged from ESSUNITY3200.

1.4.5 System Functionality

The DS200 enhancements and bug fixes submitted In Unity 3.2.0.0 Revision 1 are listed below. All other functionality is unchanged from ESSUNITY3200.

Table 6 –DS200 Functional Changes to ESSUNITY3200

ES&S Change ID	ES& S Category	DS200 Menu or Function	Change Description	Reason for Change	Documentation Changed
General					
BUG15827	Overvote handling	System	Resolved an issue where the scanner failed to divert overvoted write-in ballots when the Divert Write-ins option was selected	Fixed Issue	N/A – Bug Fix
BUG17375	Code	Source Code	Fix source code discrepancies per VSTL review.	Fixed Issue	N/A – Bug Fix
BUG17664	Code	Source Code	Fix source code discrepancies per VSTL review.	Fixed Issue	N/A – Bug Fix
BUG17666	Reports	Status Report	Added the protected count to the status report that prints automatically when a DS200 is re-opened for voting.	Fixed Issue	N/A – Bug Fix
ENH14725	Interface	Display	Remove Image Drive icon from DS200 if images are not being saved	System Enhancement	N/A
ENH14726	Interface	Display	Extend the time that "Thank you for voting" displays	System Enhancement	N/A
ENH14728	Interface	Display	Provide clear indication that modem transfer was successful	System Enhancement	SOP – DS200
ENH14729	Poll Opening	Reports	Allow multiple zeros tapes to be printed before first ballot cast	System Enhancement	SOP – DS200
ENH14730	Interface	Audio	Change alert beeping to just two beeps	System Enhancement	N/A
ENH14731	Interface	Audio	Issue audible alarm when ballot is accepted	System Enhancement	N/A
ENH14732	Reports	Results Reports	Repeat machine ID and poll number at end of results tape	System Enhancement	SOP – DS200
ENH14745	Exception	Accept/	Provide override for Overvote or	System	SOP – DS200

ES&S Change ID	ES& S Category	DS200 Menu or Function	Change Description	Reason for Change	Documentation Changed
	Handling	Reject Ballots	blank ballot rejection	Enhancement	
ENH15287	Reports	Precinct Report	Add Early Voting Ballot Styles per Precinct Report	System Enhancement	SOP – DS200 System Functionality Description – DS200
ENH15288	Interface	Display	Increase Font Size of Thank you for Voting message	System Enhancement	SOP – DS200
ENH15418	Tabulation	Scan Accuracy`	Small white dots "hickeys" causing read problems	System Enhancement	N/A
ENH15890 (1)	System	Firmware	Implement new scanner board firmware	System Enhancement	System Overview – Unity 3.2.0.0 Rev1
ENH15891 (1)	Security	Counterfeit Detection	Implement new administration function to calibrate counterfeit sensor	System Enhancement	SOP – DS200
ENH15892 (1)	System	Firmware	Update scanner client to work with new scanner board firmware	System Enhancement	N/A
ENH16085	Interface	Display	Install New Icons on Welcome Screen	System Enhancement	SOP – DS200
ENH16120	Interface	Display	Updated the Over Vote warning screen	System Enhancement	SOP – DS200
ENH16211	Reports	Reports	Print Machine ID & Poll Number in Audit Log and after report cancellations	System Enhancement	SOP – DS200
ENH16231	Audit	Admin Menu	Enhanced audit logging to log all user actions in the Administration menu and attempts to access the Administration menu.	System Enhancement	SOP – DS200
ENH16291	Interface	Display	DS200: Additional language translations for the Over Vote screen	System Enhancement	SOP – DS200
ENH16336	Interface	Display	DS200: Update language translations for the Over Vote screen	System Enhancement	SOP – DS200
ENH16382	Tabulation	System	Expanded support from a maximum of 10 Election Day precincts to 18 precincts.	System Enhancement	SOP – DS200 Unity 3.2.0.0 rev1 System Limitations
ENH17266	Versioning	System	Update scanner board version	System Enhancement	System Overview – Unity 3.2.0.0 Revision 1 (U3200R1_OVR00)
ENH17268	Versioning	System	Promoted DS200 version implemented in Florida for use in Unity 3200r1.	System Enhancement	N/A - Versioning
ENH17538	Protected Count	System	Added a protected count to the DS200 firmware. The protected count resides on the compact flash card in the ES&S firmware partition. It will increment with every sheet accepted and dropped into the ballot box. The counter must appear in printed reports	System Enhancement	SOP – DS200
Field 1					
BUG16775	Tabulation	System	Resolved an issue that caused L&A test decks to yield incorrect vote	Fixed Issue	N/A – Bug Fix

ES&S Change ID	ES& S Category	DS200 Menu or Function	Change Description	Reason for Change	Documentation Changed
			totals-		
BUG16782	Scanning	System	Resolved an issue that caused scanned Logic and Accuracy ballot test decks to yield incorrect results.	Fixed Issue	<i>N/A – Bug Fix</i>
Withdrawn					
ENH15009 (1)	Security	Counterfeit Detection	ENH15009 Counterfeit ballot detection functionality has been withdrawn. ENH15890 to 15892 remain as settings for the Counterfeit Ballot Sensor are required.	System Enhancement	<i>SOP – DS200</i>
EAC Inst.					
ENH19328	Security	Counterfeit Detection	Disable counterfeit detection	System Enhancement	<i>SOP – DS200 System Maintenance Manual – DS200</i>

(1) Counterfeit sensor disabled by ENH19328

1.4.6 Requirements Included and Excluded

The Unity 3.2.0.0 Revision 1 voting system changes to ESSUNITY3200 are tested to the *VVSG 2005* and do not support elections in Illinois and Hawaii. All other system inclusions and exclusions are unchanged from ESSUNITY3200.

2 Pre-certification Testing and Analysis

A review of the testing performed by ES&S on the ESSUNITY3200 changes was conducted to assess the required scope of testing in conformance with the VVSG 2005.

PCA Source Code Review

The changes to the ESSUNITY3200 DS200 escrowed source code are reviewed to the VVSG 2005 Col. 2 Section 5.4 source code review criteria. Source code review issues are identified in a discrepancy report delivered to ES&S. Issues identified included missing header and variable declaration comments and undefined constants. These issues were reported to ES&S on source code review discrepancy reports. All source code resolution resubmissions from ES&S (BUG 17375 and 17664 submitted to both Unity 3.2.0.0 Revision 1 and Unity 3.2.1.0) are reviewed and validated. iBeta confirms issues are addressed prior to closing the discrepancy.

PCA TDP Document Review and FCA Document Review

A comparison of the DS200 documents submitted in Unity 3.2.0.0 Revision 1 and the certified DS200 ESSUNITY3200 documents identified all changes. The changes were reviewed to determine if there was any impact on the ESSUNITY3200 PCA Document Review or if the changes in the document require verification of a process or functional description of the voting system.

- No Impact: Cosmetic, version update, format, or changes to software or a process which is not required by the VVSG.
- Impact: Content required in Vol. 2 Section 2.2. of the VVSG is deleted; new documents are added; or addition, deletion or modification that describes changes to software, hardware and processes required by the VVSG must be verified

Items determined to impact the ESSUNITY3200 review or testing of the DS200 firmware or process were further examined to identify the type of review or testing required by the change

- PCA Document Review: Changes removed any required VVSG Vol.2: section 2.2 content. New documents were reviewed for to the VVSG Vol.2: section 2.2.
- FCA Functional Testing: Change to DS200 firmware that impacts voting system functional or security election operation

The document review found that no changes to the DS200 documents impacted the results of the ESSUNITY3200 PCA Document Review. Document changes which impacted DS200 functionality are incorporated in the DS200 Functional Test.

Hardware Engineering Change Order Review

The DS200 engineering changes submitted to Unity 3.2.0.0 Revision 1 were submitted and tested in Unity 3.2.1.0. As the submitted (DS200 hardware is identical, the Unity 3.2.1.0 assessments of the engineering changes, required testing, and test results will be used in both certifications.

2.1 Evaluation of prior VSTL Testing

iBeta initiated an assessment to identify the changes to DS200 firmware and hardware in Unity 3.2.0.0 Rev 01 (and Unity 3.2.1.0). Changes notes submitted for the DS200 were reviewed to identify the functional changes. Hardware engineering change orders submitted for Unity 3.2.1.0 and Unity 3.2.0.0 Revision 1 were reviewed and assessed to identify changes that required repeating of any hardware test.

2.2 Reports of Field Issues

Two reports of field issues have been identified for the DS200 certified in ESSUNITY3200.

Field Issue 1 is included in Unity 3.2.0.0 Revision 1

1. The DS200 was sporadically reporting a mark present in row 44 and row 45 of column D on the back of the ballot when no actual mark was present. It was found that the specific ballot had been printed with a slight skew. Additionally, the condition could only be reproduced when the ballot was inserted with a skew slight enough to not generate a rejection of the ballot. The abnormal skew revealed that the scanner's tolerance was reading text slightly outside the channel as a mark.

Field Issue 2 is currently under examination by ES&S. It will be addressed in a subsequent certification.

2. DS200 system lockup condition was observed during pre-election logic and accuracy testing for the Cuyahoga County primary election held in May 2010. Systems locked up and had to be restarted. Systems restarted immediately. Lock ups were random and could not be repeated. Cuyahoga County observations identified that the problem occurred more frequently when workers were conducting the Administrator functions. These functions tend to occur before or after the polls are closed at times of greater touch screen interaction. Touch screen interaction during voting is very limited. iBeta requested confirmation that there was no documented report of any issue resulting in the loss or corruption of voting data. Its presence shall be noted in the test report per VVSG Vol.2 section B.5.

3 Materials Required for Testing

The System Identification stipulates the following materials required for testing of ES&S Unity 3.2.0.0 Revision 1.

3.1 Voting System Software

The software listed in below is the documented configuration of the ES&S Unity 3.2.0.0 Revision 1.

Table 7 Voting System Software

Application	Manufacturer	OS or Version	Description (identify COTS)
Election Management Software			
Election Data Manager (EDM)	ES&S	7.8.1.0	EMS software for election definition and ballot preparation for M650, DS200, and M100
ES&S Ballot Image Manager (ESSIM)	ES&S	7.7.1.0	Unity election management system desktop publishing tool to layout and format paper ballots
Audit Manager (AM)	ES&S	7.5.2.0	A Unity election management system audit logging software application including security and user tracking for the Election Data Manager and Ballot Image Manager
Hardware Programming Manager (HPM)	ES&S	5.7.1.0	A Unity election management system software application to import, format, and convert an election file and create election definitions for ballot scanning equipment
Election Reporting Manager (ERM)	ES&S	7.5.4.0	A Unity central count software application to compile and report election results.
Log Monitor	ES&S	1.0.0.0	A software application that checks the status of the Windows Event Log feature and closes all ES&S applications if the Event Log feature is disabled or not configured properly.
Microsoft Windows XP SP3	Microsoft	SP3	COTS EMS Operating System
SQLXML	Microsoft	3.0 service pack 3	COTS: XML support for Unity
Windows Internet Explorer	Microsoft	7	COTS: AIMS & Unity PC ES&S does not want Internet Explorer to be run on the election System PCs. However, Internet Explorer must be resident on the PC to contain the latest security updates.
Adobe Acrobat v9	Adobe	9.0	COTS - Used with ESSIM
Adobe Type Manager 4.1	Adobe	4.1	COTS - Used with ESSIM
RM/COBOL v11.01 Runtime System	Liant	11.01	COTS interpreter software used in HPM & ERM
Norton AntiVirus 2005	Symantec Corporation		COTS Anti Virus protection for PCs and Servers
Precinct Scanner			
DS200 Firmware DS200 Power Management Firmware DS200 Scanner Firmware	ES&S	1.4.5.0 1.2.0.1 2.20.0.0	Precinct count digital scanner paper ballot tabulator including a 12-inch touch screen display providing voter feedback and poll worker messaging. DS200 scanner reads marks on both one- and two-sided ballots.

Application	Manufacturer	OS or Version	Description (identify COTS)
			Administrators can request custom ballot acceptance criteria, which ES&S programs onto the scanner's election definition.

3.2 Voting System Hardware and Equipment

The equipment listed in below is the documented configuration of the ES&S Unity 3.2.0.0 Revision 1.

Table 8 Voting System Hardware and other Equipment

Hardware or Equipment	Manufacturer	Version	Description (identify COTS)
Election Management Hardware			
(1) Dell GX260 computer desktop with monitor, keyboard & mouse SN: Tower: 7D0WL21,	Dell	Windows XP Professional Version 2002 SP3	Pre-Vote & Post-Vote: COTS Unity PC for the Unity election management system Condition: Good
Precinct Scanner			
DS200 (S/N: 2093900001)	ES&S		Vote: A Unity Voting System precinct count optical scanner paper ballot tabulator including a 12-inch touch screen display providing clear voter feedback and poll worker messaging, Condition: Good
Steel Ballot Box (P/N: 76246, S/N: C4243)	ES&S		Vote: Precinct steel ballot box, with diverter to segregate ballots into multiple chambers as programmed in the EMS Condition: Good
(3) SanDisk 2.0 GB USBs	SanDisk		COTS: Media for installing election definition, recording and reporting votes and audit logs
Thermal paper rolls	NCR	N/A	COTS: DS200 reports
Paper Ballots	Paper Ballots - 14"		Supplied by ES&S: Ballots for DS200 with preprinted election content
Ballot Marker Pens	Marking Device		COTS: VL Ballot Pen to mark paper ballots
Other Test Hardware			
ES&S intElect DS200 SN: ES0107370025	ES&S	HW 1.2.1 FW 1.3.11.0	Precinct Count Digital Scanner (Modem removed in Unity 3.2.0.0)
Plastic Ballot Boxes (HW Rev.1.3) (1) Bin P/N 94050 (1) Carrying Case P/N 94051 Emergency Ballot Bin P/N 94325 (P/N is not marked on the Emergency bin)	ES&S	N/A	Precinct Plastic Ballot Boxes for DS200, No Diverter HW 1.3 • Carrying Case: Adhesive & washer/rivets to secure foam in production process Removed the unused switch/bracket • Ballot Bin: Updated locks on the bin Replace a C/B PAR part Metal door instead of plastic door
Delkin Thumb Drives: 4GB & 8GB	Storage media for the DS200	Delkin	Delkin Thumb Drives: 4GB & 8GB COTS: Media for installing election definition, recording and reporting votes and audit logs

3.3 Testing Software, Hardware and Materials

The software, hardware and materials listed below are needed to support testing and in test simulations of elections of the ES&S Unity 3.2.0.0 Revision 1.

Table 9 Testing Software, Hardware and Materials

Software, Hardware or Material	Description	Description of use in testing
Multiple desktop and laptop PCs	A variety of PCs running Microsoft operating systems	Supplied by iBeta: Preparation, management and recording of test plans, test cases, reviews and results

Software, Hardware or Material	Description	Description of use in testing
Repository servers	Separate servers for storage of test documents and source code, running industry standards operating systems, security and back up utilities	Supplied by iBeta: Documents are maintained on a secure network server. Source code is maintained on a separate data disk on a restricted server
Microsoft Office 2003 & 2007	Excel and Word software and document templates	Supplied by iBeta: The software used to create and record test plans, test cases, reviews and results
SharePoint 2003	TDP and test documentation repository	Supplied by iBeta: TDP and test documentation repository and configuration management tool
Other standard business application software	Internet browsers, PDF viewers email	Supplied by iBeta: Industry standard tools to support testing, business and project implementation
Center 325 Mini Sound Level Meter	IEC 651 Type 2 handheld sound level meter	Supplied by iBeta: Measure decibel level
Visual Studio 2003 v.7.1.3808 (Microsoft)	Build and source code review Integrated Development Environment	Supplied by iBeta: View source code review
RSM v.6.92 (M Squared Technologies)	C, C++, Java & C# static analysis tool	Supplied by iBeta: identify line counts and cyclomatic complexity
Beyond Compare 2 v.2.4.3 (Scooter Software)	Comparison utility	Supplied by iBeta: used to compare file/folder differences
WinDiff 5.1 (Microsoft)	Comparison utility	Supplied by iBeta: used to compare file/folder differences
Hash.exe v.7.08.10.07.12 (Maresware)	Hash creation utility	Supplied by iBeta: used to generate hash signatures for Trusted Builds
SLAX LIVE W/ SHA1DEEP v.5.1.8	Hash creation tool	Supplied by iBeta: used to generate hash signatures for the DS200
Knoppix 5.1.0	Hash creation utility	Supplied by iBeta: used to generate hash signatures
Symantec Ghost v.11	Image capture tool	Supplied by iBeta: used to capture and test environments
Bart PE 3.1.10a	Image capture utility	Supplied by iBeta: used with Ghost process
Visual Studio 2008 v. 9.0.21022.8 (Microsoft)	Build and source code review Integrated Development Environment	Supplied by iBeta: View source code review
Killdisk v.4.1	PC clear utility	Supplied by iBeta: used to wipe clean PCs and servers prior to testing

3.4 Deliverable Materials

Documents listed below are delivered, to the purchaser as part of the Unity 3.2.0.0 Revision 1 voting system changes.

Table 10 Changes to Voting System User Documents from Certified ESSUNITY3200

Version #	Title	Abbreviation	Date	Author (Organization.)
2.0	Election Systems & Software System Overview Unity 3.2.0.0 Revision 1	U3200r1_OVR00.pdf	06/21/2010	ES&S
	ES&S DS200 System Operations Procedures Hardware Version 1.2.1 Firmware Version 1.4.3.0	U3200r1_SOP00_DS200.pdf	06/21/2010	ES&S
1.3.x	AutoMARK Pre-Election Day Checklist	U3200r1_TRN00_AutoMARK_PreElection.pdf	07/31/2009	ES&S
1.4.x	DS200 Precinct Ballot Scanner Election Day Training Manual	U3200r1_TRN00_DS200_Election.pdf	6/7/2010	ES&S

The materials listed below delivered as part of the ES&S Unity 3.2.0.0 Revision 1 voting system.

Table 11 Changes to Voting System Materials from Certified ESSUNITY3200

Material	Material Description	Use in the Voting System
intellect DS200 (DS200) FW: 1.4.3.0	A Unity precinct count digital scanner	Digital Scan tabulator

The [EAC Certificate of Conformance ES&S Unity 3.2.0.0](#), found on the EAC website, provides the official description of the ESSUNITY3200 baseline.

3.5 Proprietary Data

Proprietary data is handled in the same manner identified in ESSUNITY3200.

4 Test Specifications

The analysis and assessments performed for the modification source code review, PCA Document review, and FCA Document Review is included in section 2. Testing for conformance to the *VVSG 2005* shall be conducted as identified in the below. The test methods for testing the changes to the ESSUNITY3200 are contained in the appendix. Documentation of all test iterations shall be maintained with a separate record of the configuration and results of all test executions.

4.1 Requirements (Strategy for evaluating sections of the *VVSG 2005*)

The strategy for evaluation of any voting system submitted for certification is to confirm that the changes to ESSUNITY3200 conform to the Volume 1 requirements of the *VVSG 2005* with validation in a functional system level regression test and review of ES&S internal test documentation.

4.2 Hardware Configuration and Design

The hardware configuration of the ES&S Unity 3.2.0.0 Revision 1 voting system submitted for testing is identified in [Section 3.2 Voting System Hardware and Equipment](#). All test cases include verification and documentation of the test environment.

4.3 Software System Functions

Testing of the software system functions defined in the *VVSG 2005* include:

- Identification of the functional test scope based upon an analysis of the TDP changes to the ESSUNITY3200 from the PCA Document Review (Vol. 2, Sect. 2) and FCA review of prior testing (Vol.2 Appendix A.2)
- PCA TDP Source Code Review of all new or changed code (Vol.2 Sect. 5.4)
- Witness the build of the reviewed code for the updated version of the system intended to be sold by the vendor and delivered to the jurisdiction. (Vol.2. Sect. 6.2)
- Development of a Certification Test Plan and Test Cases (Vol. 2, Appendix A.)
- Execution of Functional/System Integration Tests listed below (Vol. 2, Sect. 6)
- Testing of the performance and sequence of the changed software functions identified in System Operations, Maintenance and Diagnostic Testing Manuals (Vol. 2. Sec. 6.8)
- Completion of a trusted build by the VSTL with file signatures provided to the EAC stipulated escrow agency.

4.4 Test Case Design

4.4.1 Hardware Environmental Test Case Design

ES&S submitted the hardware and administrative engineering changes (ECOs) for the ESSUNITY3200 DS200 precinct scanner and the plastic ballot box/case for certification in Unity 3.2.1.0 and Unity 3.2.0.0 Revision 1.

- The administrative ECOs covered documentation relevant to the manufacturing administrative process. They incorporated details such as label changes, production status changes, out of scope equipment, documentation updates and drawings. These ECO's were assessed and determined to have no impact on the hardware which would require [further environmental hardware assessment for impact to electrical, transportation or storage](#) testing. This included the ECOs 000315, 000337, 000342, 000366, 000375, 000423, 000466, 000523, 000545, 000554, 000562, 000566, 000570, 000582, 000618, 000628, 000665, 000669 000674, 836, 837, 838, 839, 845, 846, and 851 The SysTest's subcontractors Criterion Technology Inc. of Rollinsville, CO performed hardware testing for the Unity 3.2.1.0 certification test effort. The test record and report is applicable to both certifications.

- The hardware changes generally addressed end-of-life parts and second source suppliers required further environmental hardware assessment for impact to electrical, transportation or storage. Descriptions and the findings of the assessments for testing required of these ECOs are listed in the table below.

Table 12 DS200 Engineering Change Order Hardware Test Assessment

ECO #	Description of DS200 ECOs	Operating- EMC	Non-operating Transportation & Storage
000332	DS200 Plastic Ballot Box new lock.	4.8.3 Electrostatic Disruption EN-61000-4-2	No testing required
000339	DS200 Ballot Box carry case add washer & rivet to hold foam during manufacturing	No testing required	No testing required
000359	DS200 Plastic Ballot Box Adding metal bottom edge	4.8.3 Electrostatic Disruption EN-61000-4-2	No testing required
000529	DS200 Carry Case remove micro switch bracket and switch cable	No testing required	No testing required
000534	DS200 add clamps to chassis	No testing required	No testing required
000535	DS200 Tape and holes for attaching clamps, no change to wire routing	No testing required	No testing required
000576	DS200 End of life SMT Power Inductor	No testing required	No testing required
841	DS200 add Rod Lens Array, capacitor, and protected power switch	All EMC Tests	No testing required
843	Steel Ballot Box added a new diverter cable	All except 4.8.8 Magnetic Fields Immunity EN-61000-4-8	No testing required
844	DS200 end-of-life capacitors, resistors and diode	4.8.3 VSS Electro-static Disruption EN-61000-4-2	No testing required
847	DS200 alternate LCD Backlight Inverter	All except 4.8.8 Magnetic Fields Immunity EN-61000-4-8	No testing required

4.4.2 Software Module Test Case Design and Data

The same changes to the DS200 firmware from the certified ESSUNITY3200 are being submitted in two separate EAC certification projects, Unity 3.2.0.0 Revision 1 and Unity 3.2.1.0. The identical firmware version is used in both efforts.

- General Enhancements and Issues - Unity 3.2.1.0 DS200 Functional Test Case Scenarios 1 through 7** were previously created and tested to address enhancements and issues. Unity 3.2.1.0 includes a later version of HPM and ERM. In order to verify that the DS200 works with the original ESSUNITY3200 certified versions of HPM and ERM the election definition created in Unity 3.2.1.0, using the original EDM v.7.8.1.0 (unchanged from ESSUNITY3200), will be used to execute the *Unity 3.2.0.0 Revision 1 DS200 Functional Test Case*. In scenario 1 the election definition will be pulled into the ESSIM v.7.7.1.0 (unchanged from ESSUNITY3200), and election media will be written in the original HPM v.5.7.1.0. Ballots will be cast on the DS200. The election results will be transferred to the original ERM v.7.5.4.0. It will be confirmed that the audit and election results are correctly reported. Scenarios 2 and 3 will be validated by writing the media in HPM, confirming expected results occur on the DS200 and that all applicable election results can be properly read into ERM. The changes on Scenarios 4, 5, 6 and 7 were limited to functions on the DS200; test results from Unity 3.2.1.0 will require no further verifications in Unity 3.2.0.0 Revision 1.
- Field Issue 1:** BUG16775 and BUG16782 were also submitted to both certification efforts but were handled in a different manner. Due to the highly unique conditions required to reproduce the skewed ballot issue identified in the field, iBeta assessed that it would be unlikely that they could unquestionably reproduce the test conditions. As permitted by Vol. 2: Section 6.7 of the VVSG, a document review of ES&S' testing is being conducted to confirm the issue was acceptably tested.

- **ENH19328:** In preparing the Scope of Certification the EAC instructed ES&S to disable the counterfeit detection functionality. To verify this iBeta shall conduct a source code review to confirm that code calling the counterfeit detection is disabled or removed. A functional test shall be conducted to confirm that the disabling this functionality does not impact the casting of votes.

Greater detail is found in [Section 7.1 DS200 Functional Test Method](#).

Table 13 DS200 Functional Testing for Changes to ESSUNITY3200

Function Tested	Enhancement/Issue ID
General Enhancements and Issues	
DS200 Functional TC Scenario 1	
Test the Diverter is set for "Overvoted Write-ins & Blank Ballots". Verifying these ballots will be separated from all other ballots.	BUG15827
The DS200 scanner options are set to "Do not save any ballot images" in HPM. Verifying an X appears on over the disk icon to indicate no images are being saved.	ENH14725
From the "Polls Opened Menu" verify the zero reports can be printed 3 times prior to opening of polls.	ENH14729
Verify the DS200 sounds out 2 beeps and a "successful" message displays once the scanner has been calibrated (Calibrate scanner option)	ENH14730 ENH15890 ENH15891 ENH15892
Verify that there is an audible beep as each ballot is accepted	ENH14731
Test the 5 Ballot Control settings to Query in HPM will force the prompt to the voter to either "Accept" or "Reject" ballots. Override the "Overvoted ballots and Blank ballots only" querying setting on the DS200; verify this will automatically accept ballots due to the override.	ENH14745
Verify battery status, power status, image status, election definition and open polls icons are displayed on the "Welcome screen".	ENH16085
Verify a "Failure" error and a "Successful" status display on the DS200 and in the audit log when entering an incorrect and a correct administrator password.	ENH16231
Verify at the end of an audit log and results tape the "Machine ID" and "Poll Number" are display. Verify this occurs with and without canceling the reports.	ENH16211 ENH14732
Verify the "Machine ID" and "Poll Number" display at the end of the Results tape.	ENH14732
Verify the DS200 limit of 18 precincts	ENH16382
DS200 Functional TC Scenario 2	
Verify an Early Voting election displays a Ballot Styles report option allowing the Poll workers to view each of the ballots styles assigned to that DS200.	ENH15287
View the icon bar for each of the icons on the "Welcome screen". Verify no "X" appears over the Disk Icon (indicator that images are being saved.)	ENH14725
Test the 5 Ballot Control settings to Query in HPM will force the prompt to the voter to either "Accept" or "Reject" ballots. Override the "Overvoted ballots and Blank ballots only" querying setting on the DS200; verify this will automatically accept ballots due to the override.	ENH14745
DS200 Functional TC Scenario 3	
Verify that testing in scenario 1 confirms the DS200 limit of 18 precincts (exceeding the System Limit of 10 precincts) is correctly handled through ERM.	ENH16382
DS200 Functional TC Scenario 4	
Measure and verify the "Thank you for voting" text is larger. (Compare: old v.1.3.10.0 to the new version of the DS200 firmware)	ENH15288
Time and verify the "Thank you for voting" screen displays 3 to 5 seconds longer. Compare: old v.1.3.10.0 to the new version of the DS200 firmware	ENH14726
Test an Election database and ballots with stray marks in the time track (provided by ES&S). Scan each ballot of the older DS200 version (v. 1.3.10.0) and on the new version (v.1.4.3.0). The old version will display an error "BALLOT DRAGGED/Turn Ballot Over and Try Again". The new version will accept the ballot.	ENH15418
DS200 Functional TC Scenario 5	
Test the Added Protective Counter (for Maryland). Test by recording the protected count, scan ballots, close polls and record the protected count. Using an "updated" FW version provided by ES&S, upgrade the FW on the DS200. Again note the protected count. Scan ballots and record the protected count. Close the polls and record the protected count. Restore the original FW and again note the protected count. Verify the protected count is accurate and correct on the Audit logs, Initial state and status reports	ENH17538 ENH17666

Function Tested	Enhancement/Issue ID
DS200 Functional TC Scenario 6	
Support for the Counterfeit Ballot Detection has been withdrawn. (Calibrating the Counterfeit Sensor is required in Unity 3.2.0.0 Revision 1. It is tested in Scenario 1)	ENH15009
DS200 Functional TC Scenario 7	
Test Additional language translations for the Over Vote screen by going to Regression REV01 TC Scenario 1 for testing of Overvote translations. <ul style="list-style-type: none"> Verify updated Overvote error translation text is displayed Using an On a Spanish ballot verify the following message appears when too many votes have been selected on 1 or more contests: "Correct your ballot/Corrija Su Boleta" or "Cast your ballot with errors/Emitir su boleta con errores". 	ENH16291 ENH16336 ENH16120
Field Issue 1	
Document Review of ES&S Test Results	
The DS200 was sporadically reporting a mark present in row 44 and row 45 of column D on the back of the ballot when no actual mark was present. The ballot sizes in question were the 17 inch and/or 19 inch. ES&S provided iBeta with their assessment of the issue on the DS200 FW (v.1.3.10.0) as well as their test case and fixes. Conditions to generate the problem involved a very narrow set of variables including: location of the contest from the vertical timing tracks, proximity to the top or bottom of the ballot, left side of the column oval placement, extension of the text next to the oval the edge of the allowable print area specified in the print layout manuals and feeding of the ballot skewed fashion and no selection on the last contest in column D iBeta reviewed and verified the highly unique conditions required to generate the error were identified by ES&S so that they were able to consistently repeat the error in v.1.3.10.0. The resolution of the error was consistent with the VSS, i.e. tolerance adjustments so that ballots inserted in this skewed manner would be rejected and require reinsertion. A review of ES&S test case confirmed their testing was sufficient and accepted. No additional testing is required.	BUG16775 BUG16782
EAC Scope of Certification Instructions	
Code Review of DS200 v.1.4.5.0	
Review the source code. <ul style="list-style-type: none"> Verify that no counterfeit detection functions or errors are called. (Code is disabled or removed). Verify no additional new or changed code is contained in v.1.4.5.0. 	ENH19328
DS200 Functional TC Scenario 8	
Verify that disabling counterfeit detection does not affect vote counting and reporting on the DS200. Install DS200 FW v.1.4.5.0 on the DS200, install the election database from DS200 Functional TC Scenario 1, cast the Scenario 1 ballots and confirm the DS200 correctly counts and reports the ballots cast.	ENH19328

5 Test Data

5.1 Test Data Recording

The results of testing and review to the Unity 3.2.0.0 Revision 1 voting system to the *VVSG 2005* are recorded in the test case and review forms prepared by iBeta. Electronic copies of all testing and reviews will be maintained.

5.2 Test Data Criteria

The results of the voting system tests and reviews results shall be evaluated against the documentation of the Unity 3.2.0.0 Revision 1 voting system TDP, and the requirements of the *VVSG 2005*. The changes submitted in the Unity 3.2.0.0 Revision 1 voting system shall be evaluated for performance against the standard with the expected results identified in each test case.

Test cases shall identify the election, ballot and vote inputs. Outputs shall be verified against the expected results including the ballot displays, functions initiated during voting and the precinct and summary reports.

5.3 Test Data Reduction

Test data will be processed manually.

6 Test Procedures and Conditions

6.1 Facility Requirements

All software testing and review will be performed at iBeta laboratory in Aurora. All electrical tests on the DS200 hardware was performed at the facilities of sub-contractor Criterion Technologies, Inc. Rollinsville, Colorado.

All ES&S documentation, test documentation and results will be maintained in the ES&S Unity 3.2.0.0 Revision 1 project folder on the SharePoint server. Only project assigned test personnel will have access to the repository. ES&S source code will be maintained on a separate server. Only project assigned test personnel will have access to the source code repository. Repositories are backed up daily using industry standard utilities.

6.2 Test Set-up

As part of the PCA, the ES&S Unity 3.2.0.0 Revision 1 test platform will be set-up in the manner identified in the system configuration. The test platform will be documented. Installation of the trusted build for the changes from ESSUNITY3200 will be observed and documented. Unchanged software will be installed from the ESSUNITY3200 escrow. An inventory of any accessories or preloaded applications will be documented. Conditions necessary to reproduce the test set up are contained in the Test Case and PCA Configuration documents.

6.3 Test Operations Procedures

Test cases and review criteria are contained in separate documents. They are provided to the iBeta test staff with step-by-step procedures for each test case or review conducted. Test and review instructions identify the methods for test or review controls. Results are recorded for each test or review step. Possible results include:

- **Accept:** the expected result of the test case is observed; an element of the voting system meets the *VVSG 2005*.
- **Reject:** the expected result of the test case is not observed; an element of the voting system did not meet the *VVSG 2005*.
- **Not Applicable (NA):** test or review steps that are not applicable to the scope of the current Certification are marked NA.
- **Not Testable (NT):** rejection of a previous test step prevents execution of this and subsequent test steps.

Reject, Not Applicable and Not Testable results are marked with an explanatory note. The note for rejected results contains the discrepancy number.

Issues identified in testing or reviews are logged of Unity 3.2.1.0 Revision 1 on the Discrepancy Report. Issue types include:

- **Document Defects:** a documentation element of the voting system did not meet the *VVSG 2005*. Resolution of the defect is required for certification.
- **Functional Defects:** a hardware or software element of the voting system did not meet the *VVSG 2005*. Resolution of the defect is required for certification.
- **Informational:** an element of the voting system which meets the *VVSG 2005* but may be significant to either the vendor or the jurisdiction. Resolution of Informational issues is optional. Unresolved issues are disclosed in the certification report.

Test steps are numbered and a tabulation of the test results is reported in the test case. Test operation personnel and their assignments are identified in the [Project Schedule](#). Steps necessary to reproduce the test results are contained in the Test Case documents.

7 Appendix- Test Methods

7.1 DS200 Functional Test Method

The test method description incorporates all election conditions and details as it was set up in the *Unity 3.2.1.0 DS200 Functional Test Case* and the sequence of execution identified in the [Test Case Design](#)

iBeta Definition	DS200 Functional Test Method
Test Case Name	DS200 Functional TC
Scope - identifies the type of test	<p>The changes to the DS200 submitted in Unity 3.2.0.0 Revision 1 have also been submitted in the Unity 3.2.1.0 certification test effort. Seven test scenarios are listed within this test method. Scenarios 1, 2 & 3 require execution in Unity 3.2.0.0 Revision 1 to confirm that the changes to the DS200 integrate with the ESSUNITY3200 Election Management System. . Scenarios 4 through 7 require no additional testing because they are isolated to the DS200. The ES&S Unity 3.2.1.0 test results will be use. In Unity 3.2.1.0 the election creation was performed on a Peer-to-Peer configuration (multiple PCs). In Scenarios 1, 2 & 3 election data will be copied to the ESSUNITY3200 Election Management System Stand Alone configuration. New media will be burned, ballots will be scanned on the DS200 and election results will be read into ERM. Testing shall confirm the functional changes in the DS200 firmware v. 1.4.3.0: BUG15827, ENH14725, ENH14726, ENH14729, ENH14730, ENH14731, ENH14732, ENH14745, ENH15287, ENH15288, ENH15418, ENH15890, ENH15891, ENH15892, ENH16085, ENH16211, ENH16231, ENH16382, ENH15418, ENH17538, ENH17666, ENH16120, ENH16291, ENH16336, A Document Review shall be conducted of ES&S testing of BUG16775 & BUG16782 (Field Issue 1) to confirm sufficiency.</p> <p>(Note: Support of counterfeit ballot detection ENH15009 is withdrawn. Modem functionality is not supported in this certification effort (ENH14728); and Unity 3.2.0.0 Revision 1 does not support elections in Illinois and Hawaii. Changes for EAC Scope of Certification Instructions: ENH19328 Source Code Review shall be conducted to confirm counterfeit functionality is disabled. Confirm functional change to ENH19328 does not impact vote counting and reporting.</p>
Test Objective	The objective is to validate the ES&S functional changes to the DS200 from the ESSUNITY3200 certified baseline. These changes were submitted in Unity 3.2.1.0. Scenario 1 through 3 shall confirm that the same results from Unity 3.2.1.0 are observed. Unity 3.2.1.0 results from document reviews and testing conducted in Scenarios 4 through 7 shall be used.
Test Variables: Volume Stress Performance Error Recovery	<p>Scenario 1: Reuse the Illinois Open Primary without Party Preference election defined in the Unity 3.2.1.0 test effort with the following settings. (This was modified to Idaho as a result of discrepancies 1 and 2): ENH16382•18 Precincts election day and 1 Polling Place 9 District Types (this does not including Countywide) 18 District Name (two contests to ac district name) 18 ballot style (each precinct has its own ballot style) 14" 36 "standard 14" ballot 2 Partisan contest per style 4 candidates per contest (2 candidates per party for the mayor contest, 4 candidates for the Senator contest (total of 216 candidates) Write-ins (1 for the Mayor and 2 for the Senator race) DEM and REP Parties ENH14745 & BUG15827•The Scanner Options •Diverter is set for "Overvoted Write-ins & Blank Ballots". •Ballot Control is set to Query for "Overvoted ballots, Cross voted ballots, Unreadable marks, Undervoted ballots and blank ballots" ENH14725•The DS200 scanner options are set to "Do not save any ballot images" Run Election set up reports in EDM</p> <p>Scenario 2: Same as Scenario 1 except: ENH15287 •Changes "election day" to "early voting" in HPM by selecting the "Include all Precincts" option. The early voting option allows the Poll worker to view ballot styles for that specific ballot box. ENH14725• The DS200 scanner options are set to "save all ballot images"</p> <p>Scenario 3: Use Scenario 1 test results: ENH16382•DS200 18 precincts Election Day can exceed the declared System Limit of 10 precincts.</p> <p>Scenario 4: Reuse Unity 3.2.1.0 test results ENG15418 •ES&S will provide ballots with speckling. Use the DS200 Functional S1 election. Each ballot will contain stray marks in the time track (left hand side of the ballot). Marks will emulate various levels of white speckling. Ballot will be read on DS200 with v. 1.3.10.0 and re-read on version 1.4.3.0 ENH14726 & ENH15288 •After scanning a valid ballot, time how long the "Thank you for voting" screen displays. Note the time. Measure the font (text) on the "Thank you for voting" screen display. Note the size. Change firmware version and repeat test. Compare times and sizes.</p> <p>Scenario 5: Reuse Unity 3.2.1.0 test results ENH17538 & 17666: •Only testing the Protective Counter</p>

iBeta Definition	DS200 Functional Test Method
	<p>(for Maryland). Do not need the ballot box. ES&S will provide an "updated" FW version that will have a different version number. To test, begin scanning ballots. Upgrade the firmware with the FW provided by ES&S. Continue with voting. When the voting is complete, Verify the counter did not reset or lose count and the counter appears in the printed reports. Restore the DS200 to the original firmware version. Verify the counter did not lose count.</p> <ul style="list-style-type: none"> •Note the counter number from the DS200 and the Initial State report • Load the election and scan a few (2 to 5) ballots, close the polls and note the counter in the results report and audit log. •Upgrade the firmware, note the counter on the Initial State report. •Re-burn the media for the S1 election, load the election, and scan more ballots. •Close the polls. Examine the protected counter on the DS200, Audit log and the Results report. •Restore to the original firmware version. • Verify the protected counter did not lose count. <p>Scenario 6: ENH15009 (ES&S has withdrawn counterfeit ballot detection functionality)</p> <p>Scenario 7: Use the Unity 3.2.1.0 test results In Regression REV01 TC Scenario 1 the Overvote translations match ENH16291/16336.</p> <p>Scenario 8: ENH19328 Use the scenario 1 election database and ballots to confirm disabling counterfeit detection does not effect vote counting and reporting</p>
A description of the voting system type & operational environment	<p>The Unity 3.2.0.0 Revision 1 EMS is a single PC</p> <ul style="list-style-type: none"> • DS200 Precinct Count scanner • Steel ballot box with diverter
VVSG 2005 vol. 1	2.1.5.1.b I thru vii, c, 2.1.6, 2.1.7.2, 2.2.1, 2.2.1.3, 2.3.1 thru 2.3.1.2, 2.1.4.j, 2.2.4, 2.3.3.1.b,c,d, 2.3.3.2, 2.4.1.b, 2.4.3, 2.4.2 thru 2.4.3, 4.1.5.1.d, 4.1.6.1, 4.1.8 thru 4.1.8
VVSG 2005 vol. 2	<p>6.2, 6.2.1, 6.2.2, 6.3, 6.6, 6.7</p> <p>A4.3.5 Volume (maximum and exceeding more than the maximum number of precincts in a Polling Place)</p> <p>A4.3.5 Volume/Stress (Processing, storing and reporting data when overloading the number of precincts in a Polling Place)</p> <p>A4.3.5 Performance/Recovery (Ballot format handling capability-graceful shut down and recovery without loss of data)</p> <p>A4.3.5 Performance/Recovery (Processing rates-graceful shut down and recovery without loss of data)</p>
Hardware, Software voting system configuration and test place	<p>The Unity 3.2.0.0 Revision 1 Voting System consists of the following: Audit Manger (AM), Election Data Manger (EDM), ES&S Ballot Image Manager (ESSIM), Hardware Program Manger (HPM), Model Election Reporting Manager (ERM), LogMonitor Service.</p> <p>1 @ DS200 1-DS200 starting with version 1.3.10.0 and upgrade to version 1.4.3.0 (upgrade required for Scenario 5)</p> <p>1 Steel ballot box with diverter</p>
Pre-requisites and preparation for execution of the test case.	<p>Complete the prerequisites:</p> <p>Retrieve the election data databases archived from the DS200 Functional Test Case in Unity 3.2.1.0,</p> <p>Scenario 2 Rev 02</p> <ul style="list-style-type: none"> • Copy the Unity contents from the archive for scenario 1 into the Standalone PC. • Copy the Unity and Elecdata contents from the archive for scenario 2 & 3 into the Standalone PC. <p>Scenario 8: ENH19328 Review the source code. Confirm code changes are restricted to counterfeit related functionality and the code is disabled or removed for calls to:</p> <ul style="list-style-type: none"> • 163 Counterfeit Calibration Menu Accessed • 164 Counterfeit Calibration Started • 165 Counterfeit Calibration Success • 166 Counterfeit Calibration Fail • 167 Counterfeit Multiplier Selected • 168 Counterfeit • 231 Counterfeit detection
Getting Started Checks	<p>Getting Started: Complete the prerequisites;</p> <p>Check the voting system to:</p> <ul style="list-style-type: none"> • Verify the test environment and system configuration is documented in the PCA Configuration and matches the system used in the 48 hr. temp & power variation test and vendor described configuration. Validate installation of the witnessed build. • Testers understand that no change shall occur to the test environment without documentation in the test record and the authorization of the project manager • During testing an operational readiness test was performed.

iBeta Definition	DS200 Functional Test Method
	<ul style="list-style-type: none"> The environment is set up as a standalone configuration.
Documentation of Test Data & Test Results	<p>Test Data:</p> <ul style="list-style-type: none"> Record all programmed & observed election, ballot & vote data fields and field contents on the corresponding tabs to provide a method to repeat the test. Preserve all tabs for each instance the test is run. <p>Test Results:</p> <ul style="list-style-type: none"> Enter Accept/Reject on the Test Steps. In Comments enter any deviations, discrepancies, or notable observations. Log discrepancies on the Discrepancy Report and insert the discrepancy number in the Comments field of Test Step.
Volume: Paper-based voting systems Processing	<p>Ballot Prep:</p> <p>Scenario 1) Create DS200 media with the previously defined Test Variables for Scenario 1</p> <p>Scenario 2) Same as scenario 1 except early voting and ballot images are saved</p> <p>Scenario 3) Use scenario 1 test results to confirm exceeding the declared system limit of 10 precincts do not cause system errors or if there are any system errors that cause the EMS ballot preparation applications to crash then verify the applications recover without any loss of data. If no error is given prior to leaving HPM continue the test through ERM; verify there are no system errors. .</p> <p>Scenario 4, 5 & 7) Reuse of Unity 3.2.1.0 testing results</p> <p>Scenario 6) ENH15009 (ES&S has withdrawn counterfeit ballot detection functionality).</p> <p>Scenario 8) ENH19328 same as scenario 1</p>
Volume:	<p>Scenario 3: ENH16382•Use scenario 1 test results to confirm when exceeding the declared system limit of 10 precincts Overloading systems capacity to process, store, and report data.):</p> <ul style="list-style-type: none"> Overloading the HPM with more than the declared number of precincts in a single polling place.
Stress	<p>Scenario 3: ENH16382•Use scenario 1 test results to confirm when exceeding the declared system limit of 10 precincts the system responses to overloading conditions</p>
Performance	<p>Scenario 3: ENH16382•Use scenario 1 test results to confirm when exceeding the declared system limit of 10 precincts there is no system degradation (Ballot format handling capability and Processing rates):</p> <ul style="list-style-type: none"> The system does not slow down throughout the testing
Error Recovery	<p>Voting system gracefully shuts down (no crash) and recovers from errors caused by overloading the number of precincts and ballots styles.</p> <ul style="list-style-type: none"> Processing capabilities-graceful shut down and recover without loss of data Critical Status Messages
Readiness Testing and Poll Verification	<p>Scenario 1: Voting system is ready for the election: Verify the voting system is ready for the election:</p> <ul style="list-style-type: none"> The election is correctly installed (Election ID, polling place name, precincts) . Test data (run a precinct to validate the system is ready) is segregated from voting data, with no residual effect'. <p>Test confirmation that there are:</p> <ul style="list-style-type: none"> No hardware/software failures. The device is ready to be activated to accept votes (No Identification of any failures & corrective action)•Run 1 precinct to validate the system is ready; confirm the test data is segregated from voting data, with no residual effect. Verify totals and audit logs. <p>ENH14729•"Polls Opened Menu": Print the zero reports (first of 3 zero reports prior to opening of polls)</p> <p>ENH16231•a "Failure" error and a "Successful" message are displayed on the DS200; the audit log displays the Failure and Successful PW login attempts.</p> <p>ENH14730•2 beeps and a "successful" message displays once the scanner has been calibrated (Calibrate scanner option).</p> <p>ENH14730 (15891, 15890, 15892)•Calibrate the counterfeit sensor; 2 beeps and a "successful" message displays (testing that only the counterfeit sensor can be set up as required, a message is displayed as well as 2 beeps can be heard once the counterfeit sensor has been successfully calibrated).</p> <p>ENH14729•The zero report can be printed. (2nd of 3 zero reports prior to opening the polls) The report continually displays zeros for the contest, candidates, precincts (all 18), under/overvotes and Write-Ins.</p> <p>ENH15287•The "Polls Opened Menu" doesn't display a "Ballot Style Report" button. (this displays only for Early Voting)</p> <ul style="list-style-type: none"> Scan pre-election test ballots, <p>ENH14745 • Select the options to override Overvoted ballots and Blank ballots only, do not select any other options. Overvoted and Blank ballots will not prompt an "Accept" or "Reject" message to the voter. The ballots will automatically be accepted due to the override. The Cross voted, Undervoted and unreadable ballots will provide a prompt to "Accept" or "Reject" and the voter will be required to make a selection</p> <ul style="list-style-type: none"> Tally pre-election test ballots; ballots match the predicted results outlined in the test case <p>ENH14732 & ENH16211•run the results tape; at the end of the Results tape and audit log they display the "Machine ID" and "Poll Number"</p>

iBeta Definition	DS200 Functional Test Method
	<p>Scenario 2: Reuse the same election as Scenario 1 except with the changes noted in the Scenario 2 Voting Variations</p> <p>ENH15287 • Verify the Ballot styles report button on the "Open Polls Menu" screen displays in the upper right hand of the icon bar and the report is accurate.</p> <p>ENH14745 Reset "Override" options: Selection the options to override (undervotes and crossover ballots) Verify ballots will automatically be accepted due to the override and "Overvoted W/I ballots", "Unreadable marks", and "Blank Ballots" will provide a prompt to "Accept" or "Reject" and the voter will be required to make a selection</p> <p>ENH14730 • Unplug the DS200 from the ballot box verify 2 beeps are heard. Print a zero report and open printer door while printing is occurring. Verify printing will stop and DS200 will beep two times</p> <p>Scenario 3: •Verify scenario 1 is correctly handled by the system with 18 precincts (exceeding the declared system limit of 10 precincts).</p> <p>Scenario4, 5 & 7 Reuse Unity 3.2.1.0 test results</p> <p>Scenario 6: ENH15009 ES&S has withdrawn the detection of counterfeit ballots.</p> <p>Scenario 8: ENH19328 Run checks from scenario 1 (ENH14730 (15891, 15890, 15892) is not observed)</p>
Pre- vote: Opening the Polls Verification	<p>Verify the polling place voting system for scenario 1, 2 & 3:</p> <ul style="list-style-type: none"> - Zero count report has no results. All test results have been zeroed out during readiness testing. - Election identification including, Election Name/ID, Precinct ID/Name, Firmware Version
Voting: Ballot Activation and Casting Verifications	<p>Scenario 1: Using the predetermined vote pattern, reuse previously marked ballots from Unity 3.2.1.0 and scan ballots.</p> <p>ENH16231 • attempt to reopen Polls using an incorrect and a correct password. Verify message appears on DS200 and in audit log.</p> <p>ENH14729 •Clear pre-election readiness test totals and run another zero report</p> <p>ENH14745 •Reset the "Override" options. Selecting the options to override Overvoted ballots and Blank ballots only, do not select any other options. Overvoted and Blank ballots will not prompt an "Accept" or "Reject" message to the voter. The ballots will automatically be accepted due to the override. The Cross voted, Undervoted and unreadable ballots will provide a prompt to "Accept" or "Reject" and the voter will be required to make a selection</p> <p>ENH14725 & ENH16085 •View the icon bar for each of the icons on the "Welcome screen". Verify an X appears on over the disk icon to indicate no images are being saved. Verify ballot status, power status, image status, election definition and open polls icons are displayed.</p> <p>ENH16382 •vote ballots for all 18 precincts and verify the ballots for all 18 precincts are accepted without a precinct error</p> <p>ENH14731 •Verify that there is a beep as each ballot is accepted</p> <p>ENH15288 • Measure and verify the "Thank you for voting" text is larger. (Compare using old v.1.3.10.0 and new v.1.4.3.0 DS200 firmware)</p> <p>ENH14726 •Time and verify the "Thank you for voting" screen displays 3 to 5 seconds longer. (Compare using old v.1.3.10.0 and new v.1.4.3.0 DS200 firmware)</p> <p>ENH14725 •The Welcome screen displays the Disk icon (on the icon bar) has a small red X (not saving ballot images)</p> <p>ENH16085 • Verify the Welcome screen displays the following on the icon bar, "Battery Status Indicator Icon, AC Power Status Indicator Icon, Image Saving Status Indicator Icon, Election Definition Status Icon"</p> <p>Scenario 2: ENH14725 •View the icon bar for each of the icons on the "Welcome screen". Verify no X appears on/ over the disk icon to indicate images are being saved. All early voting ballots can be scanned without error into the correct ballot bin</p> <p>Scenario 3: ENH16382•Use scenario 1 test results to confirm exceeding the declared system limit of 10 precincts</p> <p>Scenario 4: Reuse Unity 3.2.1.0 test results</p> <p>ENG15418 •ES&S will provide ballots with speckling. Each ballot will contain stray marks in the time track (left hand side of the ballot). Marks will emulate various levels of white speckling. Ballot will be read on DS200 with v. 1.3.10.0 and re-read on version 1.4.3.0.</p> <ul style="list-style-type: none"> •Scan ballots <p>ENH14726: After scanning a valid ballot, time how long the "Thank you for voting" screen displays. Note the time.</p> <p>ENH15288: After scanning a valid ballot, measure the font (text) on the "Thank you for voting" screen displays. Note the size.</p> <p>Change the firmware version on the DS200 and scan ballots</p> <p>ENH14726: After scanning a ballot, time how long the "Thank you for voting" screen displays. Note the time.</p>

iBeta Definition	DS200 Functional Test Method
	<p>ENH15288: After scanning a ballot, measure the font (text) on the "Thank you for voting" screen displays. Note the size.</p> <p>Scenario 8: ENH19328 Reuse scenario 1 ballots and scan ballots</p>
<p>Voting: Voting System Integrity, System Audit, Errors & Status Indicators</p>	<p>The system audit provides a time stamped, always available, report of normal/abnormal events found within the percentage of sampled test</p> <p>Error messages are.</p> <ul style="list-style-type: none"> - Generated, stored and reported as they occur. - Errors requiring intervention by the voter or poll worker are clearly display issues and action instructions in easily understood non-technical text language or with indicators. - The text for any numeric codes is contained in the error or affixed to the inside of the voting system. - Incorrect responses will not lead to irreversible errors. - Nested conditions are corrected in the sequence to restore the system to the state before the error occurred <p>Status Messages:</p> <ul style="list-style-type: none"> - Display and report critical status messages using unambiguous indicators or English language text. - Non-critical status messages are displayed but do not have to be at the time of occurrence and may be numerical codes for subsequent interpretation and reported in unambiguous text. . - Status messages are part of the real-time audit record. <p>Scenario 4: Reuse Unity 3.2.1.0 test results</p> <p>ENH15418 •Using a ballot with an estimated 10% of the timing track scratched out. Scan each ballot of the older DS200 version (v. 1.3.10.0) and on the new version. The old version will display an error the new version will allow the scanning of the ballot.</p> <p>ENH15418 •Using a ballot with an estimated 50% of the timing track scratched out. Scan each ballot of the older DS200 version (v. 1.3.10.0) and on the new version. The old version will display an error the new version will allow the scanning of the ballot.</p> <p>ENH15418 •The white marks (speckles) in the ballot time track will display error "BALLOT DRAGGED/Turn Ballot Over and Try Again" on version 1.3.10.0. (Cause: The ballot did not enter the feed mechanism smoothly, which caused misalignment during scanning.) .</p> <p>End of Scenario 4 testing</p> <p>Scenario 5: Reuse Unity 3.2.1.0 test results.</p> <p>ENH17538 & 17666:</p> <ul style="list-style-type: none"> • Scan a few (2 to 5) ballot, close the polls and note the counter in the results report and audit log. •Upgrade the firmware and note the counter on the Initial State report. •Re-burn the media for the S1 election, load the election, and scan more ballots. •Close the polls. •Examine the protected counter on the DS200, Audit log and the Results report. •Restore to the original firmware version and verify the protected counter did not lose count. <p>End of Scenario 5 testing</p> <p>Scenario 6: ENH15009 ES&S has withdrawn the detection of counterfeit ballots.</p> <p>Scenario 7 - Reuse results from Unity 3.2.1.0 to confirm ENH16291/16336 Overvote translations have been updated. End of Scenario 7 testing.</p> <p>Document Review of ES&S Testing. BUG16775 & BUG16782 (Field Issue 1)</p> <p>Review the ES&S assessment, resolution and testing regarding the DS200's sporadic reporting of a mark in row 44 and row 45 of column D (back of the ballot) when no actual mark was present. Review the assessment of the issue on the DS200 FW (v.1.3.10.0) to confirm that it identified:</p> <ul style="list-style-type: none"> • A very narrow set of specific variables required to generate the error. • ES&S demonstrated they were able to consistently and reliably repeat the error; and. • ES&S' resolution was consistent with the VSS. <p>Review the resolution testing to confirm that the testing included all conditions and was sufficient to accept without additional testing by iBeta.</p> <p>Variables Identified: Location of the contest from the vertical timing tracks, proximity to the top or bottom of the ballot, left side of the column oval placement, extension of the text next to the oval the edge of the allowable print area specified in the print layout manuals, and insertion in a skewed fashion of ballots with no selection on the last contest in column D.</p> <p>Resolution: Tolerance adjustments such that ballots with these unique variables inserted in a skewed manner will be rejected and require reinsertion.</p>
<p>Post-vote: Closing the Polls</p>	<p>Scenario 1: Once the polls are closed the voting system</p> <ul style="list-style-type: none"> • Printed reports of ballots counted by tabulator • Reported votes match predicted votes from tabulator with votes and undervotes. • In the polling place print the summary report with all of the 18 precincts in a single polling place. <p>ENH16211 •Cancel printing of audit log only and view the log displays for the "Machine ID" and "Poll Number".</p>

iBeta Definition	DS200 Functional Test Method
	<p>Print audit log</p> <ul style="list-style-type: none"> • totals match the predicated reports (using the vote tab) <p>ENH16211 •Audit Log stops printing after cancellation and displays the "Machine ID" and "Poll Number" at the end of the Audit Log</p> <ul style="list-style-type: none"> •the Audit Log can be re-printed. The audit log will display the history of this election. The pretest and the election day audit log matches the pre-election activities outlined above. <p>ENH15827 •Overvoted Write-in ballots and blank ballots were separated from the other ballots</p> <p>Scenario 2</p> <ul style="list-style-type: none"> • Same as Scenario 1 excluding the listed enhancements <p>Scenario 3:</p> <p>ENH16382•Use scenario 1 test results to confirm exceeding the declared system limit of 10 precincts</p> <p>Scenario 6: ENH15009 (withdrawn counterfeit ballot detection),</p> <p>Scenario 8: ENH19328 Review the report and confirm the results are the same as Scenario 1.</p>
Post-vote: Central Count	<p>Scenario 1: ERM Zero report is printed and no totals display on the report prior to reading in the results. ERM: Vote Consolidation:</p> <p>ENH14725 • attempt to upload DS200 ballot images and a message displays stating no images saved. Ballot images from the DS200 CANNOT be extracted/ viewed. The image was not saved in HPM. (Ballot images not saved was set in Test Variables)</p> <ul style="list-style-type: none"> •Votes match predicted votes (compare to vote tab. Vote tab is what was used to create paper ballots) • reports will display election identification • EL30A - Precinct Report–Group Detail, individual precincts & contest results. • Precinct Report contains votes, undervotes & overvotes • EL45- Election Summary, total number of votes for each candidate/question • Verify DS200 SN is displayed in ERM, once the USB flash drive is read into ERM • Ensure audit logs are accurate & complete. <p>Scenario 2: Same as Scenario 1 except ENH14725 • Upload DS200 ballot images. Ballot images from the DS200 can be extracted. The image was saved in HPM. (Ballot images saved was set in Test Variables)</p> <p>Scenario 3:</p> <p>ENH16382•Use scenario 1 test results to confirm exceeding the declared system limit of 10 precincts</p> <p>Scenario 8: ENH19328 Transfer results to central count, report and confirm the results are the same as Scenario 1.</p>
Expected Results are observed	<p>Review the test result against the expected result:</p> <ul style="list-style-type: none"> • Accept: the expected result is observed • Reject: the expected result of the test case is not observed • Not Testable (NT): rejection of a previous test step prevents execution of this step, or tested in another TC. • Not Applicable (NA): not applicable to test scope
Record observations and all input/outputs for each election;	<p>All inputs, outputs, observations, deviations and any other information impacting the integrity of the test results will be recorded in the test case.</p> <ul style="list-style-type: none"> • Any failure against the requirements of the EAC guidelines will mean the failure of the system. And shall be reported as such • - Failures will be reported to the vendor as Defect Issues in the Discrepancy Report. • The vendor shall have the opportunity to cure all discrepancies prior to issuance of the Certification Report. • If cures are submitted the applicable test will be rerun. Complete information about the rerun test will be preserved in the test case. The cure and results of the retest will be noted in the - Discrepancy Report and submitted as an appendix of the Certification Report. • Operations which do not fail the requirements but could be deemed defects or inconsistent with standard software practices or election practices will be logged as Informational Issues on the Discrepancy Report. It is the vendor's option to address these issues. Open items will be identified in the report.

7.2 DS200 Environmental Hardware Test Method

The test method description incorporates the assessment, test conditions and details as it was set up in the *Unity 3.2.1.0 Environmental Hardware Test Case* and the engineering changes are listed in the [Test Case Design](#)

Method Detail	Environmental Test Method
Test Case Name	Environmental Test Case
Scope - identifies the type of test	<p>Assessment and testing of the hardware of the DS200 from ESSUNITY3200:</p> <p>Identify and assess hardware changes from the certified baseline and engineering change orders to determine the extent of testing required, including execution and the provision of test results as required.</p> <p>This set of hardware environmental test cases is outside the scope of iBeta's VSTL accreditation. Electrical testing was performed by Criterion Laboratories NVLAP #100396-0 (Electrical) with supervision of testing by iBeta. iBeta reviews and documents test records, results and reports to confirm testing was performed under an appropriate mode as a voting system and to determine acceptance or rejection of some or all testing</p>
Test Objective	<p>Validation of the Unity 3.2.0.0 Revision 1 (identical to Unity 3.2.1.0) DS200 hardware to meet the Non-Operating/Operating Environmental test standards of the EAC VSS 2002/VVSG 2005, including:</p> <p>DS200 Assessment of the ECOs from the ESSUNITY3200 baseline to verify reuse of the Non-Operating Transportation and Storage test results from ESSUNITY3200 and test execution of the Operating Electrical tests.</p>
Test Variables:	<p>Use the test results from testing in Unity 3.2.1.0:</p> <p>DS200 - Electrical ECOs from the ESSUNITY3200 baseline (identical to Unity 3.2.1.0) impact on operation</p> <ul style="list-style-type: none"> • Power disturbance disruption - IEC 61000-4-11 (1994-06). • Electromagnetic radiation- FCC Part 15 Class B requirements - ANSI C63.4. • Electrostatic disruption - IEC 61000-4-2 (1995-01). • Electromagnetic susceptibility - IEC 61000-4-3 (1996). • Electrical fast transient protection - IEC 61000-4-4 (1995-01).(2004-02) • Lightning surge protection - IEC 61000-4-5 (1995-02). • RF immunity - IEC 61000-4-6 (1996-04). • AC magnetic fields RF immunity - IEC 61000-4-8 (1993-06). <p>DS200, reuse the certified baseline in the Unity 3.2.0.0 Test Report- (ECOs have no impact)</p> <p>MIL-STD810-D:</p> <ul style="list-style-type: none"> • High temperature method 501.2 Procedures I-Storage maximum 140 F degrees • Low temperature method 502.2, Procedure I-Storage minimum -4 F degrees • Temperature & power variations method 501.2 & 502.2 • Humidity method 507.2 • Vibration method 514.3-1 Category 1 Basic Transportation Common Carrier • Bench handling method 516.3 procedure VI • Safety OSHA CFR Title 29, part 1910
A description of the voting system type and the operational environment	Precinct Count scanner/tabulator: Model 200 (DS200)
VSS 2002 vol. 1	3.2.2 thru 3.2.2.14, 3.4.8
VSS 2002 vol. 2	4.6.1.5 thru 4.7.1 & 4.8 RFI 2008-01, 2008-05, 2008-06, 2008-09, 2008-10
Hardware, Software voting system configuration and test location	<p>DS200 Electrical Testing Test Location: Criterion Labs, Rollinsville CO</p> <ul style="list-style-type: none"> • iBeta provided Criterion with the environmental hardware test case outlining methods for preparation of their test plan; iBeta documented the configuration, test environment, lab accreditations, tester qualifications, and operational status check performance <p>iBeta personnel execute the operational status checks and operate the equipment as a voting system during the EMI/EMC test execution.</p>
Pre-requisites and preparation for execution of the test case.	<p>DS200 Electrical Testing: Complete the prerequisites;</p> <ul style="list-style-type: none"> • Validation and documentation of the subcontractor test labs' NVLAP accreditation in the specific test method identified in the Test Variables • Record the testers & date • System has been set up as identified in the user manual • Gather any necessary materials or manuals.

Method Detail	Environmental Test Method
	<ul style="list-style-type: none"> • Ensure customization of the test case template is complete • The iBeta approved Operational Status Check script is provided that includes: <ul style="list-style-type: none"> ○ Checking the operation of all buttons, switches and lights ○ Opening the polls & running a zero totals report ○ Checking appropriate error conditions for correct prompts or responses. (Error conditions will depend upon the type of equipment being tested.) ○ Accessibility features are operational. ○ Power off and on with no loss of function. <p>Close the polls and print all reports. (Totals & Audit Logs)</p>
Getting Started Checks	<p>DS200 Electrical Testing: Check the voting system to:</p> <ul style="list-style-type: none"> • Verify the test environment and system configuration is documented in the PCA Configuration and matches the vendor described configuration. • Validate installation of the Trusted Build • Testers understand that no change shall occur to the test environment without documentation in the test record and the authorization of the project manager • Confirm the tester understands the recording requirements of the iBeta test case • Operational status check procedures are available and successfully run <p>An automated script to loop system operation for use during the EMC operational tests exercises all necessary functionality.</p>
Documentation of Test Data & Test Results	<p>DS200 Electrical Testing: Test Results:</p> <ul style="list-style-type: none"> • Enter Accept/Reject on the Test Steps • In Comments enter any deviations, discrepancies, or notable observations <p>Log discrepancies on the Discrepancy Report and insert the number in the Comments</p>
Standard Environmental Tests	<p>DS200 Electrical Testing: Follow the test methods in all of the international electrical standards listed above to executed the EMC tests</p>
Expected Results are observed	<p>DS200 Electrical Testing: Review the test result against the expected result:</p> <ul style="list-style-type: none"> • Accept: the expected result is observed • Reject: the expected result of the test case is not observed • Not Testable (NT): not testable; provide a reason in the comments • Not Applicable (NA): not applicable to test scope
Record observations and all input/outputs for each election;	<p>DS200 Electrical Testing: All test results will be recorded in the test case</p> <p>Any failure against the requirements will mean the failure of the system and shall be reported as such. Failures will be reported to the vendor as Defect Issues in the Discrepancy Report. The vendor shall have the opportunity to cure all discrepancies prior to issuance of the Certification Report. If cures are submitted the applicable test will be rerun. Complete information about the rerun test will be preserved in the test case. The cure and results of the retest will be noted in the Discrepancy Report and submitted as an appendix of the Certification Report</p> <ul style="list-style-type: none"> • Operations which do not fail the requirements but could be deemed defects or inconsistent with standard software practices or election practices will be logged as Informational Issues on the Discrepancy Report. It is the vendor's option to address these issues. Open items will be identified in the report